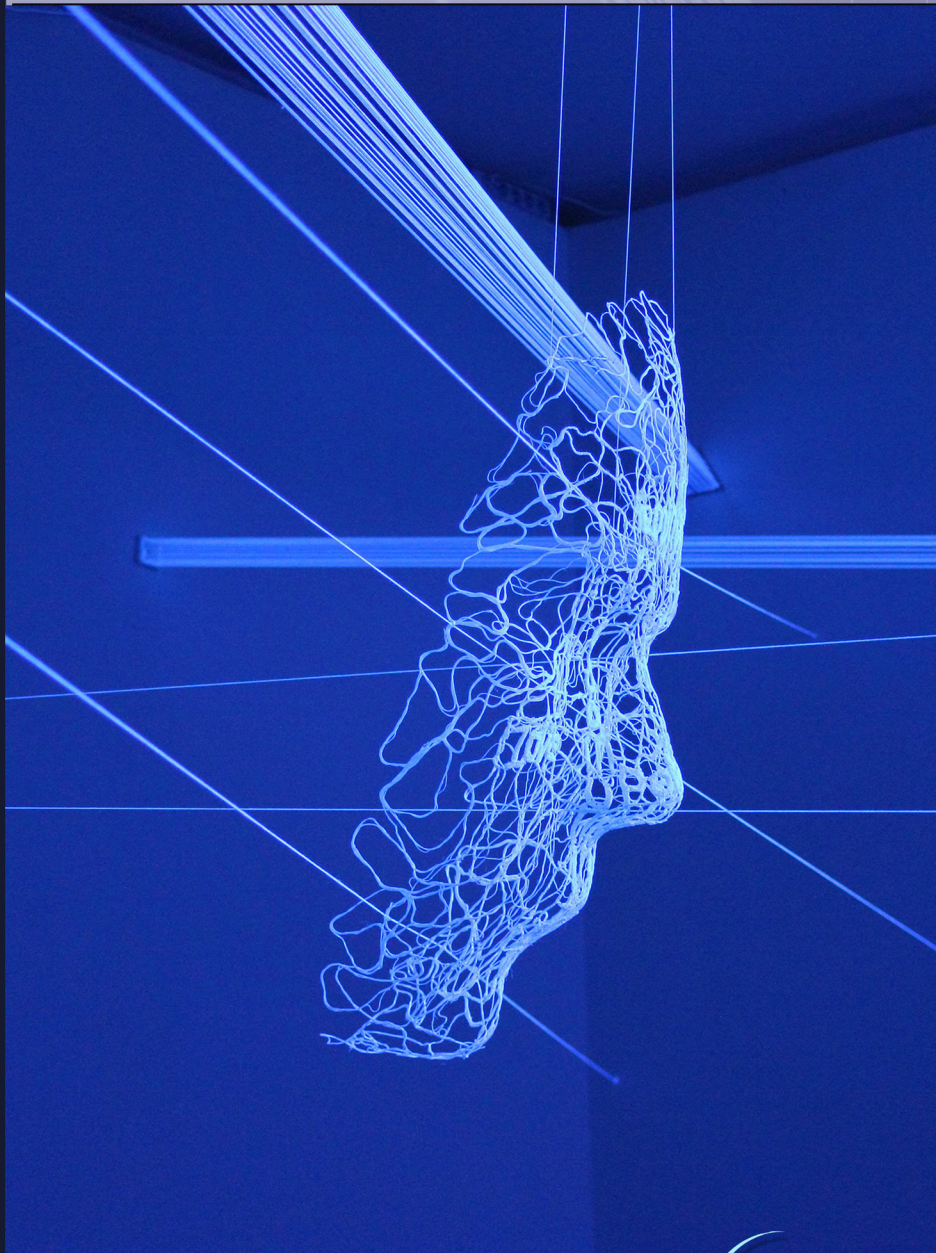


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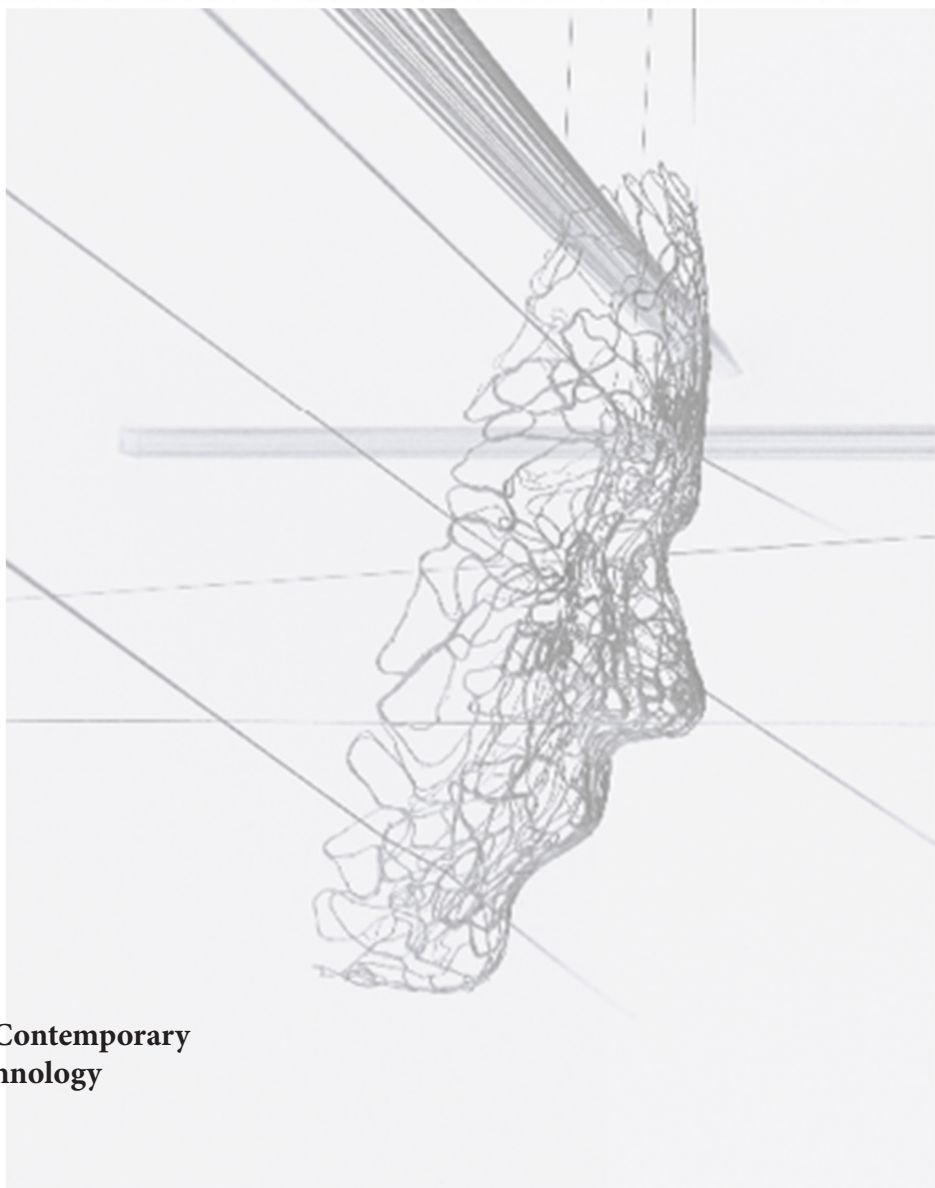
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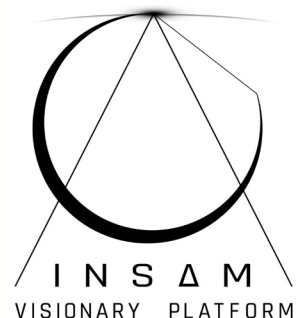
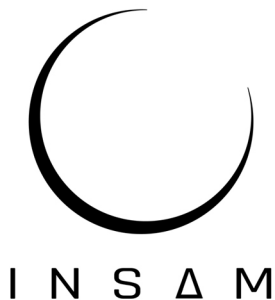


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EDITOR'S FOREWORD

The first issue of the INSAM Journal of Contemporary Music, Art and Technology in 2024 is dedicated to the main theme titled "Artificial Intelligence in Music, Arts, and Theory Revisited". In our second issue (I/2019), we explored the intersection of artificial intelligence in music, arts, and theory. Now, after ten issues and significant global events that have reshaped our perspectives and artistic endeavors, we believed it was time to revisit this compelling subject.

There are three articles in the Main theme section that shed new light on this particularly current subject. While aiming to provide a case for a balanced approach to use of AI tools in music, in his paper David Atanacković explores the difference between generative and assistive AI in music. The author does so by presenting various systems and software that are in use today, and by pointing out their features as well as the unavoidable ethical concerns. With a firm interest in the labor aspect of the utilization of AI in music, Srđan Atanasovski introduces the concept of post-work in the analysis of artistic work. Here, the thesis emerges that AI is not dangerous to creativity per se, but that it "challenges is the concept of art as a process, completely devaluing artistic work and portraying it as entirely redundant, meaningless, something easily reproducible with a single click" (p. 41). In the final article in this section, Hana Tiro raises a debate around research, data collection and knowledge production in the age of AI and particularly ChatGPT. As expected, these new tools especially impact the research in arts and humanities, which is specifically highlighted in this paper.

The paper published in the Beyond the Main theme rubric, written by Sergio Miranda-Bonilla, opens up the window to the intersections between metal music studies and technology. Namely, in this article, the author explores the evolution of signal processing technologies for electric guitar in rock and metal, viewing it through the lens of metasimulacrum, which clearly builds on Baudrillard's famous concept.

The Review sections contains two contributions with regards to new publications and events. Aida Adžović assesses a fresh electronic publication coming

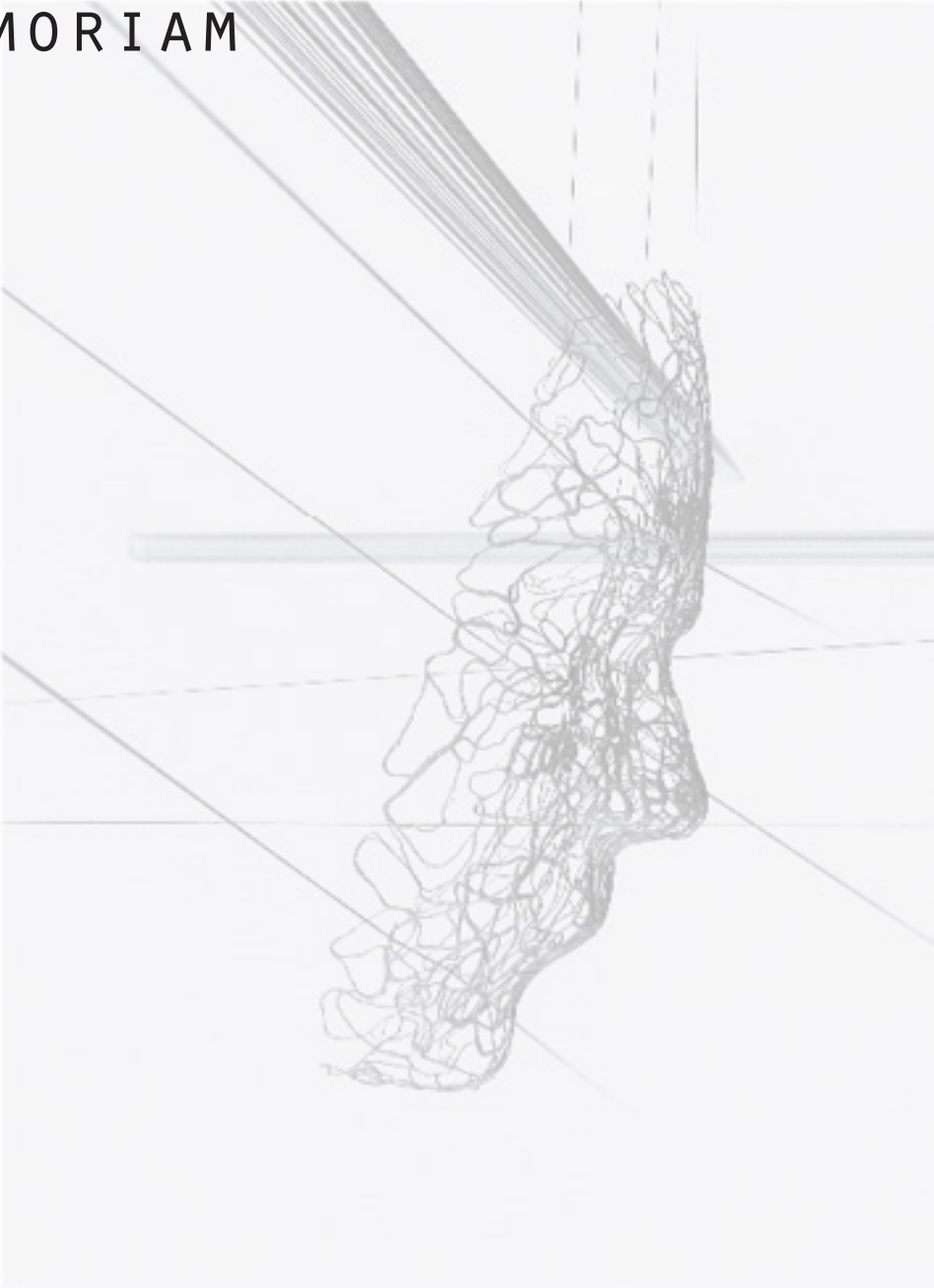
from a group of authors from Novi Sad, which deals with the history of punk music in this Serbian town. On the other hand, Monika Novaković gives a detailed report following the Ninth International Conference on Music and Minimalism that was held in Belgrade from May 29th to June 1st.

As always, we would like to thank the authors who shared their research via our platform, the reviewers for their diligence and goodwill to work on the articles, as well as our proofreader and language editor, Anthony McLean.

Finally, with the heaviest of hearts, the Editorial Team of the INSAM Journal is saying goodbye to our precious designer Milan Šuput (1983–2024), who envisioned and realized the visual identity of our journal in line with our ideas and goals. This and all the upcoming issues will carry in themselves Milan's passion, expression, meticulousness, and love. We are eternally grateful to have had an opportunity to work with him.

In Belgrade, July 12, 2024,
Dr. Bojana Radovanović,
Editor-in-Chief

IN MEMORIAM



*The sound of thunder, although deafening, is harmless;
the rainbow, despite its brilliant colors does not last;
this world, though it appears pleasant, is like a dream (...).*

— A. Helwa (Jetsun Milarepa)

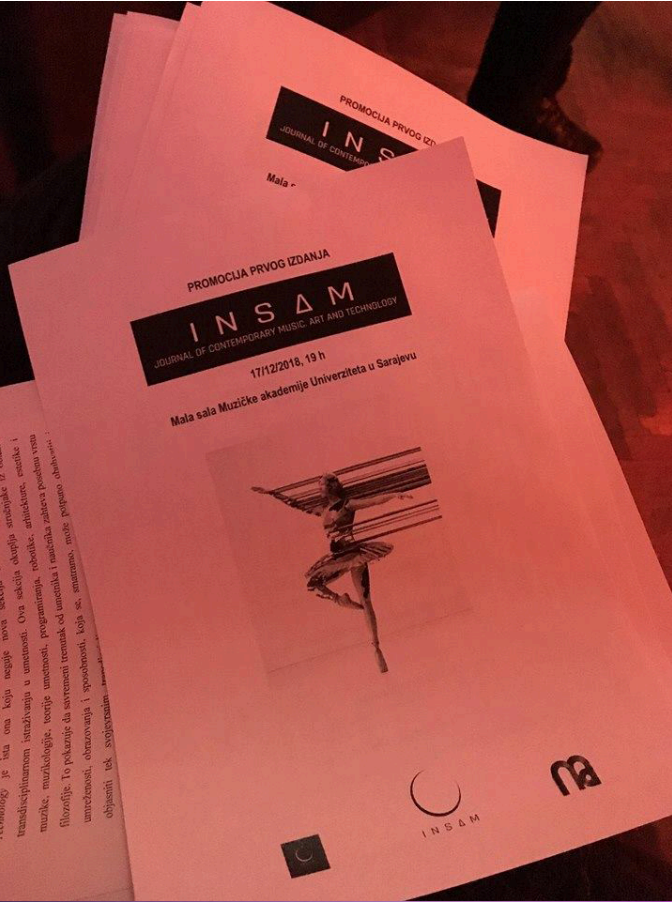


Milan Šuput

(November 24, 1983 – June 24, 2024)

We are eternally grateful for your generosity, friendship, shared moments, pleasant cooperation, and hearty support for everything we do.

Your friends from the INSAM Institute



MAIN THEME:

ARTIFICIAL INTELLIGENCE
IN MUSIC, ARTS, AND THEORY
REVISITED



David Atanacković*

*Faculty of Music, University of Arts
Belgrade, Serbia*

ARTIFICIAL INTELLIGENCE: DUALITY IN APPLICATIONS OF GENERATIVE AI AND ASSISTIVE AI IN MUSIC

Abstract: This paper explores the multifaceted role of Artificial Intelligence in the field of music, more specifically, examining the positives and negatives of generative and assistive capacities. Artificial Intelligence (AI) in music involves the application of computational techniques to various aspects of music creation, production and consumption. In the domain of assistive AI, the concentration is on how machine learning could potentially help musicians in the area of composition and performance to enhance their musical creativity. The paper will discuss an interesting collaborative effort between pure human creativity and computational assistance covering an explanation for a vast number of tools using generative as well as assistive artificial intelligence models. In addition, the paper will address the concerns facing the music industry while this technology keeps on improving, the potential drawbacks and ethical considerations. It opens the question of authenticity and emotional depth, and when or if this new technology could be able to replicate it. Further explanation in the paper will consider music examples with a focus on music styles assisted and generated by the use of artificial intelligence, from pop to classical music. With a thorough analysis of the aforementioned subject, the paper aims to provide a detailed perspective on the constant evolution of AI tools used in music with highlights on the need for a balanced approach. In providing

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a detailed perspective on the evolving landscape of AI tools in music, this study adopts a methodological approach that involves comprehensive analysis of both the benefits and challenges associated with these innovative gadgets. The paper contributes to the ongoing discussion on the intersection of technology and artistic expression. By examining the potential benefits and challenges with these innovative models, the paper signifies ongoing discourse on the impact of technology on artistic expression.

Keywords: Artificial Intelligence (AI), Composition, Technology, Music, Collaboration.

Introduction

Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined by him as “the science and engineering of making intelligent machines” (Manning 2020). In this ever growing and relatively new field, the distinction has been made between two constantly evolving branches of the domain, called Generative AI and Assistive AI. In its essence, the Generative part of Artificial Intelligence technology covers the possibility of generating various types of content, which in its expansion could potentially come close to the possibilities, creation, and talent that mimics a human being. One of the most well-known examples is image generation. The service providers that are popular in this area of expertise used machine learning in fusion with the neural networks concept to train their servers on a vast amount of image datasets. On the other hand, the counterpart of Generative AI, called Assistive AI, powers the enhancement of human creativity, efficiency and knowledge improvement. On the subject of finance, it helps to optimize investment strategies, analyze the current state of market trends and detect suspicious activities. Even though not fully accepted or utilized, these tools can be found in the world of music as well and have recently become very popular for creating full songs, compositions of various genres and helping music enthusiasts and professionals. The place for improvement is still astonishing, merging traditional ways, innovation and assistance in the creative process. However, the potential of AI to assist and generate content raises the question of ethical considerations not only in music, but also in various other fields.

Methodology

This study involves an exploration of the current state of Generative and Assistive AI, concentrating on the music profession. It considers the potential,

limitations and ethical implications of the above-mentioned technology. With thorough research of existing literature, it explores the connection and differences between Generative AI and Assistive AI, and its potential impact on human creativity and workflow. This collection of data relies heavily on investigating existing gadgets and artificial intelligence tools by focusing on their advantages and drawbacks, the potential for improvement and advantages as well as their effectiveness. The tools, which are discussed in the paper, were chosen based on certain criteria, mainly focusing on software with the latest and most up-to-date technology advancements, the amount of features and possibilities within these generative and assistive AI platforms, their ease of use and their level of popularity. The detailed analysis shows existing patterns, themes and trends in the AI world involving music creativity. The study will conclude with concepts of possible expansions of AI implications and an examination of how to navigate the technology ethically and responsibly.

Chapter I

The Soundscape of Generative AI

One of the primary subjects of generative AI in music involves composition at the forefront. At the heart of music generative tools lie a diverse array of algorithms and techniques designed to mimic and augment the creative process. All the tools employ machine-learning models, such as recurrent neural networks (RNN), variational autoencoders (VAE) and generative adversarial networks (GAN). They include a diverse array of tools and platforms, each offering unique approaches to algorithmic creativity and sonic exploration. All these tools could be divided into the sections of music components they specialize in, from melody generation, harmonic progression, rhythmical patterns and sound synthesis. In the last few years, there has been an expansion of these software and tools and numerous companies have been competing with each other in this domain, thus making it impossible to cover all of them.

Generative AI tools

MusicVAE and MuseNet

In the first chapter, we will focus on some of the most advanced up-to-date generative music tools. One such is called **MusicVAE**. Researchers at Google Magenta developed it. MusicVAE employs variational autoencoders (VAE) to learn the underlying structure of musical data and generate music compositions

based on learned patterns and styles. MusicVAE has advanced in such a way that enables users to explore and create a vast number of musical possibilities, from familiar melodies to avant-garde compositions. Similarly, OpenAI's MuseNet leverages deep neural networks to compose original music across a wide range of genres and styles. By training on a diverse dataset of musical scores, MuseNet learns to capture the nuances of different musical traditions and genres, generating compositions that exhibit both creativity and coherence. This online tool captures jazz improvisations and classical compositions by feeding its algorithm with a proper composer and performer's work. However, its focus is generating simple melodies and short motifs.

Soundraw and AIVA

Another notable device is Soundraw, a platform that allows users to generate royalty-free music tailored to their specific needs and preferences. By leveraging machine learning to analyze user inputs and musical parameters, Soundraw generates custom compositions, offering a seamless solution for content creators, multimedia producers or even filmmakers seeking soundtracks for their projects. In the same category, among the pioneers in this domain is AIVA, an AI music generation assistant that allows users to generate new songs in more than 250 different styles in a matter of seconds. It is suitable for seasoned professionals as well as complete beginners in the field. What is more, it allows consumers to create their own style models by uploading audio or MIDI files to influence the algorithm. The composition can be then downloaded in multiple file formats. However, its focus is generating mainly instrumental music.

Suno AI and MelodyRNN

Similarly, Suno AI not only generates music from the text input, but it can also generate suitable lyrics for the song, as shown by a few examples on their official website. Another suitable melodic generator might be Magenta's MelodyRNN that excels at generating melodic sequences. Similarly to the previously mentioned software, it leverages deep learning algorithms to analyze melodic contours present in existing musical compositions, enabling it to generate new melodies that adhere to established stylistic conventions while also exploring novel variations and permutations.

Harmonic and rhythmic AI generators

When it comes to generating harmonic progressions, a component that plays a crucial role in shaping the tonal and emotional landscape of a composition,

generative tools such as ChordChord and ToneGym Chord Progression Generator are adept at generating harmonic sequences that complement and support melodic lines. These tools employ machine-learning algorithms to analyze the harmonic structures, chord progressions and voice leading principles prevalent in different musical genres and styles, enabling them to generate new progressions that are both harmonically rich and aesthetically pleasing. From the aspect of the rhythmic music component, GroovePizza specializes in generating rhythmic patterns and drum loops that potentially form the foundation of a musical composition. Analyzing the rhythmic motifs, syncopated grooves and polyrhythmic interactions present in various musical traditions and cultures enables the tool to generate new patterns that are both rhythmically diverse and dynamically engaging.

Generative sound synthesis and transformation tools

In addition, generative AI is also capable of synthesizing sounds and timbres that contribute to the overall sonic palette of a composition. Platforms such as Google's Nsynth and OpenAI's GPT-3 based SynthGPT analyze the spectral characteristics, harmonic overtones and transient dynamics and shaping present in different acoustic and synthetic instruments and sound sources, enabling them to synthesize new sounds with the fusion of realism and expressiveness. One of the more advanced ideas derived from ChatGPT and generative art Discord servers (Midjourney), which SynthGPT utilizes, is text-to-prompt. This allows users to describe the sound they want to use in their composition and production that results in a fully created synth patch. However, it is not yet updated to the point at which SynthGPT allows the creatives to change some of its parameters.

Another interesting addition to sound synthesis-based AI is Magenta's Tone Transfer. Users can upload any audio file and material that is analyzed and later synthesized to some acoustic instruments such as Saxophone, Violin, Flute, Cello etc. Tone Transfer is also available as a VST (Virtual Studio Technologies) plugin, which music professionals can use in their DAW (Digital Audio Workstation) of choice.

One of the more advanced technologies with the same text-to-prompt idea is used in the Synplant plugin, a VST instrument highly used in modern electronic music. In its new version (2.0), not only is it possible to describe the sound and get the full patch, but also producers and composers are allowed to shape the sound using more advanced parameters such as filtering, shaping the length of the sound using ADSR envelope (Attack, Decay, Sustain and Release) and more.

Even though SynthGPT and Tone Transfer (along with Synplant) could be thought of as generative AI tools, due to the fact of their text prompt or sound

analytic possibilities, they can also potentially be used as assistive tools for composers and producers.

Personalized text-powered music generation tools

MusicLM

Language processing advancements are offering a unique approach to music creation through conversational interaction with the machine. One example is MusicLM. By interpreting user inputs and preferences, MusicLM generates personalized tracks tailored to individual tastes. It is a model generating music from text descriptions such as ‘a calming violin melody backed by a distorted guitar riff’. MusicLM casts the process of conditional music generation as a hierarchical sequence-to-sequence modeling task, and it generates music at 24kHz (kilo Hertz) with mono compatibility that remains consistent over several minutes. MusicLM can be conditioned on both text and melody in that it can transform whistled and hummed melodies according to the style described in a text caption (Google, n.d.).

MusicGen

Certain extensions of the MusicLM model can be traced in its more advanced version called MusicGen. In the words of its authors, it is:

a powerful single Language Model (LM) redefining the boundaries of conditional music generation, with the ability to create high-quality music by taking cues from text descriptions or melodies. Extensive studies have confirmed the superior performance of MusicGen compared to existing approaches (MusicGen n.d.).

One of the biggest advancements in transition from the MusicLM model to the one used in MusicGen is the possibility of creating music compositions and productions with not only mono, but with stereo compatibility as well.

Stable Audio

Another good example of text prompt-based tools is Stable Audio, a music generation product built by Stability AI (Stable Audio 2024). Users can utilize their website to create original tracks that can potentially be used later for their personal projects. Audio files from the website are allowed to be downloaded as

stereo files with a sampling frequency rate of up to 44.1 kHz, which is a current industry standard, besides 48 kHz, more preferred in the video, film and video game industry.

Lyria

Beyond all the aforementioned products, one of the most currently advanced technologies in the scope of generative AI music is Google's Lyria. In partnership with YouTube in the focus of Shorts, Lyria represents two AI experiments designed to open a new playground for creativity. The first one is called Dream Track, which is an experiment in YouTube Shorts still in its trial period, designed to help deepen connections between artists, creators and fans through music creation. The second is a set of music AI tools that Google is designing with professional artists, songwriters and producers to help bolster their creative processes:

Within the experiment, a limited set of creators will be able to use Dream Track for producing a unique soundtrack with the AI-generated voice and musical style of artists including Alec Benjamin, Charlie Puth, Charli XCX, Demi Lovato, John Legend, Sia, T-Pain, Troye Sivan and Papoose. Each participating artist has partnered with us and will have a hand in helping us test and learn to shape the future of AI in music (Google DeepMind 2023).

Considering the target of this new form of created material is the audience and their stronger relationship with the artists, it would be for fans around the globe to create songs tailored to their needs using these available algorithms.

Dream Track users can simply enter a topic and choose an artist from the carousel to generate a thirty-second soundtrack for their Short. Using our Lyria model, Dream Track simultaneously generates the lyrics, backing track and AI-generated voice in the style of the participating artist selected (Google DeepMind 2023).

Assistive AI tools by Lyria will be discussed later on.

Udio

One of the latest text-powered tools in the scope of generative AI in music is Udio. On 10th April, 2024, the developers publicly released a Beta version of their model. Even though it is still in its early stages, Udio has proven to be one of the most advanced text-to-music tools at the moment. Critics praised the developer's ability to create higher quality and realistic sounding vocals. It allows its users to

create 600 songs a month free of charge with a vast majority of music genres to choose from. It allows users to describe what kind of song or instrumental they want to produce with the additional feature to choose between an instrumental or vocal version. The lyrics may be generated by the service as well or can be written by the users themselves. It became very popular and widespread, especially on social media, where people started creating pages and channels with music they generated on this platform and gaining millions of views. With the possibility of an additional payment to this service, users have all the copyright on finished song materials. However, this raised a question of the possibility that developers at Udio trained their material on copyrighted data.

Chapter II

Implementation of Assistive AI in music

As stated previously, the idea behind Assistive AI in music is to create a symbolic relationship between human and machine to foster collaboration and accelerate the creative process. In this way, the machine would behave as a personal assistant to established music professionals, music producers, audio engineers, sound designers, performers and even music enthusiasts. The pioneers behind some of these tools, as mentioned earlier, are the creatives from IRCAM, dating to the late 1990s to the beginning of the 2000s. They have developed assistive music software such as OpenMusic and Orchidea, which intrigued and inspired primarily established and well-known contemporary classical composers to create their original work, like Brian Ferneyhough, Marco Stroppa, Kaija Saariaho, Tristan Murail and more. The software are available either as plugins (standalone or for DAW) or are designed to be controlled via another interactive software called MaxMSP.

Assistive AI tools

AI tools by IRCAM

Orchidea functions as a composition assistant or computer-aided orchestration tool, giving orchestral or arrangement solutions based on user input. Music composers may 'upload' an orchestral solution they currently have and by analyzing that specific situation, Orchidea could potentially propose numerous different orchestration and arrangement choices based on the composer's input. In the words of the IRCAM developers on Orchidea:

Assisted orchestration can be thought as the process of searching for the best combinations of orchestral sounds to match a target sound under specified metric and constraints. Although a solution to this problem has been a long-standing request from many composers, it remains relatively unexplored because of its high complexity, requiring knowledge and understanding of both mathematical formalization and musical writing. Orchidea is an evolution of the Orch tools and performs static and dynamic assisted orchestration. Orchidea performs mono-objective optimization on various features and requires a little number of parameters for orchestration (Cella 2019).

OpenMusic takes a similar approach, offering a visual programming environment for computer assisted composition and analysis, empowering users to explore complex musical structures.

Emergent Drums

Another company called Audialab recently launched a drum programming and drum sample synthesis tool called Emergent Drums. Since rhythm lies at the heart of musical expression, Emergent Drums harnesses the power of AI to imbue compositions with dynamic, expressive drum patterns. By leveraging advanced neural networks trained on vast repositories of rhythmic data, Emergent Drums generates intricate grooves, fills and even polyrhythms with human-like fluidity and nuance. Whether constructing pulsating beats for electronic dance tracks or intricate percussion arrangements for cinematic soundscapes, this tool offers a versatile toolkit for rhythm exploration and experimentation. What is more, Emergent Drums offers a way to upload a composer's or producer's own samples, analyze them and create numerous variations of the same sample which could later be used. The only downside is that it does not work well with samples of longer duration.

Magenta bundle

Google's Magenta created a diverse array of tools for assistive AI, that could even be downloaded as plugins and incorporated into a musician's DAW of choice, or they could be installed as standalone software. In some new versions, these tools are collected in a bundle called Magenta Studio, a plugin built on Magenta's open-source models. The preferred way of usage is incorporation with Ableton Live. Assistive tools available in the bundle are Continue, Interpolate, Groove and Drumify. In its essence, it is a MIDI plugin which lets users apply existing models to Ableton Live's MIDI clips in Session View. One innovative feature, similar to the creation of sample variation in Emergent Drums, is la-

beled Temperature. All plugins in this bundle have this slider, which is basically a parameter used for controlling randomness: higher values produce more variation or creative chaos, while lower values are more conservative in their predictions. One drawback of the software, specifically its melody generation, is that it is limited to monophonic (one voice or one note at a time) input. As stated previously, all the tools employ machine-learning models, which is the same with the Magenta Studio bundle.

First, the plugin called Continue uses the predictive power of recurrent neural networks or RNN to generate notes that are likely to follow drum beats or melodies. This means its algorithm should be fed with a pre-existing musical motif, whether it is a groove or a melodic structure. After the processing, an existing MIDI clip can be extended by up to 32 measures. This could be especially helpful for adding variation to a drum beat or creating new material for a melodic track. It picks up on factors such as durations, key signatures and timing. By increasing the temperature parameter, it can produce more random outputs.

Second, the plugin called Generate is similar to Continue, but it generates a four-bar phrase with no necessary input. Composers can choose the number of variations, which can be especially helpful for breaking creative blocks. It can also be used as a source of inspiration. Unlike previous RNN machine-learning models, Generate uses Variational Autoencoder or VAE that has been trained on millions of melodies and rhythms. Generate chooses a random combination of these summarized qualities and decodes it back to MIDI to form a completely new MIDI clip which can later be edited in Ableton.

The third plugin, called Interpolate, has been described by the developers. It “takes two drum beats or two melodies as inputs. It then generates up to 16 clips, which combine the qualities of these two clips. It is useful for merging musical ideas or creating a smooth morphing between them” (Magenta n.d.). Similarly to Generate, Interpolate also utilizes Variational Autoencoder.

The fourth plugin is specialized in drum clips and patterns. It is called Groove and it “adjusts the timing and velocity of an input drum clip to produce the ‘feel’ of a drummer’s performance. This is similar to what a ‘humanize’ plugin does, but achieved in a totally different way” (Magenta n.d.). The way Groove was programmed with such precision is through fifteen hours of prerecorded material with real drummers. Many digital audio workstations have the ability to create innovative timing and velocity adjustments, especially to drum parts since they can tend to become overly robotic in the arrangement. This parameter is usually called **swing**, which tries to move the time of the accentuated or non-accentuated beats away from the grid in a way they do not exactly align with the tempo. This parameter is also adjustable in **quantization** section in many digital audio workstations.

The fifth plugin is called Drumify and it:

creates grooves based on the rhythm of any input. It can be used to generate a drum accompaniment to a bassline or a melody or to create a drum track from a tapped rhythm. It works best with performed inputs, but it can also handle quantized clips... We extract a rhythm from each performance by removing the pitches and velocities, while keeping the precise timing details. When you provide an input sequence, be it a melody, bassline, chord progression or a drum pattern – we extract a rhythm in the same way and have the model turn it into a groove (Magenta n.d.).

Lyria

Another advanced assistive AI option for music creators is Google's DeepMind project called Lyria, already mentioned in the context of generative AI (Dream Track). Beyond experimenting with YouTube shorts to get a deeper connection between artists and their fans, Google is currently developing a set of music AI assistive tools with the help of music industry professionals like songwriters, artists and producers. These audio demo examples can be heard on Google's DeepMind website (Google DeepMind, 2023). The idea is to analyze the singing or recorded voice of an artist or a composer as well as having the ability to import MIDI information and transform it to a suitable medium like ensembles, orchestras, choirs, solo instruments or to add an instrumental accompaniment to a vocal track. This means that, for example, it is possible to transform a beatbox into a drum loop, singing into an orchestral score or MIDI piano information into a vocal choir, which is shown on a few examples.

The developers at DeepMind stated:

With our music AI tools, users can create new music or instrumental sections from scratch, transform audio from one music style or instrument to another and create instrumental and vocal accompaniments. This work draws on our history of research and experimentation with AI and music and we'll continue testing our music AI tools with incubator participants throughout their development (Google DeepMind 2023).

Assistive AI audio production tools

It is no secret that assistive AI software can be found in audio production. Many audio professionals like audio, mixing or mastering engineers and sound designers are utilizing some of the software to their advantage. One of the pio-

neers in this section is company called Izotope, well-known for their post-production audio effects. In their mixing and mastering suite called Ozone, they created a feature called Master Assistant. The Master Assistant helps users to quickly achieve optimal mastering settings by analyzing audio and providing customized suggestions for equalization, compression and numerous other parameters. One similar array of audio tools, called Gullfoss by Soundtheory, also specializes in the mastering process. The idea is to use AI-driven software to optimize the clarity, balance and dynamics of an audio recording. By analyzing audio signals in real-time and applying targeted equalization, compression and enhancement, Gullfoss ensures optimal sonic quality across a wide range of playback systems. Various tools in the domain of podcast editing have also been developed as AI-driven by analyzing audio and creating a vocal or speech separation from the ambience. This is especially helpful if audio was previously recorded in an environment with a lot of echo and reverberation. One such tool is called GOYO, an AI voice separator tailored for reducing reverb, ambience and noise from vocal and speech recordings.

Generative audio workstations (GAW)

In addition, a few companies emerged to create futuristic digital audio workstations that are leveraging artificial intelligence in music creation in their software, also known as Generative Audio Workstations or GAW. Some of the most advanced Generative Audio Workstations are RipX and Wavtool. Some of the greatest assets of these workstations, that these companies emphasize, are options called stem separation and chat bots, which are not available in a traditional DAW setting.

The idea of stem separation is the possibility to create multiple audio files from one main stereo file. Based on machine learning, it can analyze the mixed or mastered stereo version of an audio file, its frequency spectrum and isolate various elements of the mix into a set of separate audio files. This is very useful for music creatives and is often utilized by music composers and producers to create a remix of popular songs.

Even though the pioneers in this region are the developers at Izotope with their tool called music rebalance, which made vocal isolation, instrument separation, level adjustment and enhancement possible, the above-mentioned generative workstations are a bit more advanced in that aspect with more control and capabilities.

For instance, the RipX developers came up with their unique 'Rip' format that is in connection with audio waveforms. For this precise reason, the software is available to make audio stem separation along with numerous other features

such as changing the tempo, mute/solo the stems, add innovative effects, equalization or even transposing stems to a new scale. This is an extension of basic functions that Izotope already utilized; however, the main difference is the fact that there are significantly fewer artefacts like clicks and pops appearing in audio files after the stem separation process than the one used in Izotope's RX. In addition, various effects could assist music composers and producers to make original music from those existing stems.

Unlike RipX that had its focus in terms of stem separation to stand out from the competition, Wavtool is the first GAW to employ a personal assistant or a chat bot called Conductor, powered by ChatGPT-4. Similar to how the text in GPT works, it is used to describe and ask the assistant to create chord progressions, basslines, melodies and even mix or master the tracks suitable to the style composed and produced. It is possible to create drum loops from the written text, receive the suggestions on harmonies and post processing, stem separation, converting audio files to MIDI files, time stretching manipulation and more.

The current state of Generative and Assistive AI in music

Even though it is evident that artificial intelligence is a technology where important companies such as Google keep on investing, seeing it as potentially highly lucrative, at least in music, it is still fairly new and not fully accepted or even understood. Although it can help to generate content and assist people in various fields, in music, whether generative or assistive, it still has plenty of drawbacks and it has not been perfected yet. The results given by the above-mentioned GAW software and additional AI-based tools still tend to sound overly robotic, plain and generic and the audio quality given by AI, containing less or more unwanted artefacts, does not still completely match with the current audio or music industry standards.

One of the most well-known audio engineers, producer, author and educator, Bobby Owsinski, explains the drawbacks in audio quality using AI models for mastering in his book *The Musician's Ai Handbook*:

Another thing to keep in mind is that many Ai mastering platforms have a maximum resolution of 44.1kHz/16bit. While that works fine for a CD or for submission to a streaming distributor, it may not satisfy the needs of a record label or high-resolution distributor like Apple Music or Tidal, who require at least 24bit files with a sampling rate at 96kHz or higher (Owsinski 2023, 96–104).

In addition, there are significant limitations of ideas produced by current AI music technology, and after a few generated variations of a melody, chord

progressions, drum loops and similar, it starts to sound very repetitive. Furthermore, the engines behind AI are still not powerful enough to evoke emotions of a real human playing and a professional performer's feel. It is especially difficult in the domain of classical music or any form that uses acoustic instruments exclusively. Many companies produced virtual instruments for DAW software that replicate the sound for better or worse, but it is never identical to a real performer, recorded or listened in a good acoustical space. The imperfection in a performer's live playing or studio setting is a quality which separates them from a machine. Relying solely on AI to create something original and intriguing without any intervention from a music professional is still highly unlikely.

As generative and assistive artificial intelligence continue their advancements in technology, art and various other fields, it is essential to consider the ethical implications and societal impacts of these technologies.

Chapter III

Ethical considerations and future directions

Questions of authorship, ownership, copyright and accountability loom large in the age of AI-driven creativity, raising concerns about the role of humans in the creative process and the potential for algorithmic bias and discrimination. Furthermore, as generative AI tools become increasingly sophisticated and autonomous, they may challenge traditional notions of artistic authenticity and originality, blurring the distinction between human and machine creativity.

While AI algorithms can undoubtedly inspire, augment and amplify human creative endeavors, they also raise fundamental questions about the nature of creativity itself and the relationship between technology and culture. Looking ahead, the future of generative AI in music composition and beyond is ripe with possibilities and challenges. As researchers and practitioners continue to push the boundaries of AI-driven creativity, it is crucial to foster interdisciplinary dialogue and collaboration, ensuring that these technologies are developed and deployed in ways that are ethical, equitable and empowering.

AI Schubert

In the domain of classical music, there was a project developed by Huawei Company in 2019 to demonstrate the technology in their smartphones. They set up a challenge to 'complete' one of the most famous classical music works – Franz Schubert's Symphony no. 8. With the existing two movements and fragments of final two movements, they decided to use AI models to complete the composition. Online portal Classic.fm wrote:

Engineers fed music in the form of data, into the phone's dual Neural Processing Unit – so the AI had information about the timbre, pitch and meter that Schubert liked to use in his melodies. The AI then created melodies from that information and composer Lucas Cantor chose his favorites. He then orchestrated those melodies and turned them into the final two movements to complete Schubert's Unfinished Symphony (Davis 2019).

Again, this is an example of how AI was used as a tool for inspiration, but a real human composer did the orchestration and, partially, composition. This was, however, an example of music that is not protected by copyright law, due to the fact that it expires 70 years after the author's passing and immediately becomes public domain.

AI implementation in popular music

The main turning point that aroused more concerns on authorship and copyright happened in 2023, when a song called 'Heart on my sleeve' appeared using AI-trained voices of some of the biggest artists today, more specifically Drake and The Weeknd. An anonymous music producer going by the name of Ghoswriter produced it. The beat and all the instrumental parts were done using virtual instruments and samples inside a DAW; however, the vocal part was trained using AI tools. The song has been pulled from multiple streaming platforms since it violated intellectual property rights. Universal Music Group, the record label where both of these artists are signed, said in a media statement: "The training of generative AI using our artist's music represented both a breach of our agreements and a violation of copyright law" (Axios 2023).

The case of Midjourney and Stability AI

Another similar violation happened in the field of images and graphic art. Namely, illustrators and cartoonists Sarah Andersen, Kelly McKernan and Karla Ortiz are suing creators of AI art generators called Midjourney and Stability AI. The artists claim that these organizations have violated the rights of "millions of artists" (Vincent 2023) by training their AI engine on a couple of billion images without the authors' consent. In the meantime, in the USA (District of Columbia), online magazine 'Vulture' wrote: "A federal court ruled on the August 18th that AI-generated artwork cannot be copyrighted on the grounds that copyright law only extends to human beings" (Davis 2023). This happened after the US Copyright Office refused to accept Stephan Thaler's image generated by AI as an original work. Judge Beryl A. Howell stated that "human authorship is an essential part of a valid copyright claim" (Guy 2023).

In this way, human artists could be protected and favored by laws against the unethical usage of AI software. However, this raises the question of how or if the authorities will be able to distinguish and know whether a piece of art was created by a human or a machine and how someone or something would detect if a machine was trained on works still protected by copyright law.

SynthID

Developers at Google's DeepMind came up with an idea of a watermark engraved in audio files to recognize whether a work was fully generated using AI technologies. On the company's website is a further and more detailed explanation:

Our team is also pioneering responsible deployment of our technologies with best-in-class tools for watermarking and identifying synthetically generated content. Any content published by our Lyria model will be watermarked with SynthID, the same technology toolkit we're using for identifying images generated by Imagen...SynthID embeds a watermark into AI-generated audio content that's inaudible to the human ear and doesn't compromise the listening experience...The watermark is designed to maintain detectability even when the audio content undergoes many common modifications...SynthID can also detect the presence of a watermark throughout a track to help determine if parts of a song were generated by Lyria (Google DeepMind 2023).

Employment concerns

Universal law on AI and intellectual properties is still considered and not yet established in every country in the world, thus leaving many future concerns that should be addressed and discussed. Therefore, it is still difficult to determine the level of impact, whether positive or negative, that AI may potentially have on music and in other art domains. In the book by Mark Coeckelbergh called *AI Ethics*, the author writes about "A famous report by Benedikt Frey and Michael Osborne (2013) predicts that 47 percent of all jobs in the United States could be automated. Other reports have less dramatic figures, but most predict that job loss will be significant" (Coeckelbergh 2020, 137).

Even though the future is still uncertain, it is no secret that AI will affect the art workforce as well. For instance, many professional music composers and producers are earning a living by working for music libraries that are promoting and specializing in synchronization music for film trailers, TV series and advertisement. In this process, musicians are earning royalties and advance fees provided by music supervisors and various clients. The implementation, rise

and fast improvement of AI models raise the question of whether these kind of jobs could potentially become obsolete, the main reason being the cost effective nature of generative AI platforms with no need of greater advance fees. In addition, clients may get finished songs and compositions within seconds or minutes, which makes the whole process significantly faster. The process and the quickness of generative AI is something that most music composers are not able to compete with.

However, generative AI is only able to produce and simulate pre-existing music material, only by analyzing different patterns and musical structures following certain rules. Generative AI is unable to be creative to the point of which it can produce something that is unheard of and completely original. In that sense, human creation and originality have a great advantage over this technology by breaking these rules and constantly moving the boundaries. This may lead to an increasing need for original and groundbreaking works, becoming more valuable due to the impact of AI on the music market; yet, this point of view might be utopian.

Conclusion

The continuation in the evolution of AI technologies and its potential effect on the music industry may become transformative, moving away from the traditional ways of creating, promoting and distributing all musical content. Firstly, generative AI systems are enabling autonomous creation of music composition and availability of the technology to not only music professionals, but also expanding the process to amateurs and enthusiasts. On the other hand, the area of assistive tools promises to help and enhance the creative process for human musicians, providing suggestions and assistance with music composition, sound synthesis and audio production. The state of the current technology has come a long way, introducing the possibility of creating melodies, harmonies, and chord progressions. Text-based audio synthesis could help transform the way music is made. Although the primary focus of AI is to enhance and empower human creativity, it is of utmost importance to discuss the ethical considerations of its usage. The first concern is the potential loss of human creativity and using artificial intelligence as a potential replacement for human artists. This could potentially raise the question of the state of employment in all creative industries. Finally, addressing these questions should be done in collaboration and discussion with various professionals in the field of art, technology, art business professionals and society, ensuring that AI in art is promoted and used responsibly and ethically.

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ARTIFICIAL INTELLIGENCE: DUALITY IN APPLICATIONS OF GENERATIVE AI AND ASSISTIVE AI IN MUSIC (summary)

In the realm where technology fuses with creativity, showing the dynamic intersection of technology and artistic expression, a new wave of innovation has emerged, bringing forth a plethora of AI-powered tools designed to revolutionize the music-making process. These tools, ranging from virtual assistants to advanced composition engines, promise to augment the capabilities of musicians, offering unprecedented avenues for exploration and expression, but also raising numerous questions on ethical considerations, copyright and the duality between human and machine creation.

Artificial Intelligence has permeated various domains, especially in the last few years, finding its path and usage in fields such as information technologies, game development, graphic art and photography as well as the audio industry, including music. The applications of this powerful technology in the art of music exhibit a duality between Generative AI and Assistive AI. The two ways of its development are exemplified through platforms and software made for this purpose. Each of these platforms is contributing uniquely to the landscape of AI development in music. It is set to revolutionize the industry in a similar manner, for instance, to the beginnings of recording studios or synthesizer development.

Generative AI in music refers to systems that autonomously compose or generate musical content. For example, it utilizes deep learning algorithms to create original compositions, mimicking the style of various artists and composers or even generating entirely original music. These systems analyze vast datasets of existing music to understand patterns, harmonies and structures, enabling them to compose music.

On the other hand, the main purpose of Assistive AI in music focuses on enhancing human creativity by providing tools for composition, production and performance. This includes AI-driven software for music production, virtual instruments, mixing and mastering tools. The idea behind developing some of these tools is not new and they have existed for quite some time. For example, IRCAM (*Institut de Recherche et Coordination Acoustique Musicque*) developed a vast amount of software which hold the idea of AI algorithms. It is no secret that a few famous contemporary composers used some of this software as assistive tools for composing their original works.

In addition, developers created tools with a primary focus in language modeling applied to music. These innovations display the potential of AI to understand and respond to musical input.

Moreover, there are AI applications geared towards audio processing and synthesis. This technology is of great value to audio professionals, especially audio engineers seeking to improve the fidelity of their recordings. AI also contributes to music recommendation systems, personalized playlists and adaptive music streaming platforms, enhancing user experience and engagement. Companies such as Spotify or Pandora leverage AI algorithms to analyze listening habits and preferences, curating tailored playlists for individual users.

Overall, the two-faced crossover between Generative AI and Assistive AI in music reflects a nuanced approach to leveraging this technology for creative expression and innovation, reshaping how industry professionals compose or produce music and how listeners consume the final product.

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Review article

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ARTIFICIAL INTELLIGENCE, POST-WORK AND MUSIC LABOR

Abstract: The recent – purportedly rapid – development of artificial intelligence (AI) tools has again resurrected the actuality of post-work u-/dystopias. Drawing on discursive topoi which have become popular since the post-WW2 automatization surge, AI post-work now advances into the field of white-collar labor, but also creative, artistic, and even music labor. In this paper I aim to analyze the emergent arrival of the post-work thesis into music labor. I will draw on prominent critics of automatization, AI and post-work discourses, such as Pierre Naville, Aaron Benanav and Jason Resnikoff, to show that these discourses are not only unsubstantiated, but are instrumentalized in order to depreciate the value of concrete labor in music production.

Keywords: artificial intelligence (AI), automatization, post-work, music labor, creative labor.

AI and post-work

The latest advancements in artificial intelligence have received significant media attention and have shaken the way we use many internet services. For the first time, ordinary users now have access to tools that can seemingly effortlessly produce texts on given topics, generate photos, and in extreme cases, even write entire short stories and student papers. Professional PowerPoint presentations

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and detailed legal opinions can now also be created with the help of artificial intelligence. It seems that, after a decade of science fiction novels and a series of blockbuster movies depicting androids and smart computers collaborating with humans on an equal footing, artificial intelligence has not only become a reality but is now readily available on open internet platforms where every ordinary person can witness its effectiveness.

Alongside the development of artificial intelligence, one fundamental dilemma arises – the future of work. The products that artificial intelligence create on the internet today, from legal documents to high-resolution photos, were until recently the laborious fruits of work in the creative industry, scholarly endeavors, artistic labor and cultural work. With the availability of these services, the question arises – what is the future of creative jobs, and will artificial intelligence become a new cycle of work automation? Will white-collar workers now face what happened to blue-collar workers with the emergence of the post-industrial society?

In his seminal 1964 work *One-Dimensional Man*, Herbert Marcuse (1964), presented the thesis that a society without labor is now within reach.² Although the changes Marcuse describes are not yet entirely realized at the point of writing, his analysis aims to amplify and theorize certain tendencies observed in society. Many automation theorists have followed his lead, with popular studies such as Aaron Bastani's (2019) *Fully Automated Luxury Communism* also positing automation as a premise for achieving a better society – that is, a purportedly socialist utopia of a prosperous, post-scarcity economy (cf. Weeks 2011; Srnicek & Williams 2015). Even more, the proliferation of information technologies such as AI are often seen as “increasing the capacities of the labouring class for self-organized immaterial labour” (Steinhoff 2021, 7). The question arises: what have such conclusions actually done to our societal imaginings?

Whether one may speak of a society where workers control the means of production, or dreams of equality without dismantling property relations of today, if we may agree that contemplating a better society is virtuous, one of the key questions our concepts ought to elucidate is the role of socially necessary labor and how it will be redistributed in a just society. However, the thesis about the complete disappearance of socially necessary labor in a future society negates the existence of this dilemma. According to this thesis, in a future (socialist) society, there will be no need for socially necessary labor or for its democratic distribution. Indeed, technological progress, especially the processes of automation present since the end of World War II, and then the development of artificial intelligence at the turn of the current century, creates the perception in public discourse that we are on the verge of abolishing work as such. Therefore,

² Arguably, Marcuse's arguments partly rest on shoulders of fallacious analysis of value production and perspective roles of state and capital within; see Mattick 1972; Bhandari 1999.

as technological advancements enable machines to do all the work for people, labor becomes a mechanism of oppression rather than exploitation. I will argue that this thesis serves as a mask for real social relations in the present and prevents discussion about the fair distribution of socially necessary labor.

At the same time, some labor theorists, like anarchist author David Graeber, put forth the thesis of “bullshit jobs” (Graeber 2018), arguing that today’s economy artificially creates jobs, primarily white-collar office jobs, to compensate for the lack of real necessary work. In an era where more and more jobs are being automated, theories about the post-industrial society serve to further sustain the remaining work, particularly industrial work, making it invisible in society.

Critics of post-work theories and discourses on automation and artificial intelligence can be, conditionally speaking, divided into two groups: on one hand, we have an analysis of specific technological processes that reveal the degrees of automation and the exclusion of humans as workers, while on the other hand, we have critiques of the discourse of automation and artificial intelligence itself and its purpose. Critics of automation in the 1950s and 1960s argued that automation in factory settings largely does not necessarily mean a reduction in the number of workers but rather a reorganization of physical labor and jobs in factories (see Naville 1979, 55ff). In other words, while talk of automation was ongoing, what was happening in the reality of factory floors was not a drastic reduction in the workforce but rather a change in qualifications and the structure of jobs in the factories. On the other hand, processes of deindustrialization and the creation of the so-called post-industrial society actually functioned more through the industrialization of the Third World countries and the relocation of factory plants outside the visibility zone of the First World, rather than actually involving the elimination of human labor and complete automation (cf. Moody 1997).

Labor notwithstanding automation

The current way in which artificial intelligence operates, especially regarding white-collar jobs, also resembles these described processes, whereby artificial intelligence and its tools become additional means of labor for white-collar workers, which can result in a change in job profiles and increased productivity, along with the creation of new types of jobs, primarily in the IT industry, which require a large number of engineers to manage the algorithms of artificial intelligence itself. The number of jobs that artificial intelligence actually eliminates, like pre-automatic systems, is relatively small compared to all the stories of mass layoffs we hear, and the number of working hours in specific companies often even increases.

Critics of automation theory like Pierre Naville (1979) and Aaron Benanav (2020) discuss how discourses on automation actually influence our understanding of work. Already in 1963, Pierre Naville (1979) argued that there was an overemphasis on automation with the purpose of creating the semblance that work itself would disappear. Naville shows how proponents of automation theory often portray automation as a solution to societal problems that would eventually lead to the elimination of labor. Critical of this portrayal, Naville analyzed how it obscured the complexities of social and economic systems. He emphasized the need to recognize the continued existence of work and the importance of reorganizing society to ensure equitable distribution of the benefits and burdens of automation. His critique suggested that the focus on automation as a means of eliminating work was misleading and that it obscured the deeper social and political issues at play in the implementation and impact of technological advancements. Economic historian and researcher Aaron Benanav, in his study *Automation and the Future of Work* (2020), explores the relationship between automation and employment in the context of contemporary capitalism. Examining historical trends in employment, Benanav emphasizes that technological advancements have not always led to mass reduction of work, but that they rather result in shifts in employment patterns. It is also indicative that in popular narratives, the role of automation in shaping employment trends has been overemphasized, while the role of factors such as globalization, financialization, and changes in labor market institutions is glossed over. Benanav shows how by focusing narrowly on automation, the broader issue of precarious employment, deregulation and the erosion of labor rights may be sidelined in public discourse and policy debates. In other words, if there is an overwhelming idea that labor itself is just one step from being abolished, the issues of labor protection and value of labor itself are portrayed as byzantine notions.

All our jobs are to some extent labeled in public discourse as prone to elimination, automation, digitization, under threat of becoming redundant. On the other hand, the remaining jobs are reduced to so-called bullshit jobs, already trivialized and from which it would be most honorable to simply give up. In other words, the vision of a world without work, where all human labor will be transferred to automated robots and artificial intelligence, tends to belittle existing socially necessary labor and justify its underpayment and undervaluation.

In the recent years, authors such as Benanav, James Bridle and Jason Resnikoff have claimed that the popular image of AI leads to a distorted picture that we live in post-work society. Benanav argues that the popular image of AI leading to a post-work society is overly simplistic and ignores the complexities of labor markets and economic systems, while suggesting that while automation may transform the nature of work, it is unlikely to eliminate the need for labor altogether. Author and artist James Bridle (2018) has explored the intersection

of technology and society in his book *New Dark Age: Technology and the End of the Future*. Bridle suggests that the belief in a post-work society is a form of techno-utopianism that fails to address underlying issues of inequality and exploitation.

Labor historian Jason Resnikoff provides the most cutting critique of the post-work thesis. Resnikoff points out that post-work authors argue that if the production in the society can be accomplished “without the participation of the vast majority of people”, and if the fruits of this production can be distributed evenly, “this eventuality would constitute liberation”. However, even if we would concede that this is achievable, the question arises whether liberation is liberation from “exploitation by other human beings”, or “freedom from the demands of embodied, biological existence” (Resnikoff 2018, 210; cf. *idem* 2021; 2023). Resnikoff stresses that the discourses of automation have shifted our visions of emancipation from being able to control the work of oneself, to being free from work – that is, from the realm of labor to the realm of leisure (Resnikoff 2021; cf. Gourevitch 2022). In his study on automation, Resnikoff (*idem*) offers a line of thinking that can be particularly useful for thinking on effects AI has on music labor: the role of automatization, as well as of “mechanic learning”, is to disguise and conceal the role of actual human labor, and by dint of this concealment to depreciate it in the wider social contract.³

Artificial intelligence and music

From the current moment, it is important to reflect on the new wave of artificial intelligence emerging in the third decade of the 21st century, especially in music. We can observe a lively discourse on artificial intelligence that began in the late 20th century when humanity first encountered processors with tremendous computing power, enabling them to surpass human capabilities in certain tasks involving a limited number of computational operations. Devised in 1950 by Alan Turing, so-called Turing Test became a common place for discussing and assessing the existence, or the reach, of artificial intelligence, by assessing a machine’s ability to mimic human intelligence in conversation. The test, origi-

3 The recent academic discussions on “music labor” have often themselves contributed to the obfuscation of the place of the labor in music industries. Particularly through seemingly confusing the role of the producer and consumer, and introducing concepts such as “emotional labor”, “affective labor”, “unpaid labor”, (labor of the) prosumer, etc., the place of the productive labor in the music industry is doubly concealed. In this regard, Shannon Garland’s critique of the concept of “affective labor” is particularly useful, as she argues for the much-needed return to the concept of productive labor, that is, (human) labor that produces music as commodity and surplus value (Garland 2023).

nally named imitation game, in which a human evaluator would interact blindly with both a machine and a human aiming to reliably distinguish between them based on their responses, for decades served as a benchmark for safeguarding the title of “artificial intelligence” of existing automata. However, a milestone of the last decade of 20th century was the famous chess match Deep Blue versus Garry Kasparov of 1997, in which a computer defeated a grandmaster, where Deep Blue – a chess-playing program run on a purpose-built IBM supercomputer – thus became the first computer program to defeat a world chess champion under tournament regulations.

The new generation of artificial intelligence essentially possesses certain specificities compared to 20th-century artificial intelligence. The breakthrough in the development of this new artificial intelligence largely relies on new models of microchips that mimic the neural networks of humans, exponentially increasing the number of computational operations. More importantly, these new microchips offer a different architecture suitable for automated learning. Another innovation in the field of artificial intelligence is the development of Big Data, where artificial intelligence produces algorithms that autonomously process large amounts of data, entering into learning processes through such analysis. Finally, the third characteristic of the new generation of artificial intelligence is the so-called black-box model, where the human author of the algorithm is not entirely capable of controlling and explaining how and why the algorithm arrived at a certain result. In other words, the learning process is such that the algorithm reaches results based on the autonomous processing of vast amounts of data, with the final result being the only evident outcome, rather than the details of the process that led to that result.

In a sense, music has been a very suitable field for demonstrating the power of early “artificial intelligence”, especially when it comes to replicating the styles of different composers. For artificial intelligence, replicating the style of a particular composer has been a challenging but reachable task because it involved processing a large but limited volume of data. For example, a computer program could produce a piece in Mozart’s or Bach’s style by analyzing a corpus of their works, which presents a significant amount of data but is far removed from the level of Big Data, not only by scale, but by its finite nature. Conceptualizing music might also have been important for developing AI models: theorist of artificial intelligence and music Marvin Minsky has pointed out that working with music involves recognizing its structures and that music can be used to foster AI “feature-finding” capabilities (Minsky 1981; cf. Roads 1980).

The new generation of artificial intelligence emphasizes the popularization of visual communication and textual content as its fundamental feature. It often passes the Turing test, clearly indicating its advancement in communication, where an observer often wouldn’t be able to determine which of two interlocu-

tors is a human. The importance of visual communication for the new artificial intelligence is particularly evident in military applications, one of its most significant uses (cf. Virilio 1993; Pasquinelli 2023). Artificial intelligence is developing its abilities to interpret visual data, crucial in modern warfare with automated weapons, where rapid and precise interpretation of on-field information is essential. Therefore, the expansion of artificial intelligence and its algorithms in visual media is noticeable, and its use in warfare is evident, as seen in conflicts like those in Ukraine or the Israeli offensive in Gaza.

While music isn't a priority in artificial intelligence development, there are already services capable of generating music tracks or songs based on internet user prompts, similar to Chat-GPT operations. Based on input data, or prompts, these services generally provide two categories of music products: (royalty-free) background music and customized song tracks in selected style or genre. An example of the former is a simple online AI tool Mubert (<https://mubert.com/>), generating background music based on simple prompts and featuring premium memberships tailored for internet content creators, in need of instant custom-made music backgrounds and signatures. As stated on their website, their vision is that "content creators should have instant access to tailor-made music"; whereas "Mubert's platform allows users to unleash their creativity with a massive database of pre-made tracks and real-time generative music" (Mubert 2024). And if one would have wondered what would be a tailor-made track for reading this paper, [this track](#) was generated using the keywords of this article as a prompt, with a free license that obliges to note "Music by mubert.com" when sharing the track. AI services such as Mubert, as well as Soundful (<https://www.soundful.com/>) and Aiva (<https://www.aiva.ai/>), all aim to provide for content creators and their operability renders music labor superfluous, by drawing on existing music. Song track AI creators market themselves to a different audience: users who want to experiment with the production of customized song music tracks in specific styles, including generated lyrics. Both types of AI web-based generative music services purportedly aim to democratize music production, but also problematize the position of music labor and creative labor and how it is presented as exceedingly unnecessary.

In the current landscape of AI tools there is no dearth of seemingly different services which can cater to the different needs of users or customers, with potential to radically transform the ways music is produced (cf. Deahl 2018). Song track AI creators include contemporary platforms like Sony-created Flow Machines (<https://www.flow-machines.com/>) and Amper Music (<https://www.ampermusic.com/>), which demonstrate AI's capacity to generate melodies and entire tracks. The list goes on: Ecret Music (<https://ecretmusic.com>) enables users to generate tracks in various genres, Orb Plugins (<https://www.orbplugins.com>) offers a range of software tools that generate chords, melodies, rhythms and

sounds, based on user prompts, while Tokyo-based startup company Dreamtonics (<https://dreamtonics.com/synthesizerv/>) offers vocal synthesis technology that enables users to generate singing voices, based on their input of lyrics and melodies. Notable AI services marketed towards individual users also include IBM Watson Beat and Google Magenta's Studio. Watson Beat (<https://www.ibm.com/case-studies/ibm-watson-beat>) is an AI tool developed by IBM that generates musical compositions in various genres. It uses machine learning techniques to analyze musical data and create original compositions based on user input and preferences. Magenta Studio (<https://magenta.tensorflow.org/studio>) is an Ableton Live plugin developed by Google's Magenta project and it includes tools for mechanic music generation, such as Melody Mixer and Drumify.

Amper Music is specifically interesting, as it aims to make its use and interface as simple as possible, aiming to produce "feeling of empowerment" at the user end (Deahl 2018). It supposedly provides a "music composition platform" that allows users to create custom tracks tailored to their needs, where users can specify parameters like mood, style, and length, and the AI generates original compositions accordingly. Amper co-founder Michael Hobe stated for the online press: "It's more of intelligence augmentation. We can facilitate your creative process to cut a lot of the bullshit elements of it." The "bullshit elements" Hobe refers to in his statement are precisely what for generations of music artists has been highly-skilled and praised music labor.

One of the main controversies that artificial intelligence raises is the question of sourcing, namely, as we have already mentioned, one of the basic characteristics of the new generation of artificial intelligence is the use of Big Data. This practically means that artificial intelligence services need to be fed with data in an uncontrolled and automated manner in order to produce appropriate responses to the given questions. In other words, for artificial intelligence to paint a picture in the style of impressionism, it needs to process large amounts of data related to the reproduction of paintings by impressionist artists, as well as discursive data about how people talk about impressionism. Since it operates on principle of a black box, information on what input data was used for the artificial intelligence algorithm to arrive at the appropriate result might not even be available.

Important in the watershed in AI and understanding music labor has been the release of the track "Heart On My Sleeve", uploaded on April 15, 2023, by the anonymous TikTok user Ghostwriter977 and ostensibly featuring vocals from Drake and The Weeknd. The two music artists, who have collaborated previously, have not been involved in the production of the record, as it was revealed that the track was created from scratch using artificial intelligence and mimicking the timbres of the artists. The song was streamed more than 20 million times before Universal Music Group, the multinational music corporation representing

the artists, demanded it be taken down from the platforms (Savage 2023; Paul and Millman 2023). In 2024, The Economist also reported that “several thousand new tracks added to Spotify every day are made by AI”, leading to a decline of record label-signed artists publishing tracks on Spotify (Lee-Devlin, Fulwood and Bird 2024). Universal Music Group has issued thousands of take-down notices to posters of fake AI-generated tracks under names of its signed artists and has lobbied lawmakers on the issue (*idem.*).

However, it is unlikely that AI in music becomes dominantly the vehicle for grassroots producers defying the business models of corporations such as Universal Music Group, which (for now) relies on monopolizing the exchange channels, that is, effectively connecting niche audiences with promoted artists in a controlled way, enabling them to claim the significant part of the produced value (cf. Sandoval 2018, Prey, Del Valle and Zwerwer 2020). Namely, music industry magnates are to follow what was already demonstrated as the intent of the Hollywood movie industry: phasing out and obfuscating human labor in the music production. The year of 2023 again proves to be a watershed, with the “Beatles’ Last Song” released on November 2nd, where AI software was used to create John Lennon’s vocals from a demo tape and to create a new version of “Now And Then”. The type of the software used is referred to as “stem separation software”, machined-trained to separate recordings containing multiple instruments and vocals into constituent parts – stems. As Matt Mullen reported for Musicradar, “stem separation tools utilize a form of machine learning wherein the software is trained using thousands of existing songs to understand and recognize the frequency bands that individual elements of a mix, such as vocals, guitars and drums, typically tend to occupy” (Mullen 2023).

In that context, creative products of humanity from previous centuries become a kind of fodder for artificial intelligence algorithms. This not only questions the concept of intellectual property, which remains one of the fundamental ideas of neoliberal capitalism, but fundamentally undermines the rights of the authors and creators over their works, whether they are paintings, music, or literary works. There are already initiatives in the creative sector, both in the United States and internationally, aimed at protecting creators from the mechanisms of artificial intelligence that could appropriate their works. In March 2023 a broad coalition of over 40 members, including unions, associations, and policy experts, announced the launch of the Human Artistry Campaign against uses of artificial intelligence technologies which could be developed and used to denigrate or erode human agency in art (Human Artistry Campaign 2023). Universal Music Group has also highlighted issues of misappropriation of artists’ copyright and identity. Michael Nash, chief digital officer at the Universal Music Group, in an interview given to The Economist pointed out that the corporation advocates for “future-proof policy solutions”, some of the precepts of their com-

mercial contracts with digital partners including: (1) AI models can't be trained on an artist's work without consent, (2) AI recordings trained on unlicensed music content need to be removed, (3) AI content can't dilute artists' royalties, and (4) AI content that infringes on artists' right to publicity needs to be removed (Lee-Devlin, Fulwood and Bird 2024).

Conclusion

In conclusion, artificial intelligence services unregulated access to big data, which remains the main point of disagreement between this and similar campaigns on one hand, and AI providers on the other. Unsupervised access to data remains an integral part of this technology, the suspension of which will have an unavoidable detrimental effect to the quality of AI services themselves. Additionally, artistic initiatives aim to prevent situations where the personality of a certain artist is imitated through artificially generated voices or sounds, or when writing in the style of a specific author using artificially generated tools. Namely, protecting the likeness of actors has been one of the cornerstones of industrial action by the American actors' union SAG-AFTRA (Screen Actors Guild – American Federation of Television and Radio Artists), lasting from July 14 to November 9, 2023, and being the longest in the union's history.⁴

Fundamentally, both expert and popular discussions on the new generation of AI in music are grounded in understanding that AI doesn't create new styles or original content but relies on what is already recognizable and available: it uses the creative efforts of other artists to generate new outcomes, remaining on the line of pure imitation of existing styles. What artificial intelligence actually challenges is the concept of art as a process, completely devaluing artistic work and portraying it as entirely redundant, meaningless, something easily reproducible with a single click, and without any value in terms of effort. However, the key difference between artificial intelligence and genuine musical invention remains the lack of creativity and decision-making about what we listen to. Artificial intelligence might be able to "compose", but it cannot truly "listen" to music, and therefore make decisions through its compositional process based on intermittent listening. Importantly, recent developments of new genres in popular and art music that use technological tools actually rely on creating new sonic landscapes and timbres stemming from the compositional process, which requires constant listening and a reassessment of results. In other words, digital

4 The agreement reached with the Hollywood studios concerning AI included protections such as "clear and conspicuous" consent, "reasonably specific description of the intended use", etc. (SAG-AFTRA 2023), in opposition to studios initially intending to produce "digital replicas" in unregulated and/or extorting fashion.

technology has had a paradoxical impact, as it brings back timbre (and manipulation of timbre) as the cornerstone of musical creativity, thus making human (close) listening an even more important part of the creative process. “Artificial intelligence” here, as in other places, is contradictory in itself, as in order to speak of any “intelligence” in music, it has to be *embodied*. If music has ever been at the forefront of the development of AI, it now may also have a role at the forefront of showing its limited capacity, as fundamentally dis-embodied cognition.

The question of musical labor within this discourse remains open: with abundant availability of music AI generative services, music labor remains under constant threat of being devalued and depreciated. It is, however, important to locate machine-learning and the AI industry not as the driver in disembodiment of the labor, but as mechanism of obfuscating the embodiment of the labor processes. As Steinhoff stresses, “AI work presents us with yet another example of the fragmentation, deskilling and automation of labour processes long familiar to Marxist labour process studies” (Steinhoff 2021, 8). In that context, one reaction we can note is musicians seeming to feel pressured to open and publically present their laborious music production processes. This year at the Serbian Eurovision competition, the winner Teya Dora, with her song “Ramonda”, released a video on TikTok about the song’s creation (TeyaDora 2024). In the video, we witness a situation where the composer presents the process of music creation – parallel to classical depictions of music creation of the romantic genius of the 19th century, when composers were portrayed in moments of inspiration, usually faced with blank music sheet paper and a pen – now, in a form of video documentation of the process of making a popular music piece, which aims to record the physical effort and material exigencies of music labor itself. Together with the well-documented shift of music industry to live concerts (Holt 2010), these processes aim to bring back our understanding of digitally produced music to material, even visceral circumstances of its production and consumption – in opposition to discourses which would render not only musical and creative labor, but socially useful labor in general as obsolete.

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VEŠTAČKA INTELIGENCIJA, POST-RAD I RAD U MUZICI (summary)

Načini na koje veštačka inteligencija (VI) transformiše naša iskustva i rad u digitalnom dobu su značajni. VI omogućava korisnicima da generišu tekstove, fotografije, čak i kompleksne prezentacije i pravne analize, što otvara pitanja o budućnosti rada, posebno u kreativnim industrijama. Automatizacija poslova, koju su neki videli kao potencijal za oslobađanje od rada, često dovodi do promena u strukturi poslova i premeštanja poslova u globalnim lancima snabdevanja. Narativi o automatizaciji i veštačkoj inteligenciji pre svega imaju za svrhu umanjeње percipirane vrednosti društveno neophodnog rada, dovodeći do potplaćivanja i potcenjivanja radnika: vizija društva bez rada zanemaruje pitanja nejednakosti i eksploatacije i preusmerava fokus sa kontrole rada na slobodno vreme. U muzičkoj industriji, VI se ističe u repliciranju stilova i generisanju pesama na zahtev korisnika, demokratizujući pristup stvaranju muzike kroz platforme kao što su Mubert, Amper Music i IBM Watson Beat. Međutim, upotreba VI u muzici donosi brojne kontroverze, posebno u vezi sa korišćenjem podataka. Nova generacija VI za optimalno funkcionisanje koristi velike podatke koji se automatizovano prikupljaju, što može ugroziti privatnost korisnika, ali i integritet nečijeg umetničkog izraza. Nedavni slučaj pesme „Heart On My Sleeve” na TikToku, koja je imitirala vokale Drakea i The Weeknda bez njihovog učešća, izazvao je debate o autorskim pravima i etici u muzici generisanoj putem veštačke inteligencije. Udruženja muzičkih umetnika pokrenula su pitanja koja se tiču kontrole nad podacima i zaštite umetnika od imitacija, što takođe pokazuje rastuću zabrinutost u industriji u vezi sa devalvacijom kreativnog rada i potrebom za zaštitom umetničkog integriteta. Naizgled paradoksalno, digitalni alati veštačke inteligencije dovode do novootkrivenog značaja ljudske kreativnosti, a posebno procesa slušanja, kao i potrebe da se muzički rad kao realan, materijalni proces, dokumentuje i načini transparentnim.

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QUESTION OF KNOWLEDGE IN ACTIVE USAGE OF AI TOOL “CHATGPT”

Abstract: The paper analyzes the outcomes and usefulness of ChatGPT after being prompted by the user to collect information in the field of arts and humanities. The research questions whether AI methodologies make it easier to find precise sources, or whether the methodologies move us away from the topic we are supposed to know how to precisely communicate. Another question that naturally surfaces is the copyright of the generated text, taken that the tool itself is a storage of already published papers and articles. As such, if we use that information, do we mimic someone else's work? Materials used in research are forums, academic papers, and ChatGPT results themselves. The research method is based on comparing forum discussions and showing different sides of the ethical usage of ChatGPT. There is a possibility of two different approaches, one confirming copyright infringement, and the other arguing how AI tools are helpful. As we are currently ending the first quarter of the 21st century, learning about the newly emerged AI tools is our obligation. The topic is valuable because writing about the proper usage of AI tools means exposing both positive and negative changes of AI in arts and humanities research.

Keywords: artificial intelligence (AI), copyright, ChatGPT, prompting, data, knowledge, academic research.

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Introduction

Artificial intelligence (AI) has made its way into academia, government, and business since it was first established as a concept in the 1950s. Over the past seven decades, different notions of AI have been examined, from machine learning (ML) and natural language processing (NLP), and now through the everyday usage of handy assistance tools such as ChatGPT. Artificial intelligence is a complex sociotechnical artifact that must be understood as a phenomenon created through intricate social processes, just like all other technologies (Eynon and Young 2020).

In academia, AI-driven tools assist researchers as they can now easily access information repositories, or aid journals in preventing plagiarism as well as helping publishers find potential peer reviewers. Both for students and professionals engaged in research, the digitization of archives and libraries has democratized access to knowledge and made it possible for individuals to acquire information.

However, this convenience has been widely criticized due to a question of ethics, creativity, and originality of ideas which must always reflect the author's knowledge on the subject. One notable concern is the possibility of AI tools to disturb coherent thought an intellectual should develop, by providing information that is not always true. According to the American Society of Health-System Pharmacists, at the Midyear Clinical Meeting December 3rd–7th in Anaheim, California, when ChatGPT was asked to cite references it generated false information and fake citations to support the responses. Only 10 of the 39 ChatGPT-provided responses were judged to be satisfactory (ASHP 2023).

So, are we becoming disconnected from the subjects we are exploring? It seems that the ChatGPT approach may not go deep enough into the assigned topics. This idea of detachment from the paper shows a significant shift in our research and learning methodologies, and we are moving away from the traditional approach of immersive research, where we study multiple books and understand their content. Instead, we seem to be opting for convenience.

History of AI

The idea of AI had become ingrained in the minds of a generation of scientists, mathematicians, and philosophers by the 1950s. One such individual was the young British polymath Alan Turing, who investigated the mathematical potential of artificial intelligence. Turing argued that since humans use available

information along with reason to solve issues and reach decisions, why shouldn't machines be able to do the same? His 1950 paper, *Computing Machinery and Intelligence*, which discussed how to create intelligent machines and how to assess their intelligence, was organized along these logical lines:

I propose to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous, if the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words. (Turing 1950)

The Massachusetts Institute of Technology (MIT) professor John McCarthy coined the term "artificial intelligence", which Carnegie-Mellon University professor Marvin Minsky defines as "the development of computer programs that engage in tasks that are currently more satisfactorily performed by humans because they require high-level mental processes like perceptual learning, memory organization, and critical reasoning". The Rockefeller Institute sponsored a conference at Dartmouth College in the summer of 1956 that is regarded as the beginning of the discipline (Council of Europe). Today, in the era of big data, we can gather enormous amounts of data that would be difficult for a person to process. In this regard, the use of artificial intelligence is successful across several industries, including technology, banking, marketing, and entertainment. We've seen that big data and massive computing can enable artificial intelligence to learn through brute force (Rockwell 2017).

Reasoning behind the chosen resources

In this research, resources can be categorized in three separate forms. First, we have online forums as platforms designed for open discussions, which offer volumes of subjective opinions and feedback. These platforms serve as valuable sources of information for scholars and researchers seeking insights from a diverse range of perspectives. The forum of choice was Reddit, founded in 2005 by Steve Huffman and Alexis Ohanian (Jaehnig 2022). It allows users to post content in various categories, known as subreddits, where they can openly express opinions, share links, and engage in discussions. Reddit's design emphasizes user-driven content curation, with upvotes and downvotes determining content

visibility. The platform has a diverse user base and covers a wide range of topics, from news and entertainment to niche interests. In 2024, Reddit became a publicly traded company (Holt 2024).

Secondly, academic papers that have tackled technological advancements that play a pivotal role in research endeavors, adding to rigorous academic standards. These scholarly publications delve into technological development, providing an academic foundation of knowledge that this paper can build upon inside the field of arts and humanities.

Lastly, the third category involves the utilization of results generated by ChatGPT, a prominent artificial intelligence tool. Presently, ChatGPT holds a strong position among various AI tools and is extensively used in research. As stated on The Netherlands Ministry of Foreign Affairs website, only 8% of European enterprises were using AI technology in 2021. This percentage had at least doubled by January of 2023, and in some industries, as many as 75% of European enterprises are now using AI technology. The main reason is the launch of ChatGPT in the autumn of 2022 (CBI 2023).

To sum it up, I dedicated this paper to developing the discussion on knowledge, originality, and credibility of ChatGPT usage, backed by the folk in online forums and academic papers. In addition, I added ChatGPT outcomes to enhance the arguments when it comes to real-life situations.

The research approach employed here is a dialectical method. It involves presenting a well-defined thesis, stating that AI is beneficial in research endeavors, followed by an antithesis, which asserts that AI may not be beneficial due to knowledge superficiality. In essence, this provides a comprehensive understanding of the role that AI plays for scholar researchers, and a bit further than that. The paper also utilized the data gathered from the online forum Reddit, which intends to show several different opinions, regarding the possibility of employing artificial intelligence where the distribution of expert knowledge is needed. The topic that users are talking about, and the dates and periods, might make a change in the overall opinion structure. The latest opinions will be taken into account, with sufficient comment following the contemporariness of the issue and the outline of this paper's topic – creativity and knowledge in times of ChatGPT.

A study showing usage of artificial intelligence in academia

Even though just over half of researchers do not use AI in their work, the percentage of researchers who use AI heavily has increased since 2020, to about one in six (Mulligan 2022).

To what extent do you use Artificial Intelligence (AI) in your research? Please indicate your response on a five-point scale where 5 is extensively and 1 is not at all.

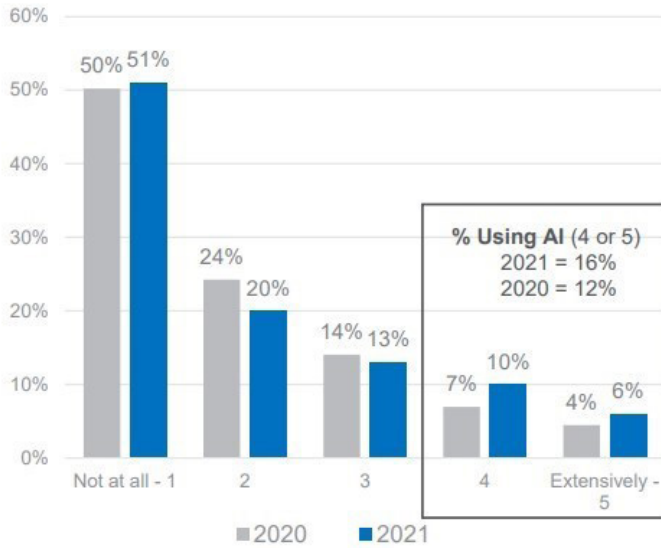
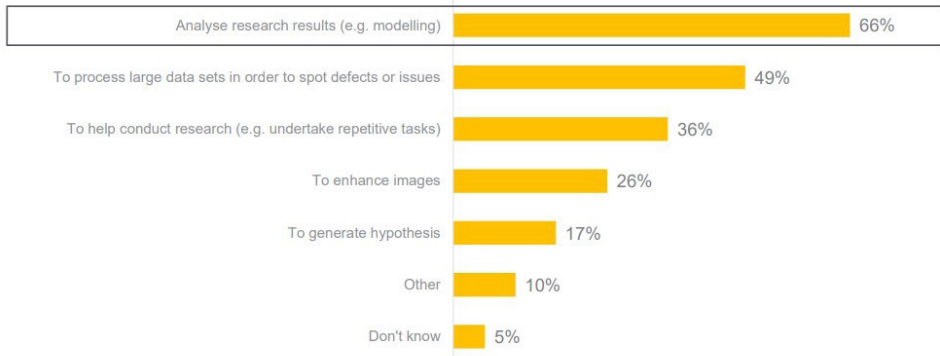


Figure 1. Usage of artificial intelligence in 2020 and 2021. Image taken from Elsevier, 2022, 24.

How do you use Artificial Intelligence (AI) in your research?



Base: All researchers who use AI n=479

Figure 2. The most common justification for using AI was to analyze research results (using modeling, for example). Image taken from Elsevier 2022, 25.

Even though researchers doubt AI's ability to replace human understanding and intelligence, more people than in 2020 are willing to read articles relying on

AI for peer review. As one of the surveyed academics stated: “Artificial intelligence (AI) is fairer than human peer review, human peer review is not a good thing because reviews are biased by the subjective view of the reviewers, reviewers are not balanced in comparison to AI.”



Figure 3. In 2021, more people agree on using AI as a way to objectively review academic papers; but the disagreed group is almost equal due to human capabilities being superior. Image taken from Elsevier 2022, 28.

The survey Research Futures 2.0: A New Look at the Drivers and Scenarios That Will Define the Decade was undertaken in the United Kingdom during 2020 and 2021, when two separate surveys were conducted, asking questions ranging from collaboration and education to open science and public engagement. The survey was administered online and available in the English language only, taking about 20 minutes to complete. The audience for the first research in 2020 were $n=1,066$ and for the second research in 2021 were $n=1,173$.

The article “The Age of AI Has Begun” (Gates 2023) states that pointing and clicking or tapping on menus and dialogue boxes won’t be your primary method of computer control. You will be able to write a request in a straightforward way instead. Additionally, developments in AI will make it possible to create a personal agent. Consider it as your own digital assistant: it will be aware of your most recent emails, the meetings you attend, what you read, and what you don’t want to bother reading.

Some countries are already ahead of others, and this time it’s The Netherlands. Collaboration is essential for creating an inclusive strategy for the use of AI and ML in academia and other sectors. Dutch Prime Minister Mark Rutte introduced Elsevier’s TechHub at the start of 2019. It supports initiatives to coordinate the creation of AI-enabled technologies between the public, academic, and private sectors (LexisNexis 2023). Another example of how cooperation between the private sector and academic institutions can enhance the application of AI and ML technologies is the Innovation Center for Artificial Intelligence in Amsterdam, which is linked to Elsevier’s TechHub.

But, let's proceed to the ChatGPT itself, and the way it forms its answers for the public.

Task '5 European Philosophers'

Provide top 5 European philosophers who are also musicians, in 100 words.

Default (GPT-3.5)

H Provide top 5 European philosophers who are also musicians, in 100 words



1. Jean-Jacques Rousseau: The Swiss-French philosopher was an accomplished composer, known for his operas and musical theory, influencing both philosophy and music.
2. Pyotr Tchaikovsky: The Russian composer and philosopher explored themes of emotion and existentialism in his music, reflecting his philosophical musings.
3. Arthur Schopenhauer: The German thinker, also a skilled pianist, incorporated his metaphysical ideas into music, emphasizing the power of art to reveal life's deeper truths.
4. Friedrich Nietzsche: A prominent German philosopher and composer, Nietzsche's views on aesthetics and the relationship between art and life echoed in his musical compositions.
5. John Cage: An avant-garde American philosopher and composer, Cage's innovative ideas about chance and silence profoundly impacted his musical compositions, reflecting his philosophical explorations.

Figure 4. First attempt; correspondence between the author and ChatGPT. Chat-GPT answers in 2023 to a prompt “Provide top 5 European philosophers who are also musicians”.

The results are as follows:

Jean-Jacques Rousseau: The Swiss-French philosopher was an accomplished composer, known for his operas and musical theory, influencing both philosophy and music. Pyotr Tchaikovsky: The Russian composer and philosopher explored themes of emotion and existentialism in his music, reflecting his philosophical musings. Arthur Schopenhauer: The German thinker, also a skilled pianist, incorporated his metaphysical ideas into music, emphasizing the power of art to reveal life's deeper truths. Friedrich Nietzsche: A prominent German philosopher and composer, Nietzsche's views on aesthetics and the relationship between art and life echoed in his musical compositions. John Cage: An avant-garde American philosopher and composer, Cage's innovative ideas about chance and silence profoundly impacted his musical compositions, reflecting his philosophical explorations (ChatGPT November 2023).

In Figure 4, the prompt used for the first attempt for generating the information was clear when it comes to two meaningful points, crucial points in the search – musician and philosopher. The other point that the prompt highlighted is that the answer should not be longer than 100 words, which made ChatGPT compute the results in under 100 words. What is interesting here, is that the prompt didn't direct the ChatGPT to explain the choices. The tool itself decided to compose the information.

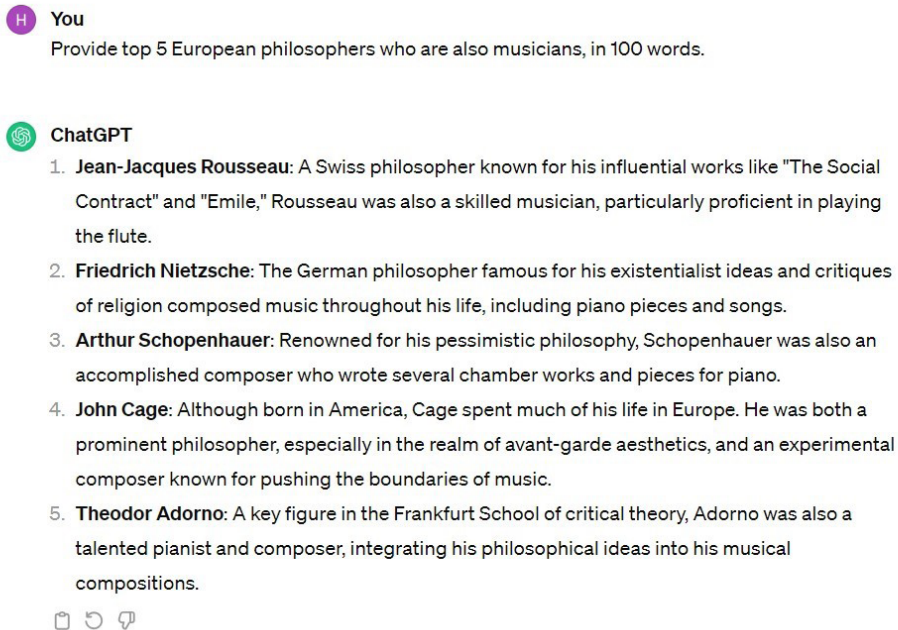


Figure 5. Second attempt; correspondence between the author and ChatGPT. ChatGPT answers in 2024 to a prompt “Provide top 5 European philosophers who are also musicians”

The results state:

Jean-Jacques Rousseau: A Swiss philosopher known for his influential works like "The Social Contract" and "Emile," Rousseau was also a skilled musician, particularly proficient in playing the flute. Friedrich Nietzsche: The German philosopher famous for his existentialist ideas and critiques of religion composed music throughout his life, including piano pieces and songs. Arthur Schopenhauer: Renowned for his pessimistic philosophy, Schopenhauer was also an accomplished composer who wrote several chamber works and pieces for piano. John Cage: Although born in America, Cage spent much of his life in Europe. He was both a prominent philosopher, especially in the realm of avant-garde aesthetics, and an experimental composer known for

pushing the boundaries of music. Theodor Adorno: A key figure in the Frankfurt School of critical theory, Adorno was also a talented pianist and composer, integrating his philosophical ideas into his musical compositions (ChatGPT February 2024).

In Figure 5, the prompt is same as in the Figure 4. The answer in Figure 5 is similar to Figure 4. This kind of general prompt question shows that ChatGPT doesn't have consistency when answering questions, and needs complete context and direct input by the user to provide sufficient information. If one really needed a list of any musicians who were also philosophers, from any country in the world, written in less than 100 words, then ChatGPT would give them exactly that. No mistake here, the knowledge is as plain and simple as it can get. We can see that the set of information given described exactly what was needed, and in both cases with an explanation that can further help the user in understanding the context of their own question. This provides an argument when it comes to the benefits of using ChatGPT – not only does the user get the information which they need, but also a wider context to their question. This shows that ChatGPT works on a completely neutral ground even when it comes to itself. But what about ideologies, literature analysis, scientific conclusions and implications? Can ChatGPT really have a say in this?

Do users know how to word the prompt, so that ChatGPT can recognize the user's question, and then provide an output with concrete information? The possibility of wording prompts badly is very high, because when it comes to it, ChatGPT is a program that reads instructions. To provide an example – GitHub, the open source community for developers, explains that their prompt knowledge base covers brainstorming research ideas, language and styles, conducting literature reviews, and developing research plans (Ahmetbersoz n.d.).

So, can we be even more precise with AI giving us exactly what we need, or do we slowly start lacking additional context and additional knowledge – even if it's just in the form of a quick-fix distributed by the most used artificial intelligence tool today? To get more precise information, the user has to provide ChatGPT with concrete information about their focus. And what is needed for precise context, historical background, style, language, focus, and a plan on how to use the information?

Comments extracted from Reddit

Although the usage of ChatGPT proved that knowledge can be a variable when it comes to AI tools, this part of the paper shows comments by anonymous forum users. It shows more general feedback on current usage of artificial intelligence in academia, and arts and humanities respectively. The reason why taking

the time to extract comments from Reddit was necessary is the demographic values that form part of qualitative research. Here, we have internationally based academic staff or students who are eager to maximize their results and minimize their research time. Although this may seem almost like a capitalistic remark on science, it actually stems from the intellectuals themselves who want to develop their ideas in a more effective and less time-consuming ways.

I decided to take a look at Reddit and provide this paper with the raw thoughts of people who decided to use AI for their research and academic writings. Reddit is a social news aggregation and discussion platform where users can submit, share, and discuss content on various topics. Organized into communities called “subreddits”, users vote on posts to determine their visibility. It’s a diverse hub for conversations, information sharing, and community engagement (Csutoras 2020).

On the Reddit thread named “Are there appropriate uses for chatGPT in academic work or is it too much of an integrity bungle?” (DrainerMate 2023), the discussion started out discussing integrity and knowledge, and a Reddit user stated the next argument:

I care deeply about the integrity of my work, I care deeply about uncovering truths and interpreting/presenting them appropriately/responsibly. I believe honestly that chatGPT greatly enhances my potential contributions to human knowledge. Do my fellow academics disapprove of my chatGPT use? (DrainerMate 2023)

One of the answers doesn’t comment on the ChatGPT but on other AI tools – such as “Grammarly”, which has been in use for several years, quite openly in academia circles as a way to edit written content. “Grammarly” is an AI-powered writing assistant that enhances written communication. It detects and corrects grammar, spelling, punctuation, and style errors in text, providing real-time suggestions and explanations. It’s widely used for professional documents, emails, and more, helping users improve their writing clarity and correctness (Grammarly 2024):

I used it like Grammarly’s advanced tools you normally have to pay for. It helped me rephrase a paragraph that was a little clunky and I had writers block on how to untangle it. (JackMitcham 2023)

Perspectives are not given only by the everyday users for their email generation tasks, or for inquires on news ideas that ChatGPT can provide when writer’s block arises. Reddit’s users are also professors, researchers, and scientists who share their expert knowledge in research tasks and usage of ChatGPT. This widens the potential of understanding the different needs of the users, and also how data which ChatGPT generates are used in professional academic surroundings.

The following user is a technical editor and former research scientist who provides content and language editing for researchers both native and non-native, and helps them to articulate the research results clearly:

I'm excited about the capacity of AI to do some of my editing work for free—academic writers can now quickly and easily polish awkward or ungrammatical language. (Some companies I work with have long used in-house AI tools with manuscript submissions.) I see the lower barrier as the key advantage right now. I will note, however, that ChatGPT and other such services lack a couple guarantees that a human editor can provide (...) (Chemomechanics 2023)

On the other hand, a 20-year-old male college student, as he describes himself in his individual thread “20M college student” (uselessurprise 2023), states that ChatGPT just changed the academic landscape forever:

This was magic. Fast forward to today, as finals are hitting, I've written 6 papers for people and made a great chunk of change. ... I mean, I'm thankful I'm almost done school and I've always been a strong writer, but I deeply worry for the future generations of students. 130 million Americans already can't read at the basic level, and writing is such a strong proponent in developing strong linguistic and literary skills. (...) (uselessurprise 2023)

This was written one year ago, January 2023, meaning that today ChatGPT is widely used and already academics are worried about what is happening. People from all over the world are using it to write their papers, to get information, or impress someone with their (or not so *their*) poetry. What happens, is that some are giving ideas on how this might end up, or what measures can academia (in the following comment, the professors) provide that will make this go a different route, with a final effect of poor social and literacy skills for students:

Most of the people think that checking knowledge is needed to do the necessary caution. Colleges will probably bring back in-person vivas, where you have to present on a topic and then defend it to a panel of experts who can ask you anything. This will negatively impact people with social anxiety, those who can't talk fluently in the language the viva is in, and others who struggle with oral presentations. (Delwyn_dodwick 2023)

When it comes to the professors themselves, there was a heated discussion in the subreddit named “How has ChatGPT changed the way you teach?” (zrbf 2023). Some decided to actually consciously use ChatGPT to provide a real advantage so that students are aware that it can be used, but still using their own knowledge:

I'm in a teacher preparation program. I assign my students to ask ChatGPT to generate a lesson plan. Students then have to evaluate it, drawing on theory and empirical research to critique the lesson. (zombie_barbarossa 2023)

On the other hand, others are still following the 'strict professor' route, not letting ChatGPT or any similar AI tools get into their classrooms:

It's a bulls**t generator that produces vaguely plausible but usually incorrect answers. (...) The only safe way to deal with it, at the moment, is to tell students not to use it, that it will be obvious if they do, and that it will be no help at all when it comes to their in-person, internetless exams, which we are all rushing to get back to as quickly as possible. (blueb0g 2023)

Reddit makes it easy to find thoughts and feedback by people of different backgrounds, even contradicting points of view. How safe, or unsafe, prompting ChatGPT can be is shown in the task above on 'European Philosophers'. The task proves how the prompts have to be expertly written for the AI tool to understand them and provide a concrete answer. Together with feedback by Reddit users, this shows the complexity of fair and clear usage of ChatGPT. ChatGPT results rely on the data that the system already has, so it does not have information on more recent topics. When it comes to the generation of the results, it is based on data patterns, which means it can produce incorrect answers (Gewitz 2024). This gives more space for research about how knowledge about AI tools can be acquired and what ways can it provide quick, effective and true information, while following regulations of ethical research.

Creativity in art – to AI chat or not to AI chat

The following list is sourced from the Penji.co platform for outsourcing international visual artists. The first example is roboticist and AI researcher Alexander Reben who is well-known for his AI artworks, and the "Blind Self-Portrait" series (Garces, "12 AI Artists Who Exemplify the Weird World of AI Art"), which Reben created, is his most well-known creation. In this series, Reben trained an AI algorithm to produce self-portraits based on descriptions provided by people who had never seen themselves. The second example is multidisciplinary artist and designer Scott Eaton, who uses traditional artistic methods combined with digital tools to produce hyper-realistic sculptures and figures. The "Artist+AI: Figures & Faces" series is one of Eaton's noteworthy endeavors, as he worked with AI algorithms to investigate the viability of producing realistic-looking digital portraits. He created new variations and interpretations of human faces by

training AI models on enormous datasets of facial features. Eaton's AI artwork has been displayed internationally in galleries and at exhibitions such as the VIEW Conference 2022 in Torino, Italy. The third example is Taryn Southern, a multi-talented artist best known for her music production career, but also as a singer-songwriter and filmmaker. In her songs and performances, she makes use of AI technologies, algorithms, and machine learning techniques. She has worked with AI programs to produce music, lyrics, and songs, and AI algorithms were used to co-write and co-produce her album "I AM AI". The album demonstrates how human creativity and AI can combine to create a distinctive fusion of electronic and pop music (Garces 2023).

These artists are as examples from each individual art discipline (illustration, sculpture, songwriting) that show the possibility of effective relations between art, science, and artificial intelligence.

Conclusion

The digital age has developed into a new era of research and information access. Technological advancements, including digital archives and search engines, have made our lives easier by providing access to vast amounts of information. While these tools have been widely embraced, it is essential to develop the skills needed to navigate the digital landscape effectively. As we continue to adapt to this ever-evolving technological landscape, we need to find a balance between real knowledge and the effectiveness of research methodologies.

The integration of artificial intelligence into arts can be useful in analysis tasks or even help in the development of ideas that can make a difference. As proposed by the Reddit users who are actively participating in academia, the life we currently lead is not much changed with ChatGPT, as this tool's potential needs to be further aligned with users' needs. In addition, the users themselves have to learn how to make the correct prompts to get the wanted results. However, concerns about the authenticity and integrity of the final product are a top priority because each day artificial intelligence is used by researchers, students, and professors.

We have already seen the results that ChatGPT can produce, how it responds to prompts, and what ability it has to process vast amounts of text quickly, identifying patterns and themes across a wide range of literary works. That accelerates the research process and enables scholars to focus on deeper analysis and interpretation. In addition, ChatGPT's translation capabilities can help bridge linguistic gaps, allowing researchers to quickly access large documents no matter the language in which the document is written. However, the integration of AI in the arts and humanities means that ChatGPT's data is sourced from the

internet, and if not carefully monitored and addressed, AI-generated insights could lead to incorrect conclusions. Another concern is the potential fall of human creativity as the generated content lacks the depth of authentic human experiences. Relying solely on AI-generated content should not overshadow the contributions and insights that human researchers, artists, and scholars bring. The ability to assist in analysis must be done ethically, preserving the authenticity of human expression.

Researchers, artists, and scholars must approach AI-generated content as a tool to benefit working processes and productivity, not as a replacement for their artistic insights and creativity.

As discussed earlier, the knowledge shown by ChatGPT has to be precisely funneled and measured due to the tool's large databases which categorize the needs of the users only after the user has stated exactly what he needs. So, in any case, the user already needs to have information about the field of research, and this already removes the possibility of empty-headed ChatGPT-supported publications. The papers will always have critical thinking and originality.

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QUESTION OF KNOWLEDGE IN ACTIVE USAGE OF AI TOOL “CHATGPT” (summary)

Technological advancements have made our lives easier, starting from the digital archives that can be searched through our PCs by logging into the institution’s platform, to googling a term of our dissertation and getting useful answers in the first five pages. This notion has been accepted not only by students but also by professionals in research circles because the availability of massive amounts of information has simplified many research methodologies.

When it comes to the present paper, the materials that are going to be used in the research process are: a) forums on Reddit as the most popular free-speech platform that provides massive amounts of subjective feedback, b) academic papers on technological development impacting ethics and strict academic standards, and c) results by ChatGPT prompted with straightforward instructions.

The starting point will be a definition of artificial intelligence and then a focus on the academic sector. This will be a challenge, given that AI has not yet been officially included as a means of use. After which, I will proceed to a classification of the different ways that AI has aided in research. Then follows a forum discussion examining which ways it has helped, or whether students’ cognitive functions and operational knowledge are on the decline. At this point, almost leaving the first quarter of the 21st century, we do not need to read five books to get the knowledge we are looking for. We can look for certain paragraphs that give us clear information. In addition, ChatGPT lists that information in an even faster way. So, are we moving further away from knowledge?

The method in this paper will be only outlined as a dialectical method of research, more as a discussion. It will present a thesis (AI helps), and an antithesis (AI does not help), as this controversial topic has only two types of audience – ones that are cheering for the AI changes, and ones that are against it. This method will be also used together with an examination of academic papers as well as professional texts published on valuable and authoritative platforms that comment on technological assistance in research activities.

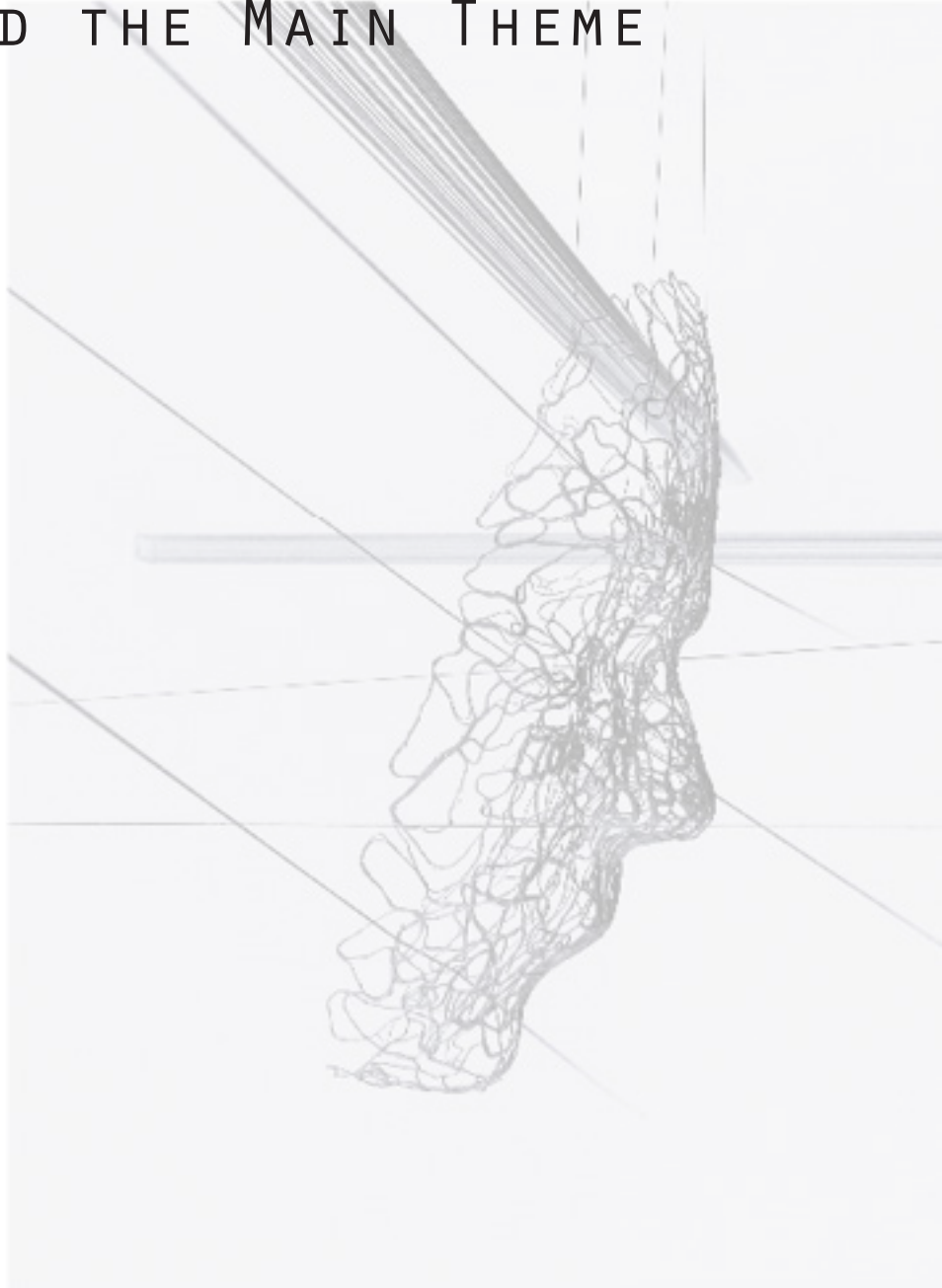
With the information collected from the forums, I will include the above-mentioned components, a conclusion about the perception of using artificial intelligence for research purposes, and the creativity issues that might arise. This means that I will spice up the basic discussion with information coming from the real world, and concerning the users of ChatGPT as much as the professors who grade papers, journalists who write double-checked articles, and artists who prefer the human soul as a creative source just a tad more than the prompted AI discussions.

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Scholarly polemics

BEYOND THE MAIN THEME



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SPIRAL OUROBOROS: METASIMULACRUM IN ROCK AND METAL ELECTRIC GUITAR PROCESSING AND MODELING TECHNOLOGIES

Abstract: The article reviews Jean Baudrillard's concept of simulacrum and puts it in dialogue with the evolution of signal processing technologies for electric guitar, introducing the concept of *metasimulacrum*—a simulacrum of a simulacrum—to describe the historical trajectory from early electric guitar amplification to recent advances in digital signal processing, taking a critical stance on technological determinism.

Keywords: metasimulacrum, simulacra, electric guitar, processing, modeling, metal music, Baudrillard.

By Way of Preface

As a 45-year-old rock and metal guitar player, I find myself needing to lighten the burden of carrying around bulky amplifiers, cabinets, pedalboards, cabling, stands, and guitar cases. Instead, I get to the stage, set up my digital processing gear, and take part in the Baudrillardian hyperreality event that is a rock or metal performance.

All rock and metal guitarists face this choice these days: on one hand, carrying light digital equipment and sound processing systems which connect

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quickly onstage is the practical option (Figure 1); on the other hand, showing off heavy and bulky analog valve or solid-state Marshall, Randall or Mesa Boogie full stacks has symbolic value within the traditional metal concerts aesthetics (Figure 2).



Figure 1. Author's pedalboard within a suitcase-sized carrying bag: guitar modeling processor, IR cabinet emulator, MIDI controllers and DI box (Photograph by author, June 2024).



Figure 2. A 3 x 6 stack of Marshall guitar cabinets (the setup of Jeff Hanneman from Slayer) on the Tuska Open Air Metal Festival main stage in 2008. Note that only two cabinets are miked, pointing only one speaker within each cab (Date 29 June 2008. Source: super work. Author: Jaakonam. Creative Commons Attribution-Share Alike 3.0 Unported license).

In the following sections, we will review Jean Baudrillard's concepts of *simulacrum* and *hyperreality*. We will relate them to a diachronic review of electric guitar's processing technologies. Also, we'll discuss the acoustic problem posed by the timbral peculiarities of amplification within the context of distorted guitar music ensembles, mainly the heaviest rock forms that led to metal genres that rely heavily on distorted guitar sound. This will lay the foundation for extending Baudrillard's concept of simulacrum to *metasimulacrum*, which I use to critique claims of technological determinism in the history of the electric guitar. Other than forging a linear path toward new sounds, this traces a spiral ouroboros, a rather oxymoronic image which accounts for discovering new expressive tools in their recursive search for fidelity to an already surpassed original.

Simulacra and hyperreality according to Baudrillard

French social theorist and philosopher Jean Baudrillard (1994) addressed the concepts *simulacrum* within his critical theory of society and culture.² *Simulacrum* refers to a copy or reproduction in which the original fades. In Baudrillard's world, the simulacrum is a representation that has lost connection with reality. It is not simply a copy of the real, but a creation that precedes and determines reality itself, in a process he calls "the precession of simulacra" (Baudrillard 1994, 9): simulacra reveal how in postmodern society, representations have become more important and "real" than the objects or events they supposedly represent. An example of a simulacrum could be wearing a counterfeit T-shirt stamped with a prestigious clothing brand's visible logo: it is irrelevant whether we believe that a counterfeit T-shirt is authentic. The sign gains its own value while losing contact with the reality that is supposed to ground it.

To understand the precession of simulacra, Baudrillard organizes them into three different orders (Baudrillard 1994, 9):

- **First Order Simulacra:** They correspond to a pre-modern phase in which imitation seeks to faithfully represent reality. In this order, there is a clear distinction between the territory (reality) and the map (representation). First-order simulacra attempt to be reflections of reality, maintaining a

2 Although Baudrillard addresses the concepts of both simulation and simulacrum, his focus is not on detailing a philosophical distinction between them, but rather on understanding how the logic of hyperreality is based on successive orders of simulacra. Simulation, for Baudrillard, is the general concept that accounts for the process of generating the appearance of reality. In his words, "simulation threatens the difference between the 'true' and the 'false,' the 'real' and the 'imaginary'" (Baudrillard 1994, 11), while the different orders of simulacra are the ways it deploys in society.

direct and obvious relationship with their referent. That is, the simulacrum is a clear copy of an existing original. This order refers to the faithful copy or representation of reality. The sign (representation) and the real are distinct, and the sign reflects reality. A painting of a landscape can be a good example. The painting represents a real place, and there's a clear distinction between the painting as a sign and the actual real landscape.

- Second Order Simulacra: They emerged in the era of industrial production, characterized by the ability to reproduce objects on a large scale. In this order, the distinction between the original and the copy begins to blur. Second-order simulacra not only replicate reality, but also aim to improve or perfect it, introducing an element of *hyperreality*. Reproduction does not so much seek to imitate the original, but rather to replace it or improve its perception, generating versions of reality that can be considered even "more real than real". The sign starts to mask and distort reality, leading to a perception that mixes reality with representation. A photograph in a magazine that has been edited to make the model look flawless is a sign that distorts reality, the actual appearance of the model, making it hard to distinguish between the real person and the edited image.
- Third Order Simulacra: They represent the contemporary phase according to Baudrillard, marked by the digital age. In this order, reality and representation merge to the point that the original is no longer necessary and may not even exist. Third-order simulacra are characterized by generating completely new realities that have no link with the reality they supposedly represent. Here, the simulacrum is not just a copy, but creates its own referent. Not only does the map precede the territory, but the territory no longer exists independently of the map. We are, then, in the era of *hyperreality*, where the real and the imaginary intermingle in an indiscernible totality. The distinction between reality and representation disappears, and the simulacra becomes the new reality. In a virtual reality (VR) game, players interact with a fully simulated environment that has no direct connection to the real world. Simulacrum is experienced as a reality in its own right, laying the foundation for understanding phenomena such as flight simulator games that train military drone pilots (Raza et al. 2016, 17).

Baudrillard sees these orders as stages in the evolution of society and its relationship with signs and representations. As he moves from one order to another, he argues that we move further and further away from reality, entering a world dominated by simulacra, where the real has become indistinguishable from its

imitation and, ultimately, irrelevant. Simulacra tend to be copies without originals, creations that define and precede reality, contributing to an era of *hyperreality* where distinctions between reality and representation fade.

Hyperreality (Baudrillard 1994, 17) is a concept that refers to a condition in which reality and simulacra are indistinguishable. We live, according to Baudrillard, in a “hyperrealism”, where simulacra dominate and shape our perception of reality, to the point that the distinction between reality and representation becomes irrelevant. In hyperreality, the boundary between what is real and what is a representation or a simulated reality blurs to the point where they merge, creating a new form of reality that is a mix of both. This new reality is constructed by media, technology, and symbols, and it can be more compelling or convincing than actual reality. Representations such as images, media, and virtual environments become more real and influential than the actual objects or experiences they depict. People begin to live within simulacra, treating them as more real or significant than their tangible experiences, as can be exemplified by the extensive use of TikTok’s or Snapchat’s filters: the distinction between reality and illusion, original and copy, becomes meaningless as they blend into one seamless experience (Singh and Singh 2021, 288–304).

Baudrillard (1994, 10) himself gives Disneyland as an example, where visitors experience a highly controlled and idealized version of reality. The environments and interactions are meticulously designed to create a perfect, immersive experience that feels more real and enjoyable than everyday life, thus becoming the “real” experience for visitors, overshadowing the actual, less perfect reality outside the park.

In the rest of this article, I show that the development of guitar processing technology has been guided by a logic of recursive simulacra, to the point that it surpasses Baudrillard’s third order. First, we will survey the history of electric guitar amplification devices, which began with tube amplifiers in the mid 20th century and moved through the invention of spring reverb and tape echo effects, solid-state distortion, digital effects and modeling software, and arrived at impulse response processing (Light 2022, 55–59). This will provide background for a Baudrillardian analysis of the logic of current modeling technologies.

A Diachrony of Electric Guitar Sound Processing Technologies

During the first half of the 20th century, tube amplifiers were the standard for instrument amplification (Carrasco-Filisola 2021, 55–65). At the beginning, they came merely as a solution to the acoustic problem of making perceptible and discernible the sound of the guitar that was buried under the intense sonority of percussion and brass in jazz ensembles. Soon, musicians discovered

that by pushing the volume beyond its nominal capacity, i.e., saturating the electronic gain stages of the devices, the amplifiers produced a saturated or “distorted” sound that added a unique harmonic richness. This accidental “distortion” became a sought-after characteristic for genres like electric blues and early rock, and spawned a whole palette of saturation sound effects ranging from mild and creamy overdrive and thick valve crunch, to crackly solid-state transistorized fuzz and full out hard distortion, characteristic of hard rock and metal music.

At the same time, time-based effects such as reverb or echo were introduced, and some were included in guitar amplifiers (Carrasco-Filisola 2021, 66–68). Spring reverb used a set of springs to create a lingering echo effect, adding depth and space to the guitar sound. Concurrently, tape echo devices, like the famed Echoplex, used magnetic tapes to record and play back the guitar sound with a slight delay, creating echo and repetition effects that could vary in intensity and duration. Such processes were patterned after real sounds in the world: the sound of playing in specific rooms or ambiances. This opened the door to modulation effects such as chorus, phasers, and flangers, which were originally achieved by physically manipulating tape device motors and tape rollers.

As technology advanced, amplifiers and effects pedals began to use transistors instead of tubes. These devices were smaller, more reliable and cheaper. The digital revolution of the 1980s brought the first digital effects, which used digital signal processors (DSPs) to emulate or surpass traditional analog effects. This opened a plethora of sonic possibilities, from modulation and delay to complex reverberations and distortions, all with unprecedented precision and flexibility.

The evolution continued with the development of amplifier and effects modeling software, allowing musicians and producers to accurately simulate the sound of specific amps, cabinets, and effects pedals within a digital audio workstation (DAW). This advance democratized access to sounds that previously required expensive and hard-to-obtain equipment, leading to the latest frontier in sound modeling by the use of impulse response technology, which captures and reproduces the acoustic footprint of physical spaces, amplifiers, and speaker cabinets. This allows musicians and producers to load these “impulses” into their DAW or compatible hardware, replicating the character and response of specific equipment and environments with astonishing accuracy.³

As the next section shows, distortion plays its own role in the development of the heavy sound of hard rock and metal music, while raising certain peculiarities and problems in the context of sound production.

3 “(...)It seems safe to say that the KPA is well able to produce a very good and totally sufficient sound for popular music. Our evidence shows that average listeners would never notice, much less complain about, a bad guitar sound if the guitarist used the KPA (Kemper Profiling Amp) in the right way” (Düvel et al. 2020, 12).

Sound and Distortion in a Rock and Metal Ensemble as Acoustic Problem

Heaviness in music has been discussed as a combination of perceptions of several elements such as weight itself, size, proximity, density, volume, power, aggression, energy, emotion and intensity, which are not exclusively but greatly provided by the harmonic distortion of guitar sound (Mynett 2017, 9–21). Other heavy sound traits are noisy textures, specific locations of energy in the frequency spectrum related to noise formants, sustain and high frequency harmonics (Berger and Fales 2005, 194), as well as compositional choices such as rhythmic difficulty that enact “metaphors for both the material and the expressive dimensions of ‘heaviness’” (Hannan 2018, 438). These qualities are transmitted through compositional choices as well as individual and collective performances:

Sound distortion acts as a fundamental stylistic element in this music and is nothing other than the result of brutally elevating electrical gain with an audio signal, which raises harmonics (secondary and higher vibrations than those of a fundamental musical note, which are already present in said signal but are not the protagonists) in the audible range. In other words, distortion does not modify, change or replace, but rather manifests what is hidden, what is not heard in normal hearing. The distortion also puts in dialogue the performer’s technical skill and a timbral character that is expressive in itself: “The flow of associations, (...) shaping a sound through electronic equalization to playing through a Marshall amplifier, says much about the ways in which technological developments have sought to fill in where the resourcefulness of the musician once had to suffice” (Waksman 2001, 117). Aesthetically, it can be stated that distortion acts as a device that raises the whisper to the range of the scream. Specifically, metal, as a form of art, is distortion; it is the cry of what is buried by energy.

The technical characteristics of tube amplifiers require rock and metal guitarists to maximize the gain in order to achieve the desired harmonic richness of distorted timbres; to put it simply, with tube amps, one has to play really loud to get the desired tone. Now, distortion produced by transistorized or digital gear can be more controlled and less dependent on volume variations, allowing musicians to access a broader range of distorted tones with ease, but always with reference to all-out tube amp gain: “In a real sense, then, the brutal sound of the death metal guitar is impossible without the right level of volume, whether real or simulated” (Wallmark 2018, 67).

For example, if to achieve the harmonically rich timbre of a tube amplifier it is necessary to raise its volume beyond what most stage situations allow, and which are only achievable in the context of massive concerts for thousands of

attendees, the technologies of solid-state transistors and digital processors allow musicians to get closer to this timbre without requiring extreme sound pressure levels that pose a problem both from the perspective of public address sound mixing and for the monitoring of the musicians on stage. Let's keep in mind that whereas the human voice reaches 70 dB SPL at *fortissimo* (Dadafarin, 2017) or 80–85 dB SPL for a shouted vocal performance and a kit's bass drum is measured at 106 dB SPL and, by nature of its around 80 Hz fundamental frequency (Mynett 2017, 13), can be perceived as quieter by human ear, guitar amps reach 120 dB SPL (Dadafarin 2017) and can easily go beyond 140 dB SPL.

Thus, unlike other music genres whose execution is independent of the means to balance its different instruments sounds and voices, such as early jazz, most classical music, many traditional genres, etc., hardest rock and metal performances require electronic amplification that go beyond the acoustic structure of the ensemble itself. One doesn't need PA or technical support other than the acoustic instruments themselves to properly listen to tango or bossanova. Hardest rock and metal sonority is materially linked to devices that function as prosthetics so that its sound is adequately perceived by an audience, regardless of whether it must be loud and strong for it to be considered metal.

With the arrival of devices such as distortion pedals and compact reverb systems, the meaning of these processing technologies begins to revolve around simulated sounds: distortion, in relation to amplifiers; reverberation, in relation to architectural spaces. This simulacra logic is key, and Baudrillardian theory helps to understand it.

Rock and Metal and its Musical Technology as *Metasimulacrum*

The change over time of effect devices for electric guitar reflects not only advancements in sound engineering and cultural and stylistic shifts in popular music, but also shows how music production has shifted towards Baudrillardian logics. Although digital processing technologies since the 1980s offered possibilities beyond what was done before, they were always marketed with references to the sound and performances of what was already known as the golden era of rock, which by then had occurred 10 to 15 years earlier (Herbst and Vallejo 2023, 19–22).

In Baudrillardian terms, the three simulacra orders within the guitar technology realm have preceded another: a simulacrum that has become *meta*—that is, *beyond*—simulacrum. Amplification and microphone modeling technology, thus, constitutes a *metasimulacrum*. To better understand this idea, let's focus on one aspect of the development of the electric guitar. As stated before, the electric guitar gave a solution to the problem of the relative low intensity of the acoustic

guitar sound compared to brass and percussion sections in jazz bands. This need for mere amplification led inadvertently to an element of expressiveness in the amplifier's distortion from gain stage saturation (Santos-Morales 2016, 94).

While distortion was originally linked to high intensity and electric gain, when it became an expressive feature, it became desirable to achieve said distortion at manageable levels for smaller spaces. Pedals and other processing devices were designed so that enormous amplitudes were no longer necessary to achieve the desired timbral quality. Distortion, originally a consequence of intensity, becomes severed from actual intensity, but still achievable by analog or digital means. Possession, display and use of large and heavy amplification equipment in metal culture (Carasco-Filisola 2021, 105) is put into a dialectical relationship with considerations of practicality, portability, price, accessibility and convenience. Something similar happens to what is illustrated by a well-known saying in Mexico: "*Cualquier pendejo toca el tololoche, pero no cualquier pendejo lo carga*" ("any dumbass can play a *tololoche*,⁴ but not just any dumbass can carry it"); the display of brute force that involves the physical presence of the instrument and the actual musical and interpretive ability.

Modelling technologies model not only amps and cabinets, but distortion pedals, cabinets and cab miking itself. It appears that more than forward sonic exploration, it is backwards nostalgia that fuels these endeavors. The simulated sounds refer to techniques that are no longer necessary per se for the production of heavy sound:

In the recording and subsequent listening sessions, we were surprised by most profiles matching the original so closely that in a blind test, they could not be distinguished. The sound and the dynamic response were authentic. Another observation concerned the interpretation of the original amplifier's sound. The distorted sounds produced with an additional boosting pedal sometimes were resonating whilst lacking intelligibility in the presence range. The profiles however were quite different from the original but more apt for real musical use since the problematic features were corrected, making the sound more transparent as for instance in the case of the Fender Super-Sonic (Herbst et al. 2018, 497).

Making an ellipsis of the development of those technologies, we find a *meta-simulacrum* of music production technologies: currently, there is hardware that runs software that emulates both physical microphone systems such as devices that simulated the sound of the distortion of the tube amplifiers of the mid-20th century, distortion that was initially considered an undesirable consequence of the amplification of its time, and that today is an indispensable element of hard rock and metal music aesthetics.

4 *Tololoche* is Mexican slang for "double bass".

The metasimulacrum, extending Baudrillard's logic, is as follows:

- Reality: the sound of an acoustic guitar
- First order simulacrum: tube amplification that seeks to faithfully simulate the sound of the guitar, but louder. Electric guitars do not make much sound unplugged; the “real” reference point no longer exists.
- Second order simulacrum: pedals and solid-state amplifiers that simulate (and enhance or exaggerate) the distortion of tube amps and the spaces they're in (reverb, echo); recursion of first order.
- Third order simulacrum: digital devices (multi effects pedals) that simulate second order devices such as distortion pedals, tape echo and flanger machines or spring reverbs; recursion of second order.
- Metasimulacrum: Digital Signal Processing and Impulse Response technologies (such as AXE FX, Kemper Profiler, Neural Quad Cortex, and other software) that simulate the whole electric guitar chain from guitar pickup emulation to pedals, amps, cabinet and voicings to microphone models and positions; recursion of third order (Figure 3).

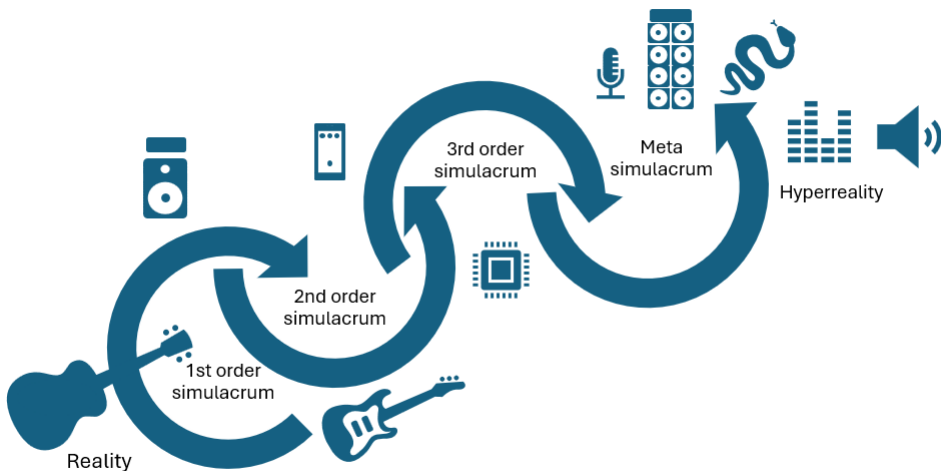


Figure 3. Metasimulacrum logic (figure by author).

In a concert or live performance situation with a minimum professional setup, it is essential that all voices and instrumentation used by a band are present in the sound mix that is directed to the audience through a PA (public address) systems, full-range speaker cabinets that are capable of reproducing the entire frequency spectrum produced by the band. Thus, what the audience hears is not just louder voices, guitars, bass or drums, but rather a represented, mediated,

and (hopefully) improved image of the sound on stage, part of which is already produced by third-order simulacrum techniques.

It is also worth mentioning that for guitarists, the desirable timbral characteristics of their sound depend not only on the guitar itself, the electronic signal processing line or the role of electrical gain in its amplification, but also largely (although not exclusively) on the specific loudspeaker cabinet voicing used as the end of the acoustic chain. In that sense, the electric guitar, understood as a chain of devices, serves as an acoustic instrument whose sound is captured through microphones, at least according to pre-modelling logic:

A standard trope in any serious discussion of electric guitar tone is an imaginative trip through one of these networks, the ‘signal chain’ that runs from the player’s fingers to the listener’s ears. As the various nodes— guitar, amps, cables, and effects— are painstakingly enumerated, one understands ‘tone’ emerging from the polling of various sonic factions, each representing a different region of the signal chain (Fink et al. 2018, 5).

The idea that an electric guitar chain behaves as an acoustic instrument may seem counterintuitive, but it is necessary to consider that, to the extent that the timbral character of the electric guitar sound finds its ultimate conditioning in the physical speakers and the physical cabinet itself, it is necessary to use microphone techniques that capture said sound, its acoustic character.⁵

Cabinet microphone modeling breaks said “acousticality” of the electric guitar chain, permeated by the metasimulacral logic. Nowadays, for reasons of cost, practicality, and portability, it is possible for an electric guitar to only make use of a processing system that digitally emulates not only the amplification cabinet, with its particular tone or voice, but the type, model, position and angle of any desired microphone. Current modeling technologies make it possible to satisfy rock and metal timbral needs while solving the associated intensive problems. The heavy sound, with the help of today’s modelers, can comfortably do without a heavy, expensive, bulky and difficult to maintain tube amplifier, to find its way into earbuds at bedroom volume.

Advertising claims for some of the modeling products offered on the market exemplify the idea:

5 Also, at the signal chain beginning, electric guitar pickups don’t capture sound waves but rather magnetic waves. On the opposite pole, keyboards, samplers, and synthesizers do not usually depend on any microphone stage, but rather their signal is injected directly into the mix. By this criteria, the signal produced by a piezoelectric pickup on an electroacoustic guitar may or may not be considered acoustic per se, unless there is a diaphragm microphone signal injected into the guitar’s preamp.

- AxeFX: “The original Axe-Fx upended the industry by being the first device for musicians to put a military/industrial-grade DSP into a consumer product. Leveraging the power of this DSP allowed detail and realism that no other product had previously achieved.”⁶
- Kemper Profiler: “Playing live is where the PROFILER really comes into its own – just spend a little time making PROFILES in the studio, and you can play live with the exact same sound that you used on your blockbuster hit, only without the need for multiple amp setups on stage. You will sound better than ever before through the PA.”⁷
- Neural DSP Quad Cortex: “Capture, share and download your favorite rigs’ sounds. Equipped with our unique biomimetic AI technology, Quad Cortex can learn and replicate the sonic characteristics of any physical amplifier, overdrive, and cabinet with unprecedented accuracy. Unlike any other, our sophisticated neural network algorithm perceives sound akin to human perception, making it the most natural-sounding capture solution on the planet.”⁸

In other words, in the logic of metasimulacrum, digital modeling devices make a recursive sign of what is originally no more than an attempt to bring to the audience the acoustic character of an electric guitar chain. This chain was intended for that very same purpose, but now modeling tech is assuming vintage microphone non-linearities as a desirable feature of what 40 or 50 years ago was no more than an imperfect pursuit of fidelity.

If distortion devices are the consequence of simulating the addition of great electrical power applied to guitar signal, for its part reverb effects are also metasimulacra: reverb is the sound of an instrument in a specific room, analog reverb effects are simulacra of these, and digital signal processors are iterations of these simulacra. From actual acoustical spaces to imperfect spring reverb boxes to solid-state reverb units to spring reverb modelers that capture all vintage nuances and nonlinearities, metasimulacrum ensues. In other words, reverb devices not only simulate acoustical spaces, but the very vintage spring boxes are used to simulate space, with all their glitches and noises.

Another example lies in echo or delay effects. Today there are everything from software emulations to reissues of magnetic echo effects that at the time induced noises and errors in the signal: “the alchemical combination of vacu-

6 Fractal Audio Systems, n.d., “Axe-Fx III Preamp – Effects Processor – Fractal Audio Systems,” <https://www.fractalaudio.com/iii/>. Accessed June 1, 2024.

7 Kemper GmbH, “Kemper Amps,” n.d., <https://www.kemper-amps.com/profiler/overview#a-applications>. Accessed June 1, 2024.

8 Neural DSP, n.d., “Neural DSP - Quad Cortex,” <https://neuraldsp.com/quad-cortex>. Accessed June 1, 2024.

um tubes, resistors, capacitors, and transistors that could transmute timbral lead into tonal gold” (Fink et al. 2018, 4). Noises and errors that formed a canonical aesthetic (Lotman 2013, 373; Herbst and Vallejo 2023, 7) that reduces the precision and cleanliness of digital delays down to just another flavor in the ample delay menu, on the path from first-order simulacrum to metasimulacrum: from physical sound wave bounces and repetitions, to glitchy analog delay pedal repetitions, to clean and pristine delay, to digital emulation of analog devices. Thus, the practicality and economy of a digital compact effect does not replace the timbral qualities of a rotating magnetic drum echo, although it implies greater disadvantages in terms of manufacturing, transportation, operation and maintenance.

Prospective: Beyond Technological Determinism

Technological determinism, as a belief that technology is the primary driving force behind social and cultural change, offers a straightforward way to address the relationship of culture and technology, but simplifies it by erasing non-linear phenomena. Proponents of technological determinism, such as Thorstein Veblen, Jacques Ellul, John Kenneth Galbraith, Martin Heidegger or Marshall McLuhan (Smith and Marx 1994) suggest that technological advancements create new possibilities and constraints, which shape social structures and cultural values. For instance, it states that digitalization in contemporary media has transformed how information is disseminated and consumed, leading to shifts in cultural norms and communication practices.

Although, as has been seen, there is no doubt that technology accompanies the cultural significance of sound production in rock and metal, as Carrasco-Filisola points out (2021, 117), it is not technology itself that drives cultural change, but rather it reflects the zeitgeist, as well as the desires for the past and the horizons of nostalgia of its users.

One argument against technological determinism is that it reduces the active role that societies, cultures and economies play in the development and adoption of technologies. Human decisions, cultural values, political structures, and economic conditions significantly influence how technology is developed, adopted, and used. A position of technological determinism ignores how the social and political context can shape and limit technological development. Technologies neither emerge nor are applied in a vacuum; they are deeply rooted in specific contexts that affect their design, implementation, and use.

The deterministic perspective tends to simplify the causal relationship between technology and society, assuming a unidirectional path in which technology determines social change. However, reality is more complex, with technol-

ogy and society influencing each other in a dynamic and bidirectional process. Such a position does not take into account how different cultures, social groups and individuals can adopt, adapt and resist technologies in diverse ways. The same technology can have very different effects in different social and cultural contexts.

By focusing on technology as the primary force of change, technological determinism ignores how power and access inequalities affect the development and distribution of technologies. Who controls technological resources, who has access to them, and who benefits from their use are crucial questions that this perspective overlooks. This perspective minimizes the potential for collective action and human agency in shaping the technological future. Statements such as Virilio's *The Art of the Motor* have proposed more nuanced approaches that recognize the complex interplay between technology and society, emphasizing how both shape and define each other: "information comes to the fore as an entirely separate form of energy: sound and image energy, the energy of long-distance touch and contact" (Virilio 1995, 147). Reflecting on musical technology, authors like Mark Katz advocate for a subtle view that puts social change and its technologies in dialogue:

Although we often respond to technology within a context of limited options not of our own making, we must remember that, in the end, recording's influence manifests itself in human actions. Put another way, it is not the technology but the relationship between the technology and its users that determines the impact of recording. It is important to add, too, that the influence I describe does not flow in one direction only, from technology to user (Katz 2010, 3).

Metasimulacrum, in this way, has been canonized in the artistic field (Herbst and Vallejo 2023, 8) of pop music in general, and in rock and metal in particular, and its canonization has gone through successive layers of distribution. As Iuri Lotman points out, *canonization* of cultural elements marks a border beyond what is not known as culture, and helps consolidate the central culture realm in a spheric metaphor of culture as biosphere, in which external layers tend to counterculture or not culture at all.⁹ In Weberian terms, the rationalization of music "could occur in a completely extra-musical form, and in part it has actually occurred that way" (Weber 1964, 1167).

9 For Iuri Lotman, there are four layers in the culture understood as semiosphere or concentric spheres of meaning array: central culture, peripheral culture, counterculture and non-culture. Cultural change is understood as the translation of communication codes between the different spheres. What for some time can be threatening or alien (countercultural) or not even known (non-cultural), at another time it can take its place in the peripheral sphere of the not completely accepted around the central ones, or play a leading role in the central culture (Lotman 2013, 375).

In that sense, *metasimulacrum* doesn't only emerge from a recursive *simulacra* dynamic, but is also loaded with a whole era logic whose only actual current presence is no more than a sonic footprint. State of the art technology that in the vast majority of cases is only relevant as a window to the past, to a past filled with acoustic technology non-linearities.

Currently, the possibilities of digital sound processing tend to infinity, and certainly there are musicians who are creatively exploding these capabilities: "digital amplifier situations were adopted by progressive metal guitarists out of necessity and for aesthetic reasons. Djent guitarists has chosen freeware plugins for sonic or workflow reasons" (Herbst and Vallejo 2023, 47). Nevertheless, the market for processing technologies, as shown by modeling products advertising claims, continues to focus on the emulation of a production logic that, in strictly technical terms, has been far surpassed. *Metasimulacrum* is a spiral *ouroboros*: not simply a snake biting its own tail, but a non-linear advance that, despite apparently returning to itself, breaks into musical hyperreality and adds successive layers of complexity to the aesthetic experience.¹⁰

10 A possible route for the subsequent development of the ideas presented here could be to discuss the decision-making flow of rock and metal musicians regarding their stage gear options, in a gradient between the visual aesthetic values of displaying powerful cabinet walls and amplifiers on stage as a scenic resource against the criteria of portability, practicality, price and reliability of modeling equipment.

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SPIRAL OUBOROS: METASIMULACRUM IN ROCK AND METAL ELECTRIC GUITAR PROCESSING AND MODELING TECHNOLOGIES

(summary)

The development of the electric guitar has been fundamental in the evolution of international popular music, particularly rock and metal. Originating as a solution to the weak sound intensity of acoustic guitars in jazz bands, the electric guitar found a new element of expressiveness in the limitations of the amplifiers of that era: distortion, born from the saturation in the gain stage of these amplifiers. This distorted sound, initially an unintended byproduct, became a distinctive feature of rock and metal.

However, a tension arose between the use of large amplification equipment in rock and metal music and practical considerations such as portability and cost. The market responded by offering analog amplification equipment that facilitated the generation of distortion, later evolving to devices such as pedals, which allowed achieving this timbral quality without the need for high volumes.

Before modelling technology, the electric guitar had been handled as an acoustic instrument, with its amplification, cabinets and particular timbres and voicings. However, current digital processing technologies allow emulating not just the amplifier and its sound character, but also any desired microphone configuration, thus offering advantages in terms of cost, practicality, and portability.

Nowadays, hardware that runs software designed to emulate both the physical microphones and 20th-century tube amplifiers is available in the musical industry. This phenomenon represents an additional order of simulacra, as what was initially a technical flaw has become an essential stylistic element. Modelling devices for electric guitar have evolved into what can be described as a *metasimulacrum*.

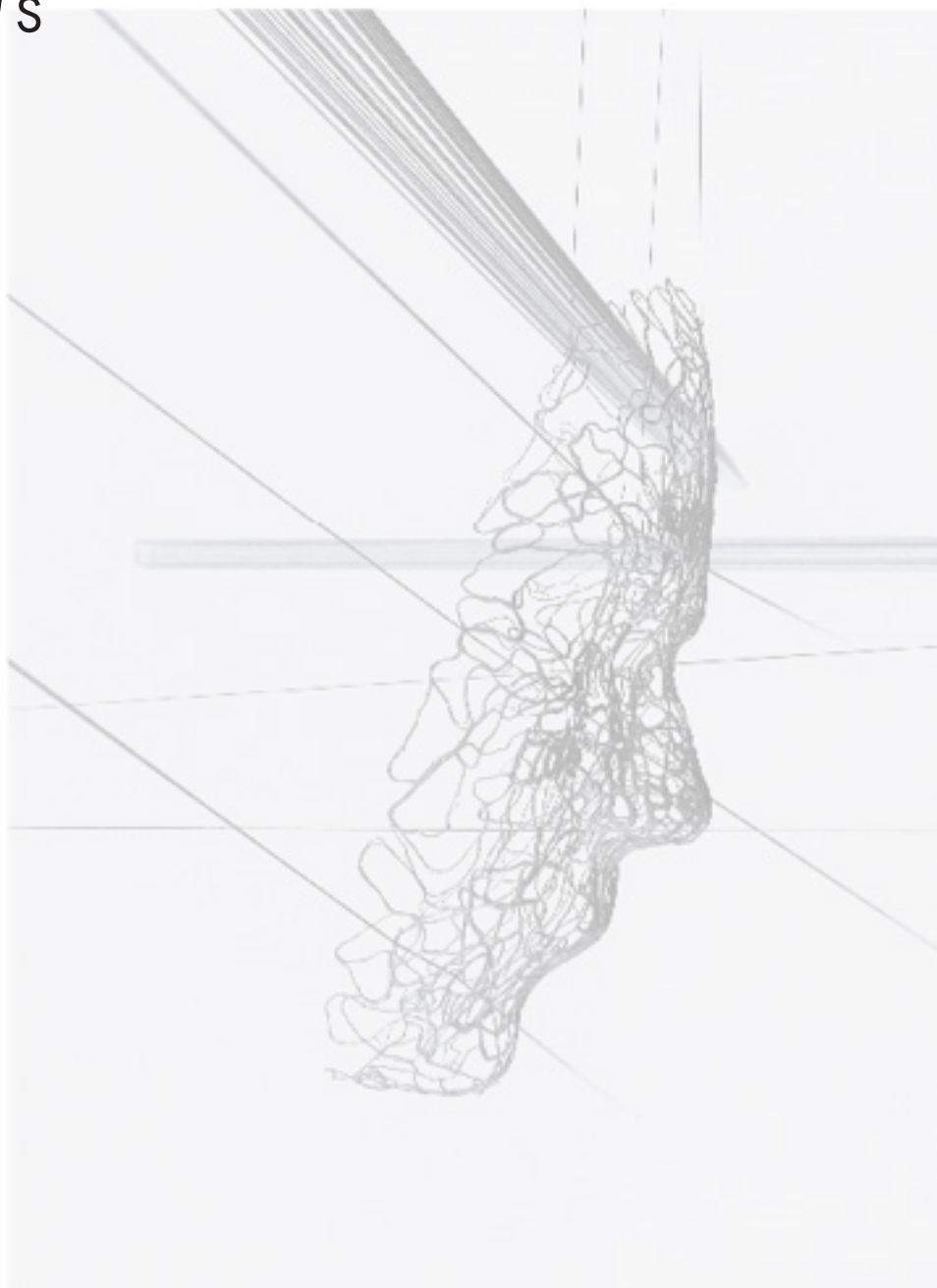
This metasimulacrum has been canonized in rock and metal music and has come through successive layers of simulacra. The market offers emulating production logics that are strictly technically outdated, although opening the path to the exploration of nearly infinite timbral possibilities on current modelling technologies.

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REVIEWS



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**MILAN MILOJKOVIĆ, IRA PRODANOV,
ADRIANA SABO, AND LJUBICA ILIĆ,
VODIČ KROZ PANK KULTURU
U NOVOM SADU**

[A GUIDE TO PUNK CULTURE IN NOVI SAD]

The fame of the “rock and roll legacy” of the Socialist Federal Republic of Yugoslavia (SFRY), as a symbol of better times, is a significant aspect of collective memory and general history, like no other field of social activity in the former country. While this phenomenon has been considered in various media formats and in books and articles on both local and international levels, these representations often reflect a nostalgic personal perspective. Among the “cacophony” of individual standpoints and revival of the “golden era” of rock and roll, there is an increasing shift toward an academic discourse that tends to provide an objective and multidimensional interpretation of the history of popular music in ex-Yugoslav countries, taking into account all its complexities and avoiding diminishing its significance.

A notable publication that offers an overview of decades of punk culture in Novi Sad, as a significant aspect of popular music in former Yugoslavia but also the contemporary scene in our region, is *A Guide to Punk Culture in Novi Sad*,¹ published in 2023 by the Academy of Arts in Novi Sad. This interactive electronic edition, written by Milan Milojković, Ira Prodanov, Adriana Sabo, and Ljubica Ilić, is divided into six chapters that include links to music excerpts. Through insights into the micro and macro context of development of punk in Novi

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1 The original title of the book in the Serbian language is *Водич кроз панк културу у Новом Саду*. It is published as an electronic edition available at: <https://akademija.uns.ac.rs/pdf/vodic-kroz-pank-kulturu-u-novom-sadu/>.



Sad, as one of the leading “generators” of Yugoslav alternative music from its initial steps to the present days, this multi-layered book presents a comprehensive analysis of the (sub)cultural phenomenon. The authors “dissect” and systematize various primary and secondary sources about music and performers, including discography, audio and video recordings, academic editions and journals, and problematize its media impact and representation in the local community in correlation with other punk centers regionally and globally, examining its expressive and social transformation through different (a)political levels.

In the opening chapter, *Review of Literature, Methodology, and Terminology* [*Osvrt na literaturu, metodologiju i terminologiju*], Milan Milojković provides an intersection of relevant literature, where he defines the terminology, scope and methodology of this research in relation to the specificities of Novi Sad punk, conditioned by the political and social environment and transitions. The author notes that the term “punk” in general is examined within the academic paradigm from diverse perspectives, with most studies focusing particular geographic and time frames, which is also the starting point of this publication. Through an analytical review of the literature and various interpretations, Milojković emphasizes its multiple definitions and meanings, primarily encompassing the genre determination (often identified with the term “punk-rock”), as well as its identification and distinction from various, usually contrasting, (sub)genres such as post-punk or new wave. Furthermore, he presents the perspective of punk as a broader style consisting of many elements such as fashion, art, and specific fanzine culture based on the *do-it-yourself* principle (DIY), but also recognizes

its social and political connotations that oppose the mainstream establishment, commercialization, and collective norms of the specific environment.

Considering the multi-layered essence of this term, Milojković finally defines punk in Novi Sad as an encompassment of musical, political, and artistic ideas with evident expression and tangible manifestations in popular music, visuals, and written formats (more or less) connected to specific political inclinations and social orientations. In terms of its genre characteristics, “punk” (or “punk-rock”) refers to an aggressive musical style rooted in classic rock and roll tradition, but it is also described as a “cultural” rather than a “subcultural” phenomenon in Novi Sad, according to its institutional recognition.

After defining the research scope, Adriana Sabo in the chapter *The Emergence of Punk and New Wave in Yugoslavia* [*Počeci panku i novog talasa u Jugoslaviji*] delves into the initial stage of development of punk in the late 1970s and the rise of the new wave in the early 1980s in Yugoslavia, describing the modification of the original (sub)culture movement “imported” from the West to a different social context. The text describes the early activities of the punk scene in Ljubljana, which played a significant role in shaping the first punk generation in Yugoslavia with the band *Pankrti*, and analyzes a similar spread of this punk (anti)aesthetic in Novi Sad led by *Pekinska patka*, but also in other cities such as Rijeka with bands *Paraf* and *Termiti*, and Pula with *KUD Idijoti*. Although Zagreb and Belgrade scenes were influenced by punk, these cities in the chapter are primarily perceived as dominant new wave centers, and their impact is described to provide a broad general context. As the author points out, even though the transition from punk to the new wave happened more rapidly in Yugoslavia than in the West, and despite the tendency of many punk bands towards a pluralism of more melodic (sub)genres, the “myth” of new wave as a liberator from commercialization did not deter many bands (featured in this publication) from returning to their underground punk origin.

In the central and most extensive chapter *Punk Music in Novi Sad* [*Pank muzika u Novom Sadu*], Milan Milojković provides a retrospective of four decades of the punk scene in Novi Sad. The impact of its representatives is determined by their discography, presence in fanzines or DIY compilations, and their contribution to the music scene in general. In that context, the author explores the diversity of the Novi Sad punk scene, starting with the initial commercial and discographic successes of the first generation of punk bands, highlighting the pioneering role of band *Pekinska patka* in shaping the development of Novi Sad punk, and at the same time its influence in “shifting” towards post-punk and new wave idioms. Analyzing the evolution of the scene through the work of dozens of bands, Milojković identifies a process of genre diversification during the 1980s, reflecting the way the punk movement branched into several directions, and describes the process of affirming the commercially successful new wave

trend, known for its dark, mystical, and melodic music with metaphorical lyrical expression, but also the expansion of more aggressive and explicit tendencies with (sometimes) polarized political connotations such as hardcore (/straight-edge) on one side, and Oi! (/skinhead) on the other. The transition from the last decade of the 20th century to the beginning of the 21st century is marked as an eclectic “crossover” stage, leading to the emergence of bands with more intricate musical expressions that gained regional and global recognition (such as *Atheist Rap*).² The chapter concludes with a discussion on the recent revival in interest, “canonization,” and institutionalization of punk in Novi Sad and its academic acknowledgment as a reflection of the enduring influence of punk on the city’s sound for over four decades as an integral part of its “urban folklore” alongside other cultural and musical phenomena.

Adriana Sabo, in the chapter *Women in Novi Sad Punk [Žene u novosadskom panku]*, focuses on female punk representation and expression, as well as its public perception in Novi Sad’s scene, predominantly influenced by a male paradigm, examining how female musicians have challenged traditional gender stereotypes and redefined the role of woman in punk culture. In this sense, the author questions their position through the concept of “femininity”, using it to describe women’s lifestyle and ways of self-representation in popular music. By analyzing the approaches of prominent female punk bands and musicians (from the *Boye*, known as a “first real female band” in Novi Sad, Jasmina Mitrušić from bands *Luna* and *La Strada*, Marta Čor, as well as band *Tri kapljice*), Sabo recognizes the similar expression of unique “punk femininity”, emphasizing that punk culture has enabled a platform for articulating the authentic female voice, regardless of whether it reflects individual experiences, or aligns with convention-

2 After mentioning the forerunners of punk (as an expression and attitude, not in terms of genre), such as Branko Andrić Andrla and band *Laboratorija zvuka* with its leaders Predrag and Mladen Vranešević, the author presents a few stages of the evolution of the punk scene in Novi Sad, starting with the first generation led by *Pekinska patka: Crkveni pacovi* (later known as a *Neon vojnik*), *Direktor*, *Gomila G*, *Tri crna lista*, *Armija spasa*. The most prominent bands of the new wave/post-punk generation are noted: *Boye*, *La Strada*, *Luna*, *Grad* and *Kontraritam*, as well as long-standing eclectic post-punk band *Obojeni program*. The evolution of the Oi!, hardcore, and melodic punk during the 1980s and 1990s, as well as the crossover period in the 2000s, is contextualized through the overview of connections and polarizations among dozens of bands from different generations and ideological positions: *Vrisak generacije*, *Eksplziv*, *Van kontrole*, *Dva minuta mržnje*, *Revolt*, *Ritam nereda* (the most popular Oi! band from Novi Sad), *Fluorel tačkaš* (which evolved into *Atheist Rap*), *Invalidi uma*, *Generacija bez budućnosti*, *Kapetan Leši*, *Katakлизma zvuka (KKB)*, *Provokacija*, *General*, *Pure Impact*, *Jedino rešenje*, *Tamno beli gnušavci iz smrdljive oaze*, *Distorzija motorne testere (DMT)*, *Oni koji gase požar*, *Blitzkrieg*, *Mitesers*, *Zbogom Brus Li*, *Now or Never*, *Max Bunker*, *The Antals*, *Tuška Pauk Oblak*, *Ujed motorne testere*, *Pobesneli usisivač*, *No Speed Limit*, *Bonebreaker*, *Razor 88*, *Red Union*, *Bayonets*, *Ringišpil*, *Shoplifters*, *Tizzies*, *TetraPunk*, *Selfimmolation*, *Reflections of Internal Rain*, *Against the Odds*, *Get Off My Property*, *Vršnjačko nasilje*, etc.

al notions of femininity. Used as a negation of the embodiment of “hyper-femininity” and the superficial interpretation of their music based solely on gender identity, the female perspective has traced the new path, breaking the traditional norms of the popular music industry.

Within the chapter *Printed Publications on Punk in Novi Sad [Štampane publikacije o novosadskom panku]*, Ira Prodanov explores how punk has been portrayed and evolved in the public discourse of Novi Sad. Analyzing the various written sources, the author concludes that literature on Novi Sad punk mostly belongs to the domain of music journalism and includes different types of publications such as monographs, fanzines, described as “poetry in prose”, then posters, catalogs with the primary role of promoting certain musical events, as well as interviews, presentations, reviews, audio editions, and articles published in local daily newspapers such as *Dnevnik* and *Građanski list*, but also in local newspapers in the languages of other national communities of Vojvodina. Prodanov considers the three editions of the monograph *Novosadska punk verzija* (2006, 2008, 2015), by Sava Savić and Igor Todorović as the most significant publication on this topic, describing it as a subjective “testimony” with the many episodes from the vibrant life of this (sub)culture (from 1978 to 2005). Furthermore, this chapter contains analyses of articles published in various fanzines and other printed media, such as exhibition catalogs, festivals, and other projects, as well as the reports on online portals that provide insight into the “text” and “context” of Novi Sad punk, with a “pictorial style of writing”.

Complementing the previous section, Ljubica Ilić, in the final chapter *Novi Sad Fanzines of the Eighties [Novosadski fanzini osamdesetih godina]*, describes the establishment of fanzine culture in former Yugoslavia, particularly the rise of fanzine production in Novi Sad during the 1980s, initiated by enthusiasts and amateurs as a means of affirming the cultural phenomena outside of mainstream narratives. Analyzing its “roots”, the author points out the significant growth of the local fanzine scene from 1979 to the first half of 1982, especially in Novi Sad, where the “fanzine expansion” started with the pioneering self-published fanzine *Prkosno udarnički* (1982), which later evolved into the more ambitious *Punk proces*. Ilić also focuses on leading fanzines of that time, such as *Bolji život* (1987-89) and *Tri drugara* (1993-97), discussing their structure, content and musical preferences, but also examining the social influence of fanzines and punk culture in Yugoslavia during the 1980s, highlighting their subversive potential, weakened by widespread acceptance and promotion by the social and intellectual elites of that time.

This multidimensional chronology of punk in Novi Sad took a significant step in strengthening the position of popular music studies in the regional musicological discourse, not only by offering a possible methodological direction for further research, but also providing “academic validation” to the subculture as a

relevant research area. Avoiding the nostalgic tone and glorification, it contains analytical insights into the music and broader social environment of this scene, including the genre and (anti)poetic characteristics, as well as the positive and negative connotations of the bands' expressions, questioning how this phenomenon is perceived at an institutional level. Considering all these layers, and the contribution to "filling the gap" in exploring the historical and current context and the role of contemporary popular music in the region, this publication has accomplished its outlined purpose: it will be a comprehensive and precise guide for scholars from different humanistic disciplines and future research in the field of popular culture in ex-Yu countries (which often share similar background and (sub)cultural experience).

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**THE NINTH INTERNATIONAL CONFERENCE
ON MUSIC AND MINIMALISM
[DEVETA MEĐUNARODNA KONFERENCIJA
O MUZICI I MINIMALIZMU],
BELGRADE, SERBIA,
MAY 29TH – JUNE 2ND 2024¹**

Musical minimalism, *postminimalism*, *new simplicity*, *new classicism* or *holy minimalism*, were the words on everyone's mind across Belgrade as the The Ninth International Conference on Music and Minimalism begun on May 29th. The biennial conference – in its Belgradian edition – was organized by the International Society for Minimalist Music² based in Cardiff (UK), the Serbian Academy of Sciences and Arts and the Institute of Musicology SASA, as well as Belgrade Festivals Center (CEBEF), the Cultural Center *Parobrod* and Music School *Mokranjac* in Belgrade (Serbia). The Ministry of Culture and Ministry of Science, Technological Development and Innovation of the Republic of Serbia, the Secretariat for Culture of the City of Belgrade, the Organization of Music Authors of Serbia SOKOJ, European Commission – program Erasmus+, and Emory University (Atlanta, USA) financially supported this conference (Figure 1).

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2 Society's official website: <https://www.minimalismsociety.net>.



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МИНИМАЛИСТИЧКА ПРОЖИМАЊА
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Figure 1. Conference poster © Muzikološki institut SANU / Institute of Musicology SANU.

The ambitious program (fifteen panels, three keynote lectures, five lecture recitals, one roundtable, five concerts, as well as the exhibition and the screening of a documentary film at the Cultural Center *Parobrod*) gave the international public an opportunity to get acquainted with musical minimalist production all over the world as well as engage in discussions on musical minimalism's seeming omnipresence in one form or another, intersecting with other genres of music and other art fields.



Figure 2. This way ... © author of the review.

The exhibition (Figure 2) *The Origins of Yugoslav Musical Minimalism* held in Cultural Centre *Parobrod* (from May 25th until June 3rd) set the stage for the following conference, introducing the public to the musical minimalism in Yugoslavia, and to the work of Belgradian group *Opus 4* and its members – composers Vladimir Tošić, Miroslav Miša Savić, Miodrag Lazarov Pashu, and Mili-mir Drašković. The exhibition was the brainchild of Laura Emmery and Ivana Miladinović Prica and it, among other things, highlighted the importance of the Student Cultural Centre at the end of 1960s and during the 1970s – a unique, safe space for artists to experiment, explore, reevaluate and redefine their art.



Figure 3. Keynote speakers (from left to right: Christophe Levaux, Kevin C. Karnes and Elena Dubinets) © Muzikološki institut SANU / Institute of Musicology SANU.

Keynote lectures (Figure 3) were held by Christophe Levaux (Université libre de Bruxelles, Belgium), Kevin C. Karnes (Emory University, Atlanta, USA) and Elena Dubinets (London Philharmonic Orchestra, UK). Levaux gave a lecture *On the Establishment of a Musical Concept: Minimalist Music Through the Lens of Science and Technology Studies* exploring the socio-technical construction of musical categories with a particular focus on the advent, as well as the triumph, of Minimalist music. Listeners, as well as readers cognizant of Levaux's book *We Have Always Been Minimalists: The Construction and Triumph of a Musical Style* (published in 2020 by University of California Press), seized the opportunity to engage in fruitful discussion with the author. Karnes presented to the audience the rich *DJ Culture, Black Market Sounds, and "Minimalistic Hardcore Sequencer Music" in Riga – with Excursions to Tallinn and Berlin – from 1975 to 2000* giving a thorough insight into underground music festivals, the spread of new tech-

nologies leading up to the birth of House music, the musicianship of composer/performer duo Hardijs Lediņš (1955–2004) and Kaspars Rolšteins (b. 1971) and the unique soundscapes of their work. Karnes explored the notion of *minimalist hardcore sequencer music* (term coined by Berlin DJ Westbam). Lastly, Dubinets posed the question “*What Do We Talk About in Times of War?*” *On the Ukrainian Minimalism*, presenting the palette of Ukrainian composers who utilized minimalist techniques in their works where the techniques, in junction with referentiality, consonant music language and elements of Ukrainian folklore, resulted in soundscapes containing important messages for the listener. Dubinets also provided context for the Ukrainian composers in relation to Western and Russian minimalism and presented the works of Oleh Bezborodko (b. 1973), Oleksandr Shymko (b. 1977), Maxim Kolomiiets (b. 1981) and others.

Five lecture recitals were given by Viktor Lazarov (Faculty of Music, University of Montreal, Canada) on *Stylistic Evolution and Diversity in Piano Music by Opus 4: 1988–2023*, Paul David Kean (independent performer/researcher, South Wales) on *The Complete Solo Piano Music of John Adams: Evolutions in Style and Performance Practice*, Ivana Medić (Institute of Musicology, SASA) on *Minimalism as a Vehicle for Postmodern Spirituality: Old Indian Cantillation*



Figure 4. Miloš Raičković's workshop and performance © Muzikološki institut SANU / Institute of Musicology SANU.

and *Hilandar Bells* by Vuk Kulenović and David Kirkland Garner (University of South Carolina School of Music, USA) on *Timelike Curves: Composing with Microtiming*. The highlight of the recitals was Miloš Raičković's *Water Tones (1977): A Mini-Workshop and Performance* (Figure 4) during which the composer asked members of the audience to join him on stage to receive the instructions on performing the titular piece. One short rehearsal later, the piece came alive under Raičković's conductorial guidance. Other audience members received handouts containing detailed instructions, should they feel daring enough to attempt performance of the piece on their own. These audience-engaging moments were greatly appreciated and welcomed among attendees.

Roundtable (Figure 5) was dedicated to recent publications on minimalism (*On Minimalism: Documenting a Musical Movement* by Kerry O'Brien and William Robin, eds. [University of California Press, 2023]; *The Names of Minimalism: Authorship, Art Music, and Historiography in Dispute* by Patrick Nickelson [University of Michigan Press, 2023]; previously mentioned *We Have Always Been Minimalists: The Construction and Triumph of a Musical Style* by Christophe Levaux). The authors and the editors gave the audience 'a peek behind the curtain', discussing and sharing various challenges they've met during the research for and editing of the aforementioned publications.



Figure 5. Roundtable *New Books on Minimalism* © Muzikološki institut SANU / Institute of Musicology SANU.

Six concerts acoustically enriched the conference, giving the audience a sonic smorgasbord to relish in. *The Ensemble for Different New Music* (*Ansambl za drugu novu muziku* or *ADNM*³) gave two concerts, acquainting the audience with the pieces of Andrej Negić (*Images in D*, 2021), Dragoljub Ilić (*Mindfields*, 2019), Milimir Drašković (*From the New Old World / Aus der Neuen Alten Welt*, 1999), Miroslav Savić (*Ovo nije Op. 1 [This is Not Op. 1]*, 2018) and Gavin Bryars (*My First Homage*, 1978) on the former (on May 29th at *Bioskop Balkan*) and Miodrag Lazarov Pashu (the piece *Vreme 3.1 [Time 3.1]*, 1981) on the latter concert (on May 31st at Cultural Centre *Parobrod*). A showing of the documentary *The Belgrade Minimalists: Ensemble for Different New Music – 40 Years Later* (dir. Srđan Janjuš, 2018), centered around the history of this ensemble, was also presented post-concert.

At the Great Hall of the Kolarac Endowment on May 30th, Sandra and Jeroen van Veen, together with *LP Duo* (Sonja Lončar and Andy Pavlov), performed Simeon ten Holt's *Canto Ostinato*, taking the audience on an otherworldly, meditative journey through the 'landscape' of the piece (Figure 5). This time, however, the piece donned new sonic textures due to the fact that, for the first time, *Canto Ostinato* was performed on two acoustic and two DUALITY Hybrid pianos!

*Pneuma Quartet*⁴ performed pieces by Dimitrije Beljanski (*Echoes of Ostinato*, 2023 and *Cliffhanger*, 2022), Miloš Raičković (*Dream Quartet*, 1986), Faruk Mehić (*OCD*, 2023), Vladimir Tošić (*Altus*, 2001), and Milivoje Pićurić (*Titex*, 2021) at Cultural Centre *Parobrod* on May 31st. Vladimir Milošević (piano) and Nemanja Stanković (cello) presented the music of Philip Glass. Besides the pieces *Glassworks Opening No. 1* (1981), *Piano Etudes* no. 2 (1995), no. 5 (1995/6), no. 6 (1996), no. 20 (2012), as well as *Metamorphosis 2* (1988, arr. Laura Emmery) and *Glassworks Closing* (1981, arr. Laura Emmery), their program included two numbers from the soundtrack of the film *The Hours* (2002, dir. Stephen Daldry) – *I'm Going to Make a Cake* and *The Poet Acts* (arr. by Michael Riesman and Miloš Bralović, respectively). The sixth, matinee, concert (again at the Great Hall of the Kolarac Endowment, on June 2nd) was dedicated to the music of Miloš Raičković, featuring pieces *Petite Suite* (2012/2019), *Variations* (1989), *Kolo japansko [Japanese Round Dance]* (2022), *B-A-G-D-A-D* (2002), *Passacaglia & Double Fugue on B-A-C-H- and B-A-G-D-A-D* (2013), *Romance no. 1* (1988/2018), 32 (2022), *Now or Never* (2023) and *Duet Without You* (2011).⁵

3 The ensemble includes: Dragoljub Ilić, Andrej Negić, Nataša Penezić, Miroslav Savić (piano/keyboards).

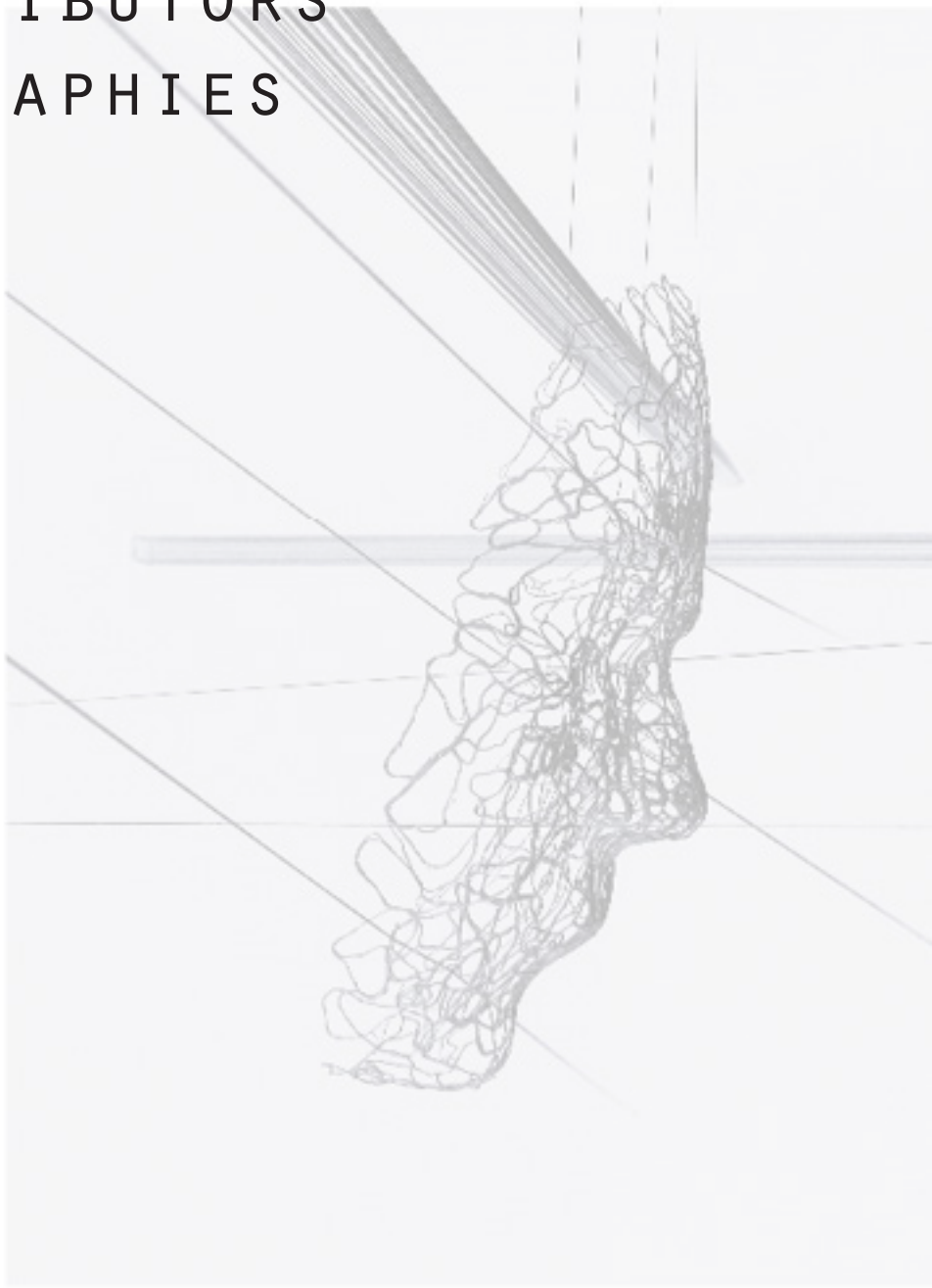
4 Members of the quartet: Dimitrije Beljanski (piano), Tetiana Tomić (violin), Stefan Milović (clarinet), Nina Henig Beljanski (cello).

5 Performers: Marija Lazić (oboe), Marko Bogdanović (piano), Stana Krstajić (flute), Milena Stanišić (harp), Srđan Tošić (guitar), Nataša Mitrović (piano), Ivana Dakić (oboe), Katarina Aleksić (violin), Maja Mihić (piano), Sanja Romić (oboe), LP Duo.

This review aimed to showcase the scope of the gargantuan conference and the ambitious program it presented to the international public. Wondrous encounters, fruitful discussions and exchange of knowledge proved that minimalism offers so much more. We look forward to the next opportunity to discuss its scope. Same time, 2026?

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CONTRIBUTORS'
BIOGRAPHIES



David Atanacković was born on May 24, 1996 in Belgrade. He graduated from the Faculty of Music in Belgrade, where he completed his undergraduate studies in 2019 and his master's degree in composition in 2020. During his studies, he won numerous awards at competitions in solfeggio, theory, composition and piano. His compositions were performed at various festivals and concerts in Serbia and abroad. He participated in projects composing music for documentary, short and animated films as well as for the theater. In addition to composing music, he is active in the fields of music production and sound design for video games.

In 2020, Atanacković was admitted to “Berklee College of Music” in the Department of music production, technology and innovation. He is currently studying for a doctorate in composition at the Faculty of Music in Belgrade, where he is currently employed as a researcher. He participated in international competitions, representing Serbia and Radio Belgrade in Italy and Germany. Since 2024, he has been collaborating with foreign publishers and music libraries, composing music for various media.

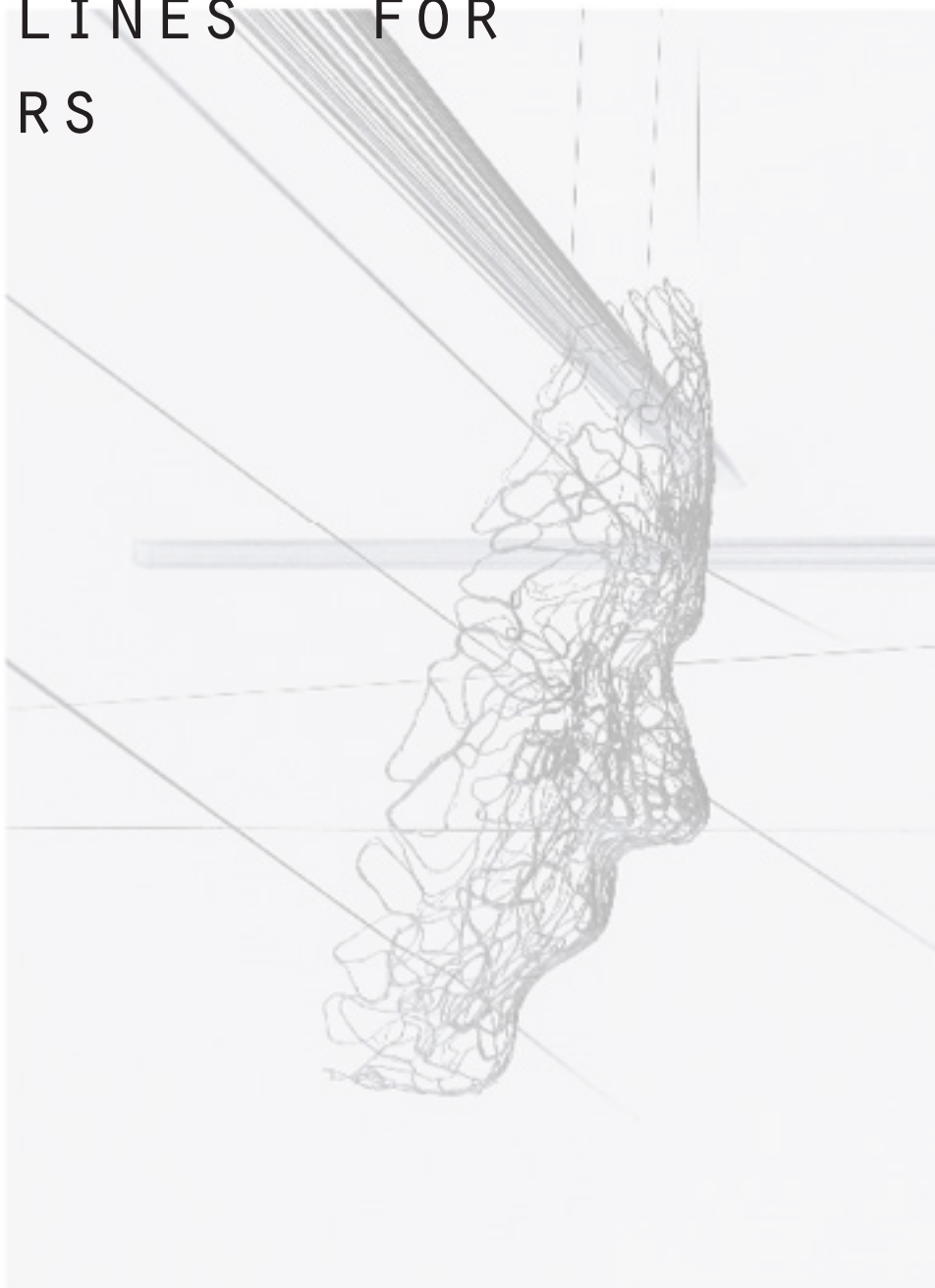
Srđan Atanasovski is a Senior Research Associate at the Institute of Musicology SASA, where he has worked since 2011. He received his Ph.D. in musicology at the Faculty of Music of the University of Belgrade in 2015, with the dissertation “Musical practices and the production of national territory”. From 2016 to 2023, he worked as a lecturer in the program SIT Western Balkans: Peace and Conflict Studies. He was also involved in several international scientific projects, including Figuring Out the Enemy (Institute for Philosophy and Social Theory, Belgrade) and City Sonic Ecology – Urban Soundscapes of Bern, Ljubljana and Belgrade (University of Bern). He has held a scholarship from the Austrian Agency for International Cooperation in Education and Science for doctoral and postdoctoral research. His first book, *Mapping Old Serbia: In the Footsteps of Travelers, Following the Traces of Folk Songs* was published in 2017 by the Library 20th Century, and his second book, *Schubert and Rivalry as a Creative Principle*, was published in 2023 by the Academic Book and the Institute of Musicology SASA. Since 2008, he has worked as the author of shows on the Third Program of Radio Belgrade about the music of the Age of Enlightenment.

Sergio Miranda-Bonilla's career revolves around academia, music and sound in León, México. Communicologist with studies in social sciences and humanities, classical and electronic music, audio, sound studies and theology. Participant in Seminars on Rock Aesthetics, mexican Heavy Metal Studies and the International Society for Heavy Metal Music Studies. Affiliated to the Mexican Interinstitutional Art and Culture PhD Universidad de Guanajuato program, he

researches conservatism, belief systems and identity in metal. He has published in books, journals and other media, as well as given classes and presentations in Mexico, Argentina, Colombia, Venezuela, Chile, Spain and Czech Republic. Enthusiastic explorer of effects pedals, music electronics and their contemplative potential.

Hana Tiro is a writer born and raised in Sarajevo, who continuously writes and translates prose, poetry and academic papers. She also works as an editor and digital communications associate. Her bachelor degree in English Language and Literature motivated her to examine materials in language other than her own, and work on publishing of collections in English language with different institutions, as well as seeing her poetry and essays on platforms and online communities. Because of her love of arts and Balkan mentality and history, in 2020 she founded Balkan Art Scene, a platform for promotion of Balkan artists with a focus on the up-and-coming artists. Her master's thesis in Comparative Literature focused on stylistic usages of trauma interpretations as a part of the stream of consciousness method.

GUIDELINES FOR AUTHORS



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All the manuscripts should be accompanied by author's name, affiliation, e-mail address, and a short biography (up to 150 words per author). Articles can be submitted in English (preferably) and Bosnian.

Manuscripts should be written in .doc or .docx format, in Times New Roman font, font size 12 with 1.5 line-spacing.

Original scholarly paper intended for sections The Main Theme and Beyond the Main Theme should include a short abstract (100–200 words), 5–10 keywords, as well as the summary (500 words). For articles in Bosnian, summary must be written in English. Do not include citations in the abstract. Keywords must be chosen appropriately in order to be relevant to the subject and content of the paper.

Regarding the citations, authors should use the author-date system with the separate bibliography, following the guidelines given in Chicago Manual of Style (The Chicago Manual of Style, 17th ed. Chicago: University of Chicago Press, 2017; http://www.chicagomanualofstyle.org/tools_citationguide.html). Please note that the list of references (bibliography) given at the end of the article must only include works that are cited in text.

Book, conference, and festival reviews should bring to attention relevant and valuable contributions or events that are in interest scope of our Journal. Reviews must contain a dose of critical appraisal instead of being written merely as summary. The title of the book review should include necessary information regarding the volume, as in following example:

- William Myers, *Bio Art – Altered Realities*. London: Thames and Hudson, 2015, 256 pp., ISBN 9780500239322
- *Margins, Futures and Tasks of Aesthetics*, Conference of the IAA, Helsinki, Finland, July 5–7, 2018.
- Sonemus Fest, Sarajevo, Bosnia and Herzegovina, April 16–21, 2018.

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Other remarks:

Em dash is used in years, page numbers or as a continuation of sentence: 112–35. 2000–2006. En dash is used in compound nouns: *art-making*.

Double opening (“) and double closing (”) quotation marks and regular font are used in citing. Single opening and closing quotation marks (”) are used in citing words, syntagms or sentences of existing citation (cit.cit). If one or more parts of a sentence is under quotation marks order of punctuation marks is: ”1,

If whole sentence is under quotation marks order of punctuation marks is: ”2

Italic is used in: 1) work title (books, compositions, paintings, sculptures, etchings, installations, photography); when citing translated and original work title in brackets: “The Hand of Fate” (*Die Glückliche Hand*); 2) emphasizing specific word, concept, syntagm, or sentence: *heterotopy*; 3) using words from foreign language; 4) using figures of speech and stylistic devices: *silence* of consciousness. For *releasing* a concept from essentialism or tradition please use single opening and closing quotation marks: ‘being in the world’.