Artificial Intelligence in Songwriting and Composing – Perspectives and Challenges in Creative Practices

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Artificial Intelligence (AI) has been a synonym for intensively discussed and continuously developed approaches in the culture of digitality for several years (Stalder 2016; Lenzen 2020). AI is regarded as a disruptive technology with great potential for change in almost all areas of human life. This also applies to the field of music. For example, Melissa Avdeeff (2019: 1), after analyzing the first music album jointly created by an AI and humans (*Hello World*, 2018), states that we are "on the edge of a new era of popular music production". Streaming platforms have also been influencing which music is suggested to listeners (and which is not) for several years, in the case of Spotify, for example, through complex algorithmic constellations such as "collaborative filtering", "natural language processing" and "conventional neural networks & audio models" for analyzing basic musical parameters (Whitehouse 2021).

AI technologies are increasingly entering artistic and creative work. Various artists engaged with different AI tools in recent years and published their work, such as Holly Herndon with the album *Proto* (2019) or Benoît Carré's and François Pachet's work on the Beatles-style pop song "Daddy's Car", realized through 'Flow Machines', as well as the subsequent and mentioned album *Hello World* (2018). At the same time, tools such as Jukebox, IRCAM's real-time timbre transfer tool RAVE (2022), short for Realtime Audio Variational autoEncoder, or music production tools (Sonible, iZotope, among others; Frieler / Zaddach / Meyer 2023) are becoming more and more widespread. These rapid developments require a multi-perspective and critical examination and classification, which equally includes creative professionals. Hence, after introducing songwriting and composing as practice, we will discuss the usage of AI in songwriting, its potentials, challenges, and risks for professional practice. The article is based on semi-structured qualitative interviews with four professional composers and songwriters who intensively work with AI.[1]

1 The interviews were conducted for a master's thesis at the Popakademie Baden-Württemberg in 2022 (Tillmann 2022). The four experts are: Benoît Carré (musician and composer, co-developer of 'Flow Machines'), Stefanie Grawe (designer and music producer), Moisés

Composing and Songwriting in Practice

Composing and Songwriting can be understood as complex creative processes to create specific musical forms and expressions, depending on the goal and purpose (such as song, film music, theater music, radio jingles, advertising jingles / music, radio plays, or special genres). If one asks OpenAI's GPT3 what songwriting is, the following was generated in a request in February 2023:

> Songwriting is the process of creating a musical composition to express emotion, ideas, or stories. It requires a combination of creativity, knowledge of music theory, and technical skill in the production of the music. It typically involves the composition of melodies, chord progressions, and lyric writing. (…). (OpenAI Playground 2023)

However, it further involves aspects and practices such as the creation of melodies and rhythms, chord progressions and voice leading, instrumentation and arrangement (Moore 2013; Perricone 2018; Moylan 2020). Also, in the age of digital music production, it includes the design of sounds and tools to create sounds. Processes of writing parts of the song often overlap with production-oriented tasks in Digital Audio Workstations (DAW). Also, songwriting and composing are often collaborative efforts of distributed creativity (Clarke / Doffman 2017) and with different expertise, including situated non-verbal communication, embodiment and affect, musical interplay and interaction in creative practices (Bennett 2011, 2012; Barrett 2014; Thompson 2015; Bishop 2018; Cook 2018).

AI and Songwriting in Practice

In the following paragraphs, we will discuss three main findings from expert interviews and will accompany them with findings in literature. The three points are: 1) working with AI in general, 2) potentials and creative approaches, and 3) challenges and risks.

Working with AI and its impact on the creative practice

While in the field of experimental computer music or algorithmic composition, programs have been developed since the 1950s, and it is only since the 1990s that a (very

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Horta Valenzuela (sound artist, technologist and musician), and Jovanka von Wilsdorf (musician, songwriter, initiator of the DIANA AI Song Contest).

basal) form of AI has been applied (e.g. tonica fugata; Montanas / Arcos 2002; Nierhaus 2018), in the field of songwriting, a trend towards the use of AI emerged only during the 2010s. Hence, working with AI appears to be a new approach to songwriting practices that comes with challenges as well as potentials. Since artistic practices employ reflexivity in their own creative processes, the interviewees were able to raise insightful considerations regarding working with AI.

Carré (in Tillmann 2022, CXVI) summarizes three points regarding the potentials of working with AI, that were mentioned by all interviewees:

1. It enables an acceleration of the creative process through experimentation;
2. it can offer an enrichment and / or augmentation of one's own forms of artistic expression with the potential of enhancing the creative outcome;
3. the task of curating the AI-generated material becomes one of the main tasks, including aesthetic evaluation.

Jovanka von Wilsdorf (in Tillmann 2022, LXXXIII) reinforces and adds the aspect of optimizing the work in teams where these tools not only speed up the processes through their functionality, but also make the whole writing process more playful and thus could help to skip the occasionally-problematic start-up phase.

Especially the aspects of acceleration and enrichment of creative ideas are frequently discussed in research (Gioti 2021; Deruty et al. 2022). Interestingly, all interviewees emphasize that a crucial point would be that the human being retains the power of decision, which echoes the current discourse in which AI in music is understood as „assistive technolog[y]" (Moffat 2021: 366). This points to a potential tension between (desired) artistic autonomy on one hand and the often-lacking comprehensibility of technological complex processes on the other.

Even though the 'surprising' is an important motivation to use AI, von Wilsdorf adds that an artist nevertheless follows one's own intuition:

> Suddenly you get suggestions that you wouldn't have thought of yourself. It's wonderful. The combination of a lyric I made entirely with LyricStudio, together with the sound inspiration of Boomy, paired with a beat from a beat AI like Orb. Suddenly something comes out where I follow my intuition but still get suggestions. (in Tillmann 2022, LXXXIII)

As von Wilsdorf indicates, for artists it is about the process, in which AI tools can play a part, especially in creative combinations. Stefanie Grawe does not limit this combination of tools to music alone, but sees it more as interdisciplinary:

> I think it's very important that you can use all the tools to be creative and not exclude other possibilities, but that the combinations are then also

> the decisive thing. What sounds are produced or how someone performs on stage are decided by the musicians themselves. (in Tillmann 2022, XCV)

Tools with possibilities for intervention are described by the interviewees as more creatively appealing, in order "to further develop and advance one's own sound identity with self-produced data by means of AI" (Grawe, in Tillmann 2022, XC).

The interviewees describe the current possibilities of AI and their impact on the creative processes as leading to new central roles of the artists:

1. *Creating the system*: The artist must decide how and in which step of the creative process AI should be used which includes defining clear goals for the use of AI. At present, companies often define the possible applications through their product design, but individual intervention in the coding would also be conceivable, so that tools can act and be used in a highly personalized manner (see also Gioti 2021: 70–72).
2. *Curating the training set*: For artists it is important, that they can curate the source material based on their own taste and intentions. It is literally about one's own possibility to decide which data the AI should work with to create new material since this would encompass the ability to enter the artist's own ideas into the system. The problem is that the AI must be pre-trained, which can pose problems from an ethical point of view, as will be discussed in section 2.3. A challenge here can be the required ability to deal with file formats and program codes at this stage of AI tools.
3. *Evaluation, curation and further processing of the output*: The generated material cannot be the final outcome, but must be evaluated, processed further, and integrated (or excluded). The creative approaches can encompass – like in prior creative music production practices – sampling or manipulating of the AI-generated material. This reinforces the need for at least basic songwriting and music production skills.

Valenzuela summarizes the task for the artists is about "deciding what you want, sonically, because you can get very easily overwhelmed by the possibilities of the models" (in Tillmann 2022, appendix, CXII). In that sense, it becomes clear that aesthetic experience and vision, knowledge of the different challenges of songwriting in general, and an artistic goal in the broadest sense are still important skills and features for working with AI to create music – as long as it is supposed to fit into certain musical styles or genres, one should add.

Potentials and creative approaches

Interestingly, all four experts explained that they are using the AI tools in a different way than they were intended in order to achieve more independent and unique results, which could be interpreted as a result of creative thinking in practice in general (Coessens 2014; Coessens / Crispin / Douglas 2009) as well as negotiating the discussed new roles of artists in working with AI. Moisés Horta Valenzuela explains:

> Sometimes I´m very overfitting the model which is like you train it on very few data, but you augment it. So, e.g. you originally have 13 minutes of data but you augment it to like 3 hours of data with some techniques and then it learns. But it's all just this data. So, when you train the prior to loop it's really constant, but it becomes this kind of phantom drive of the neural network that's always trying to make this loop and these transitions because it just knows this data. But it kind of fit it because I augmented it. And then using this with some other model that I trained […]. (in Tillmann 2022, appendix, CX)

This practice is contrary to the previous assumption that AI systems need a lot of data to work 'properly'. The difference here, however, is that the artist is looking for the 'new' and the 'unexpected'. Moreover, Horta Valenzuela adopts the 'problem' of overfitting (Gioti 2021: 67), using it for his own creative practice on purpose, and combines systems trained on other material to search for "novel sounds":

> […] it's something that it wasn't really trained on. This is when it becomes really novel and not just a reproduction of whatever you trained it on. When you start doing these combinations. […] This is not something intended in the documentation or so. They don't suggest this. It's just like a hack that I did. It's quite straightforward, but I haven't seen people tryin' it out, but it works and it sounds fucking sick. (Horta Valenzuela, in Tillmann 2022, appendix, CIXI)

Furthermore, Horta Valenzuela trains an AI system on recordings of old or rare instruments to preserve them and use them for further creative approaches. The difference to sampling here is that the individual timbre of the instrument can be preserved instead of the recording itself:

> I trained an AI on this instrument from Mexico called the Santerio, which is from the 19th century, very popular. And this instrument obviously is like cutting out of popularity because it's kind of big and very difficult (…) And so I made myself a data set from songs on YouTube basically. These songs are public domain because they are quite old, so I just made a

> dataset of this instrument and then it becomes this idea of preserving the sound of ancient instruments through the machine, at least the textures. (Horta Valenzuela, in Tillmann 2022, appendix, CIV)

It appears to be especially attractive and creativity-boosting for artists, when 'happy accidents' happen – results that are produced by the 'wrong', unanticipated or accidental use of instruments or tools (see also Deruty et al. 2022: 45). Carré explains:

> I like the accidents. Like when you are playing the piano and are working on a song, it's really exciting to lose control and let the unexpected come under your hand. AI tools increase the chances to build from nice accidents. (in Tillmann 2022, appendix, CXV)

Interestingly, the interviewees see further potentials for collaboration, for instance by building a community of users that share knowledge, but also tools. This could safe time if, for example, someone shares an on a certain genre or style trained AI-checkpoint and potentially help protecting the environment by using up fewer resources as you don't need to train the model from scratch (Horta Valenzuela, in Tillmann 2022, appendix, CXI).

Challenges and risks

As in the general discussion about AI, challenges and especially risks in the usage of AI in music and songwriting in particular are debated a lot (Beato 2023; Clancy 2023a; Frieler / Zaddach / Meyer 2023; Deruty et al 2022). While there is the argument that AI can offer some advantages in the creative process, three key issues were expressed by the interviewees: legal, ethical, and aesthetic aspects.

Legal aspects

Legal aspects relate to copyright and the associated remuneration of rights holders and associated parties. Many different experts as well as data are involved in the creative process with these tools: the (usually) copyright protected creators of the data used in the data set, the programmers of the codes, the providers of the service, the machine or algorithm itself and the artist (who can also occupy several of these positions).

While there are exceptions in the context of research, a problem arises when the data used to train the AI is not transparent. Often it is not possible to find out which data was used for the generated output. Hence, some argue that AI becomes a producer on its own, gaining similar rights as the human counterpart, or that the programmers of the AI code hold rights. Carré negates that:

> I think that the owner of the technology cannot have any rights on the music that is generated. Otherwise, you would have given rights to every person who created an instrument. When you play the piano, who should you pay? 'Schimmel'? It's not gonna work, even if those tools are different because they generate original music. (in Tillmann 2022, appendix, CXVI)

This statement points to the legal facts and the discussion which has only just begun (Vincent 2022). This discussion is complicated by lengthy decision-making processes regarding a reformation of copyright at the political level with different developments in different countries. Art and music became a special testing ground for AI (Wittpahl 2019: 257–270; Du Sautoy 2019). With reference to French economist and philosopher Jacques Attali, Clancy (2023b: 2) sees high relevance in the argument that music is an important site of negotiation and herald for social change. In engaging with AI from a creative perspective, new insights and perspectives, or those neglected in the discussion, could be gained and introduced, and "may produce wisdom for both the broader macroeconomic and the environmental ecosystem" (Clancy 2023b: 2). Debates about copyright, and corresponding remuneration are an essential part of it.

A challenge for coming years is then to develop appropriate licensing and copyright revenue solutions (Clancy 2023a: ch. 9 and 10). Subscription models could be one: "If, for example, a label created a big dataset of all the masters that they have and all the leadsheets, they could do something like a subscription. And then distribute the profits of the subscription to the composers and producers like streaming services" (Carré, in Tillmann 2022, CXVI). Furthermore, blockchain technology could be used to bring more transparency to this process. Interviewees stressed that although copyright seems to be most obvious for works by artists working with AI, future copyright revenue models should not be to the detriment of artists (Carré, in Tillmann 2022, CXVI).

Ethical aspects

Another concern expressed by the interviewees regards ethical dimensions. Algorithms and the AI training processes can be biased, racist, misogynist, traumatized – as they are only as ethical as the axioms of the trainer and the data set that was used. Horta Valenzuela asks critically:

> I think the issues that we should talk about is, why is AI so white? Why is AI so male driven and why are companies firing their black employees in 'AI ethics'? Why are these kind of issues happening? Were the data sets really racist or producing kind of fucked up shit even though the companies are trying to mitigate? (in Tillmann 2022, appendix, CXIV)

As Mike D'Errico (2022: 9) argues, Eurocentric standards of music such as the 12-tone-scale or 4/4 time signatures are inscribed in most common music songwriting and production tools such as DAWs. Such a "white racial frame" (Ewell 2020) leads to unconscious biases and practices of exclusions. Potentially, AI tools could overcome this, however, this depends on ethical considerations in the manufacturing process. Ethically questionable practices of companies producing AI tools can potentially be reproduced in the results of such – even if they contradict the intentions and views of the users. This certainly confronts artists with the problem that through their use of AI they would sometimes support (neoliberal) global power structures, dependencies, racist or misogynist ideologies that they may criticize. The aforementioned communities could help to deal with that issue. Examples of that could be the Glitch Feminism Manifesto[2] or the work of the 'Indigenous Protocol and Artificial Intelligence Working Group'.[3]

Another ethical concern are the working conditions of songwriters and composers in the future. A field, which is not only at risk, but already heavily influenced by algorithms is the field of commercial music for movies, teasers and commercials. Potentially, this can expand to specific and often instrumental microgenres or mood-based background music, which play a significant commercial role on streaming services such as Spotify. Especially the mentioned potential of accelerating the process could lead to new business standards with expectations and deadlines that literally require the usage of AI. Further, exploitative practices on the shoulders of creatives that have been prevalent for some time in the development of music software and hardware (and not just there) (D'Errico 2022), must be critically observed and prevented.

Aesthetic aspects

Finally, the interviewees discussed aspects that regard the role of the creative human in relation to AI. First, all Interviewees are convinced that artists would not be replaced by AI in future. Instead, they see AI algorithms as an extension of the toolbox of creatives as described above. This appears to be a widespread view and is described by Artemi-Maria Gioti as "human-computer co-exploration" (Gioti 2021: 62–64) respectively "distributed human-computer co-creativity" (Gioti 2021: 56). D'Errico speaks of "interface aesthetics", defining it as "a general framework for thinking through relationships between theory and practice, concept and technique, aesthetics and poietics" (D'Errico 2022: 15). Second, the interviewees emphasize the relevance of the aesthetic dimensions of creative practices. They see a difference between AI on one hand and an intrinsic desire of artists to express themselves and create on the other:

2 https://www.legacyrussell.com/GLITCHFEMINISM (31 August, 2023).

3 https://www.indigenous-ai.net/ (31 August, 2023).

> The need to make music is there. It's been around as long as there have been humans. (…) Musicians and artists make music to communicate and to reach people, but above all to express themselves and that doesn't go away. And that is so deeply anchored in people. That alone is reason enough that AI cannot replace musicians. It's not only about the product, it's also about the doing. (von Wilsdorf, in Tillmann 2022, LXXXVI)

AI tools are not artists themselves since they miss the "personal filter and the urge to want to express something" (von Wilsdorf, in Tillmann 2022, LXXXVI). A challenge is then that AI can create something that looks like art on the first sight but lacks important dimensions of it. At the moment, the interviewees still see major limitations of AI in music as Carré explains:

> Neural networks and all this technology, […] can't create a long-term melody. […] For the moment, AI technology can't tell a story like a human can do it with notes. I mean there is something that is not logic and that is […] random, even if it's not false in terms of harmony, it seems to go nowhere. (in Tillmann 2022, CXV)

By understanding art as practice (Haarmann / Lemke 2023), important functions for the practitioners themselves become apparent (see also D'Errico 2022). Both Grawe and von Wilsdorf emphasize the psychological, "healing" effect of songwriting and music making when one can live out their feelings and express themselves, process their experiences, and such (Grawe, in Tillmann 2022, CI & von Wilsdorf, in Tillmann 2022, LXXXIII). With the growing prevalence of AI in songwriting, a certain issue could arise: "When people who actually want to make music get into these simple tools at an early stage", it could lead to flattened and immature creative practices and can prevent growing as an artist (von Wilsdorf, in Tillmann 2022, LXXXIII). Von Wilsdorf refers to her own experiences: "There's just no real satisfaction when I've spent a whole night just pressing a button and I always get snippets back. Then I have a short 'cheap thrill', but I'm not proud of my work in the end" (in Tillmann 2022, LXXXIII). The issue raises the questions what functions music making (and listening) has for human beings, as well as which human components remain when the usage of AI in songwriting becomes more of a standard: "Now, if half of it is commodity music created at the push of a button, there is a training in the human ear and it becomes more and more insensitive" (von Wilsdorf, in Tillmann 2022, LXXXVI). The aesthetic practices that listening and creating humans apply could be highly determined and influenced when "many people automatically need and use these tools and no longer listen to their own imagination or idea or feeling" (Grawe, in Tillmann 2022, XCIX). Here, ethical concerns overlap highly with aesthetic aspects. This further refers to the relevance of aesthetic and artistic education, both formal and in-

formal. As discussed, to produce original individual music, a multitude of artistic decisions must be made that can quickly become overwhelming without the appropriate skills and knowledge.

Conclusion

The interviews provided important practitioner insights into concrete ways of dealing and reflecting on working with AI for songwriting and composing. Working with AI has a comprehensive impact on creative practices, ranging from aspects perceived as positive (acceleration, enrichment, and augmentation) to those perceived as critical or negative (ethical and aesthetic issues). It also became clear that although artists can understand AI as a partner, they still tend to subordinate it to the playful mode of creative work and, for example, incorporate an unintended use and exploitation. The interviewees also described new challenges and roles. Like the findings of Moffat and Sandler (2019) for music production, designing (of sounds, tools) becomes an important task of the workflow, so that we can observe a shift to an 'aesthetic curation' in songwriting and composing when it comes to working with AI.

The research could also show that due to the rapid advancement of technology as well as the professions usually involved in it, it is necessary that a large-scale debate about creativity and AI is also accompanied by "artistic reasoning" and reflection of artists (Borgdorff 2012: 167). This means that artists need to engage much more with AI to explore the scope for action, to contribute evaluations of AI performances and ultimately perspectives for socially negotiated discourses around aesthetics, arts, and ethics. A consequence of this would be to involve artists more in AI labs and collaboratively in the research and development process (Deruty et al. 2022). Artistic Research as an emerging field represents an extremely promising approach to this (Borgdorff / Peters / Pinch 2020; Zaddach 2021, 2023). In addition, the consequences of AI in the field of music and music industry must be more academically investigated and accompanied from an even broader, interdisciplinary and interprofessional perspective, since "models of taste, identity and motivation will become important as the next step in powering a more human-like AI generation" (Brown 2021: 15). This also means, that AI must also be anchored in the concrete curricula in study programs and training courses.

In our understanding, it may be the complexity and relevance of creative art practices for human-beings that remains the main difference and differentiation point between non-AI and AI music, even though authors like Hannes Bajohr see limitations in such an approach and argue for a post-humancentric "critique of aesthetic AI" (Bajohr 2022) or like Arthur Miller concludes "that in the future machines will be fully creative and may even surpass us" (Miller 2019: 336). However, we argue

that since AI algorithms follow specific rules, the resulting music could lack individuality, spontaneity, and originality, in writing as well as performing music. The difference seems to lie in the human qualities of irrationality and (spontaneous) creativity, contingency of action and thought, situatedness in environments and embodiment, affect and non-verbal communication, imagination and the ability to construct broader ideas and correlations, and last but not least the experience-based practice of doing which are still challenges for AI (Rohrmeier 2022). To that extent, one could argue that we can understand (and perhaps rediscover) music as a focal point of understanding ourselves as organic, situated human beings, constantly interacting with humans, non-humans, objects, and environments (Bennett 2010) in sensual and "vibrational practices" (Eidsheim 2015: 3). However, this also is subject of a social negotiation process about the relevance of all these aspects. As D'Errico (2022: 14) argues, "aesthetic judgment is at once a political and ethical act capable of radically transforming existing conceptions of art, culture, and society". AI music could potentially trigger such a transformation and therefore seems to push the "big-picture questions about music's ontology in the late digital age: what are we listening to, what are we listening for, and who's doing the listening?" (D'Errico 2022: 22). Nevertheless, the debate should not ignore the fact that creative practices, especially in non-commercial contexts, will likely continue to play an important role for human beings in the future. This is because music as a creative leisure activity (but also often as profession) follows a certain urge, according to which the focus is on direct as well as shared experiences, active learning, and individual expression. However, it is most likely that these contexts will increasingly be enriched and supplemented by AI, for example through individualizable practice and learning apps.

In conclusion, AI is becoming an unavoidable topic for music practices of listening and making as well as (higher) music education. It comes with promising possibilities as well as challenges and risks – and therefore requires a profound debate, which appears to happen in the context of other crisis modes such as climate crisis and political conflicts.

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