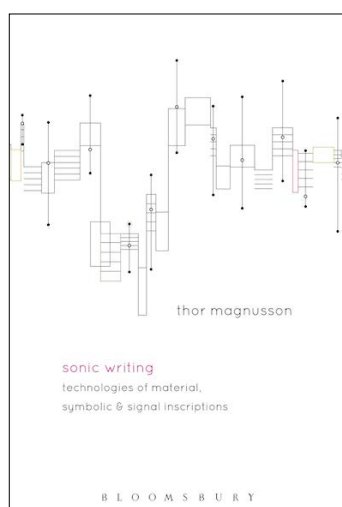


REVIEW ON THE FUTURE FOR SONIC WRITERS

 **PEDRO SARMENTO**

Queen Mary University of London
p.p.sarmento@qmul.ac.uk



Magnusson, T. (2019). *Sonic Writing: Technologies of Material, Symbolic & Signal Inscriptions*. Bloomsbury Academic.

ABSTRACT

This article intends to provide a holistic review of Thor Magnusson's *Sonic Writing*, presenting the authors' historically-informed views about sound and music technologies. It starts by addressing the distinctions between the three categories of music-related inscriptions, in material, symbolic and signal form. It then reflects upon the parallelism this categorization has with the scope and topics within different conferences from the field of sound and music technology. Furthermore, it recounts the contributions of recent deep learning approaches in musical development, expanding on the books' notions and offering an updated view concerning the specific purpose of automated music generation. Moreover, a contrast between the recent wave of AI-related technological developments and older scientific advances is discussed. Finally, driven by considerations about computational creativity in the field of music stated on *Sonic Writing*, this review propels a reflection regarding the role of machines in artistic creation.

Keywords: Thor Magnusson; Sonic writing; Artificial intelligence; Computational creativity; Music.

Continuously progressing, relentlessly opposing stagnation, claiming ubiquity - the indisputable principles of today's technology. Unsurprisingly, the fields of music and sound are also faced with this inexorable (r)evolution. The primordial drive behind *Sonic Writing* is to historically frame the role that recent technological developments play within the musical scope, tracing current techniques and aesthetics far back in time, simultaneously exploring how novel systems and tools condition artistic expression. Structurally, the author starts by addressing what he defines as three distinct modes of sonic writings: inscriptions in material, symbolic and signal form. A narrative is built around each of these, spanning from their primitive beginnings to state-of-the-art technological advances, applications and artworks. In *Material Inscriptions*, the emphasis is on musical instruments, depicted as systems or vessels into which musical practices and ideas are written, and as epistemic tools, used towards the pursuit of musical knowledge. Within *Symbolic Inscriptions*, the reader is invited to examine the evolution of musical notation, from its inception to current digital techniques. The first sketches of what would become the standard musical score are here presented, highlighting the decisive part that printing techniques and media distribution played in this context. Concerning *Signal Inscriptions*, the focus shifts from symbolic notations towards a mechanical representation of musical signals, via the advent of grooves, magnetism, and digits. First experiments with tape recording, and the subsequent musical novelties it fostered, are the core around which this section revolves. The distinctions amongst the three first parts of *Sonic Writing* are clear and pertinent, while at the same time succeeding in pointing out the unquestionable synergies between the issues of the trio. From a personal perspective as a music and sound technology researcher, it is interesting to notice a clear affiliation between *Material Inscriptions* and NIME¹ (New Interfaces for Musical Expression), *Symbolic Inscriptions* and ISMIR² (International Society for Music Information Retrieval), and *Signal Inscriptions* and ICASSP³ (International Conference on Acoustics, Speech and Signal Processing), three well-established conferences within the field. Notwithstanding, due to shared common ground on sub-fields and practices, it is not unusual for a given publication to be simultaneously suited for the three venues. The same effect can be witnessed when talking about affairs within each form of inscription, targeting different, specific matters, but also encompassing mutual interests.

The fourth section of the book, entitled *Digital Writing*, is precisely an essay about this symbiosis, exploring how digital instruments can be thought of as models of music theory, and how new notations of music can play a more interactive part in music creation, supported by and embedded with machine-oriented approaches. Despite being a recurrent theme throughout the text, artificial intelligence (AI) contributions to musical development are here highlighted, with a section dedicated to the role of deep learning in music, listing projects such as Deep Mind's *WaveNet*⁴ and Google's *Magenta*⁵. The author argues that, similarly to what happened in the dawn of computer music, whereby first experiments were mostly conducted at industry or university research labs, for

1 See www.nime.org

2 See www.ismir.net

3 See www.2020.ieeeicassp.org/

4 Oord, A. & Dieleman, S. (2016, September 8). Wavenet: A generative model for raw audio. *Deep Mind Blog Post*. <https://deepmind.com/blog/article/wavenet-generative-model-raw-audio>

5 Eck, D. (2016, June 1). Welcome to Magenta!. *Magenta Blog Post*. <https://magenta.tensorflow.org/>

6 Zukowski, Z. & Carr, C. [DADABOTS]. (2019, September 9). *RELENTLESS DOPELGANGER* [Video]. Youtube. <https://youtu.be/RRwVtKPKx3RA>

7 American musician and bass player, notoriously known by his online videos.

8 Zukowski, Z. & Carr, C. [DADABOTS]. (2021, January 27). *Infinite Bass Solo* [Video]. Youtube. <https://youtu.be/RRwJzw4VvZA>

9 Zukowski, Z. & Carr, C. [DADABOTS]. (2020, February 3). *Human Extinction Party - AI Death Metal - Cannibal Corpse* [Video]. Youtube. <https://youtu.be/ky1mPIAX2s>

10 Eurovision. (2020, May 11). Introducing the AI Song Contest!. *Eurovision Blog Post*. <https://eurovision.tv/story/introducing-the-ai-song-contest>

11 Structured by Boetius (480-524 CE), the liberal arts were divided into the *quadrivium*, namely geometry, arithmetic, geometry and music, and the *trivium*, encompassing grammar, dialectics and rhetoric.

the required computing power was yet a scarce asset, most recent developments, specifically the ones exploring deep learning approaches, follow now the same trend. Expanding on the contents of the book, it is noteworthy to acknowledge that we are currently entering the age where such technology is becoming increasingly available to a wider audience. As an example, the group Dadabots is pioneering innovations in music with deep learning and, despite having academic acceptance and scientific publications (Zukowski & Carr, 2017), is clearly focused on the music-making aspect, free from any official academic links or frequent access to research facilities. Dadabots' online stream of technical death metal generated with neural networks⁶ earned the duo widespread media attention, and propelled further projects and collaborations, from endless generation of Adam Neely's⁷ bass playing⁸ to natural language processing techniques for lyrics creation⁹. Furthermore, despite having multiple participants with ties to academia, the AI Song Contest¹⁰ from Eurovision is another example of an attempt to disseminate AI approaches within the music community, fostering the creation of multidisciplinary teams of artists and programmers. In a cyclic, recurrent manner, computing power resources, specifically GPUs, are once again the main hindrance for a wider use of these technologies, but, as we are invited to infer from *Sonic Writing*, it is very likely that such diffusion will eventually occur.

From paleolithic bone flutes, through ancient Greek music theory, medieval appraisal of music as one of the sciences of the *quadrivium*¹¹, and more recent phonographic inventions, the narrative is able to present an inclusive, critical and substantiated view on the accounts of each type of inscription, blending its past with its present, somehow speculating (and cautioning) about its future. Luckily, this is not a view *from nowhere*, welcoming Thor Magnusson's background in computer science and artificial intelligence, music and arts, and, most notably, philosophy. In particular, references to Heidegger's ideas are abundant throughout the text, placing his arguments about the philosophy of technology at center stage during a time where a careful analysis is more important than ever, helping us to navigate through the exciting maze created by recent advances in AI via deep learning techniques. Although not referenced in the book, heavily inspired by Heideggerian perspectives were also Hubert Dreyfus' deeds and arguments during the 1960s (Dreyfus, 1965), cautioning against the rampant optimism of early AI researchers which sought to represent reality through formal symbolic manipulations. Dreyfus' actions deserve serious consideration at this very moment, for the same unbridled excitement is now emerging with deep learning and data-driven AI.

By absorbing the accounts in *Sonic Writing*, the reader is subconsciously called upon to reflect on these issues, particularly those that are concerned with computational creativity in music. Steadily approaching a future where the act of sonic writing could be entirely automated, whether targeting inspection, inscription or creation of music, artists and programmers alike ought to think about what the role of the algorithm is truly used in their practice. Should we think of it as just a mere

tool, incapable of moments of serendipity? Should we expand on that and imagine it as an *organon*, the Greek term for a bodily organ, a tool, and a musical instrument, thus considering it as an extension of ourselves? Or should we conceive it as an artist by itself, capable of authenticity and creativity? Although it is clear that there is no unanimous answer for this triad of suppositions, the book clearly urges us to pose them, and points towards possible research paths and references. Outside the scope of the tome, regarding a scenario whereby an algorithm would be granted the role of artist, Penha and Carvalhais (2018) reflect upon art generated by machines, and humans' relation with it. In their article, the authors claim that the term *machinic art* should be reserved for artworks created by a machine's own intention and volition, not subjected to a human-centered influence, or, using a data-driven AI jargon, not trained with human made art data. The distinction is clear - human art made with computers differs from machinic art. Clashing with Cartesian philosophy, where pure reason of the soul takes precedence over the sensory stimuli from the body (Descartes, 2004), the argument here is that it would not be possible for humans to appreciate or understand *machinic art* as we do with art made by humans, beings with whom we share important characteristics: an identical type of body, which leads to a similar embodied perception and perspective, and, one might infer, an intrinsic fear of the inevitability of death (Heidegger, 1962). It remains to be seen whether or not machines will process the *urge to create art*, but it is clearer that we will be poorly prepared to grasp it.

The arguments and expositions in *Sonic Writing* are weighted and prudent, despite the noticeable passion about the subject one can read between the lines. Similar amounts of attention are given to technological, historical and artistic points of view, endowing the reader with a comprehensive set of tools to better understand the bigger picture within the field of music and sound technology. Moreover, the author succeeds by not making the work hermetic within a Western-centered perspective, often alluding to distinct cultures and traditions. It is not a technical book, for algorithms and formulations are mostly omitted. Fortunately, its goal is a different one, that of showing us that history repeats itself and that we should stop, frequently, and frame our artistic intentions within a wider scope.

REFERENCES

- Descartes, R. (2004). *Discurso Sobre o Método Para Bem Conduzir a Razão na Busca da Verdade Dentro da Ciência*. Guimarães Editores.
- Dreyfus, H. (1965). *Alchemy and Artificial Intelligence*. RAND Corporation. <https://www.rand.org/pubs/papers/P3244.html>
- Heidegger, M. (1962). *Being and Time*. Blackwell Editions.

Penha, R. & Carvalhais, M. (2018). Will Machinic Art Lay Beyond Our Ability to Understand It? *Proceedings of the 24th International Symposium on Electronic Art*.

<http://doi.org/10.5281/zenodo.1303352>

Zukowski, Z. & Carr, C. (2017, December 4-9). Generating Black Metal and Math Rock: Beyond Bach, Beethoven, and Beatles [Conference presentation]. *31st Conference on Neural Information Processing Systems*:

ACKNOWLEDGEMENTS

This work is supported by the EPSRC UKRI Centre for Doctoral Training in Artificial Intelligence and Music (Grant no. EP/S022694/1).

Article received on 09/03/2021 and accepted on 22/03/2021.

[Creative Commons Attribution License](#) | This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.