ISSN 2637-1898

INSΔM

JOURNAL OF CONTEMPORARY MUSIC, ART AND TECHNOLOGY

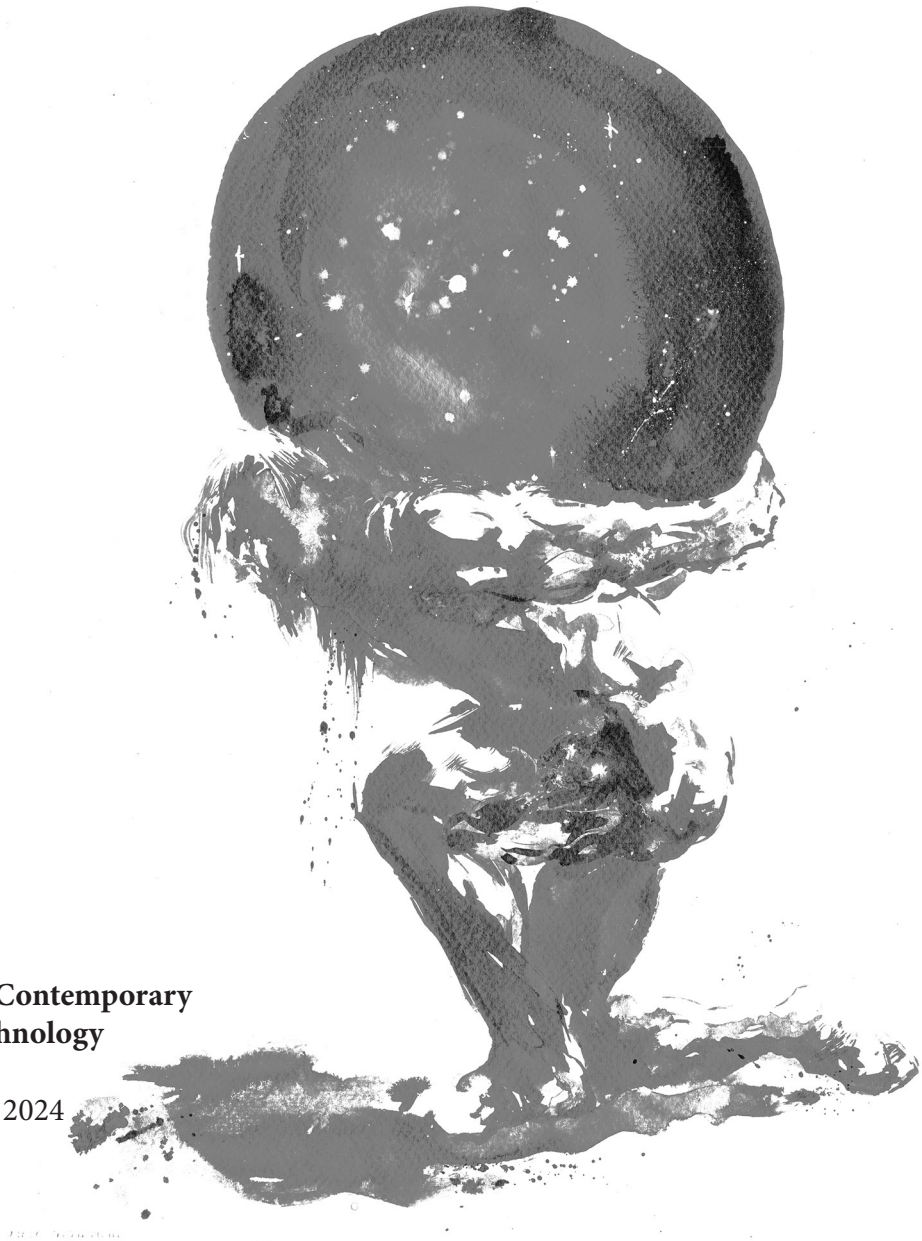
13 II/2024

JOURNAL OF INSAM
INSTITUTE FOR CONTEMPORARY ARTISTIC MUSIC

INSΔM

INSAM

JOURNAL OF CONTEMPORARY MUSIC, ART AND TECHNOLOGY



INSAM Journal of Contemporary Music, Art and Technology
Issue No. 13
Sarajevo, December 2024

INSAM

INSAM Journal of Contemporary Music, Art and Technology
Journal of INSAM Institute for Conteporary Artistic Music
ISSN 2637-1898 (online)
COBISS.BH-ID 26698502
UDC 78: 792

publisher
INSAM Institute for Contemporary Artistic Music
Sagrdžije 45, 71000
Sarajevo, Bosnia and Herzegovina

for the publisher
Rijad Kaniža

INSAM Journal of Contemporary Music, Art and Technology is an international peer reviewed journal dealing with topical issues in contemporary art music, visual and performing arts, and technology. The journal encourages interdisciplinary and transdisciplinary approaches and innovative views on these subjects, aiming to create a platform for communicating new ideas and theoretical and artistic impulses.
INSAM Journal is published semi-annually (July and December) in open access electronic form and it can be found on the following address:
https://insamjournal.com/index.php/ij/

The Journal is indexed in:
ERIH PLUS
DOAJ – Directory of Open Access Journal
CEEOL – Central and Eastern European Online Library
RILM – Répertoire International de Littérature Musicale

INSAM

INSAM
VISIONARY PLATFORM

TABLE OF CONTENTS

(Inter)Views

9 **Ališer Sijarić**
SONEMUS Fest 2024: WARIATIONS

Main Theme: New Technologies and Social Media in Art and Music Pedagogy

12 **John Aulich**
Towards Technological Ecologies as Compositional Environments in the Pedagogy of Acoustic Composition

40 **Sanela Nikolić and Biljana Leković**
Digital Competences in Classical Music Teaching:
From a Critical View to the Systematization of Digital Resources

69 **Peter W. Stone**
Rise of the Microsong: the Platformification of
Music on TikTok as an Artform

Reviews

86 **Bakir Memišević**
14th International Symposium "Music in Society",
Sarajevo, October 24–26, 2024.

93 **Aida Adžović**
Reflections of the SONEMUS Fest 2024: Resisting WARiations

Contributors' Biographies
102

Guidelines for authors
105

EDITOR'S FOREWORD

In issue No. 13 of the *INSAM Journal of Contemporary Music, Art and Technology*, the second for 2024, the main theme is focused on the "New Technologies and Social Media in Art and Music Pedagogy". This topic came following several issues of our journal throughout the years that were dedicated to themes of art and music on social media and new technologies in art in general. We posed a common presumption that traditional schools face difficulties trying to keep up with technological developments as the starting point, and were happy to receive answers from the experts dealing empirically with music and art education today.

The three articles in the Main theme section introduce different viewpoints and discussions to the table. The rubric is introduced with an article by John Aulich, who considers new technologies in the domain of acoustic composition in higher education. The author examines the limitations of traditional music notation software and advocates for an ecosystem-oriented framework that views creativity as something that emerges in spaces between professional tools, human bodies and environments they are in. Sanela Nikolić and Biljana Leković address the issue of online digital resources that could be and are used in music pedagogy. These resources require a specific set of competencies from teachers that include not only the knowledge about these resources, but also skills in music encoding, storage and transposition informed by computer science. As an addition to the theoretical bases of the research, the authors give a classification of selected digital tools. With a concept dubbed *microsong* in mind, Peter W. Stone explores the impact of social media on the "platformification of music". His focus is on TikTok as one of the most influential platforms of recent years, and on the secondary data on the musicians' experiences in adapting to the new circumstances.

The Review section contains two contributions with regards to the most recent events in Sarajevo. The first one of those, the international symposium "Music in Society" held in late October, is covered by Bakir Memišević. Following this symposium, Sarajevo's contemporary art music audience had an opportunity to

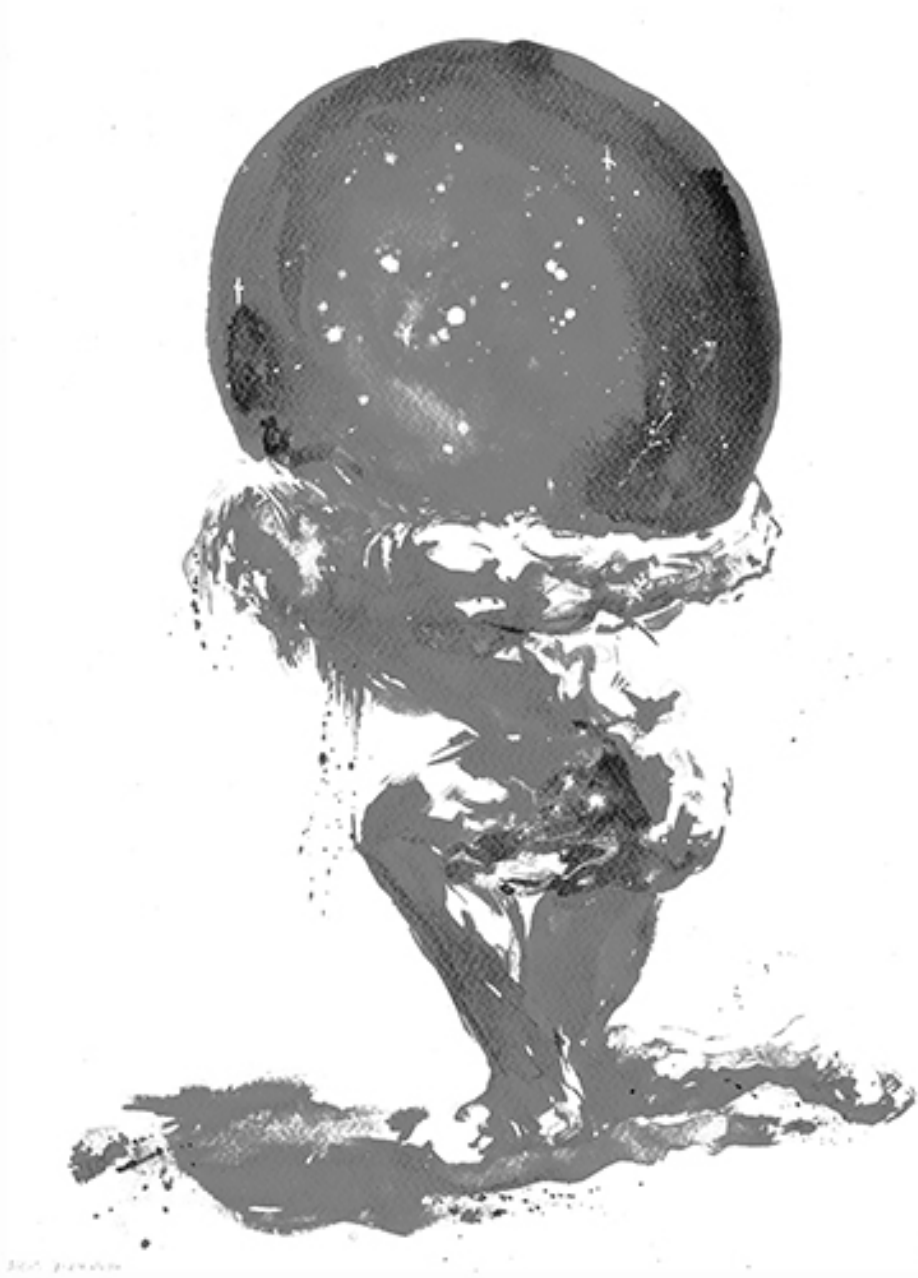
experience a whole season of SONEMUS events, which were organized in this fashion for the first time. In her extensive review, Aida Adžović presents the details of this event series.

As always, we are thankful to 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. The image of Atlas on the cover, painted by talented Kim Diaz Holm, is symbolic and nested in the original design by Milan Šuput, who we tragically lost this year.

With all the experiences we've gained, and the support from our network of curious research minds, we are closing this year's journey and welcome what is coming in the next.

In Belgrade, December 15, 2024,
Dr. Bojana Radovanović,
Editor-in-Chief

(Inter)Views



Ališer Sijarić
Academy of Music, University of Sarajevo
Sarajevo, Bosnia and Herzegovina

SONEMUS FEST 2024: WARIATIONS

From the Festival Booklet, Introductory Note from the Artistic Director

It is our honour and pleasure to invite you to this year's edition of the SONEMUS Festival, the only festival of contemporary art music in Bosnia and Herzegovina!

Immersed in a world of vapid spectacle created by the collision of power politics and technology, we have gradually become devoid of the ability to create and hear meaning in sound (whether it be speech or music), as well as the possibility of hearing the Other (and/or otherness).

Sealed off in our own internal (spiritual) echo chambers, in which external auditory stimuli reverberate infinitely in a temporal loop (which we mistakenly hear as our own identities), we have created a dystopian world akin to Bruegel's vision of hell, where war and violence are the only possible outcomes. [P. Bruegel the Elder: El Triumfo de la Muerte]

The form of musical variation, as a fundamental expression of rationalism and the Enlightenment in music, in this context becomes "wariations" [an amalgamation of:

war + (var)iation].

Art (and thus artistic music), understood as "a lie (illusion) that reveals the truth" (P. Picasso), is one of the few remaining areas of human activity in which true communication (facing the Other and otherness) is possible. This year's SONEMUS Festival is being held in that spirit, as well as in the spirit of resistance to the existing condition humaine marked by wariations.

At the first concert of the festival, *Solilokvijii* (*Soliloquies*) [October 31 2024; Academy of Music (J. Štadlera 1/II, Sarajevo) at 8 p.m.] musicians from the SONEMUS ensemble will perform a series of compositions for solo instruments by renowned composers Karlheinz Stockhausen, David Lang, Elo Masing, Liza Lim, and others.

The second concert [November 1 2024; Bosanski Kulturni Centar (Branilaca Sarajeva 24, Sarajevo) at 8 p.m.] features the Estonian Ensemble for New Music Tallinn (ENMT) with a program focused on post-spectral music—a musical style that takes the physical and psychophysical characteristics of tone/sound as its basic compositional model/paradigm, thus revealing a completely new musical world that has always been "hidden" in traditionally understood music. The concert will also feature the premiere performance of the composition Ghetto 2024: دومص by the internationally active Bosnian-Herzegovinian composer Hanan Hadžajlić.

The concert Monochromophonia [December 9 2024; Academy of Music (J. Štadlera 1/II, Sarajevo) at 8 p.m.] will present the premiere of the eponymous composition by prominent Bosnian-Herzegovinian composer Ališer Sijarić for saxophone quartet and live electronics, along with a piece by renowned Austrian composer Georg Friedrich Haas, both based on microtonality (the use of musical intervals smaller than the standard division of the octave into 12 degrees that create specific auditory effects), performed by the Sarajevo Saxophone Quartet.

No to Wariation, welcome variations!

Main Theme:

New Technologies and Social Media in Art and Music Pedagogy

DOI https://doi.org/10.51191/issn.2637-1898.2024.7.13.12

John Aulich*
University of Edinburgh / Independent
Edinburgh, Scotland, United Kingdom

TOWARDS TECHNOLOGICAL ECOLOGIES AS COMPOSITIONAL ENVIRONMENTS IN THE PEDAGOGY OF ACOUSTIC COMPOSITION

Abstract: Over the last few decades, the use of engraving software in acoustic composition pedagogy has become near ubiquitous. Numerous studies, such as those by Chen and O'Neill, Owlabi, and Nielsen, show that the use of both notation software and technology more broadly in composition aids both the creative process and the development of musical skills. However the paradigms of thought offered by traditional engraving software such as Sibelius and Finale arguably discourage approaches to acoustic composition beyond the quantifiable parameters it encodes visually and represents in playback, leading to the decentring of many of the musical features prevalent in contemporary art music. Using a framework informed by ecosystem-oriented analyses of creativity and Sara Ahmed's queer phenomenology of disorientation, this paper will interrogate the potential for practical applications of new technology to broaden student composers' toolkits when used in addition to notation software. As such, it draws from a range of real-world examples in order to offer educators some achievable means by which they can encourage student composers to think beyond notation software, as well a number of suggestions for future research, and furnish them with a basis from which to consider their music in terms that matter most to them.

Keywords: technology, pedagogy, notation software, affordances, disorientation, score, notation, ecosystem, ecology.

* Author's contact information: john@johnaulich.co.uk.

Over the last three decades, contemporary art music and its associated institutions have undergone a process of fragmentation and renewal, opening up a startling diversity of creative approaches, external influences and artistic priorities. This change is concurrent with the rapid development and adoption of new technologies, including the internet, but also speaks to an increasing interest in performing and listening bodies, the sociological and political issues of our time, and a massive expansion of permissible aesthetic sensibilities from the production of outright noise to the reappropriation of historical models (Rutherford-Johnson 2017, 1–20). From my own observations of our cultural landscape, this is a tendency that has only accelerated in the last decade, as the increasing accessibility of new technologies and information have weakened traditional gatekeeping institutions (Bayle and Provenzano 2021, 113–14).

However, our collective approach to the pedagogy of composition in higher education, and in particular the software we almost by default expect our students to engage with, no longer offers the means to produce what it is now possible to conceive of, and this has ramifications for both the creative outputs of our students and our own ability to help them meet their aims. In acoustic music in particular, this is most evident in our reliance on notation software that, as I will show through the first half of the paper, perpetuates an increasingly unsustainable underlying ideological framework.

The near ubiquity of music notion software as a compositional environment, both in pedagogical practice and professional life, attests to its usefulness across every aspect of the compositional process, from sketching to the production and distribution of parts. By offering a reconceptualization of notation software as a compositional environment that can be replaced, expanded, or subverted, this paper draws from theories of queer phenomenology and ecosystem-oriented conceptualizations of creativity to offer some tentative suggestions as to how we might begin to recenter some of the aspects of contemporary creative practice that it sidelines.

From a pedagogical perspective, numerous studies suggest that, particularly in primary and secondary educational settings, the use of both notation software and technology more broadly aids both the creative process and the development of traditional musical skills (Kang and Yoo 2021; Chen and O'Neill 2020; Gall and Breeze 2005; Nielsen 2013, 58–61). Gaining familiarity with notation software from an early age can significantly increase productivity as students in

higher education develop portfolios, and aids in fast and efficient exchanges of developing musical ideas from student to mentor. Further, the ability to instantly audition passages of music allows students and pedagogues alike to offer an immediate reflective or creative response without the need for a painstaking and often uncertain engagement of the musical imagination with the matter at hand (Watson 2006, 121–23; Dorfman 2017, 403).

In my own experience teaching composers in the context of higher education, a notated score produced with either Sibelius or MuseScore is by far the most common means by which students present me their work at every stage, from opening musical materials to the finished piece. Since the physical location of my current teaching position is hundreds of miles away, it is particularly convenient to be able to peruse an electronically transmitted PDF without requiring students to tediously scan or photograph handwritten work.

An ability to use the software efficiently also puts students in good stead for a prospective career in composition, where the process is expected to be fast and iterative, and the sharing of work-in-progress with ensembles and other stakeholders across great distances is rapidly becoming the norm (see, for example, Brown and Dillon 2016, 92–93). In film and television scoring in particular, where notated music will not necessarily be performed by live musicians at any point in the production process, engraving software is adjoined with digital audio workstations, where MIDI data can be rendered more convincing through the use of increasingly high quality sample libraries together with the DAW's flexibility in allowing its users to draw in subtle expression information (Davis 2010, 84).

Given the clear benefits of this significant technological development throughout a modern composer's education and profession, I often wonder if my own suspicions of it as a pedagogue, as a composer, and as a technologist are more reflective of my own artistic priorities than they are necessarily problems in need of a solution. Nonetheless, even my brief appraisal here proffers several questions that, if we are to take seriously the proliferation of changes in contemporary classical practice, ought to give us pause as to the nature of notation software as a compositional environment with all that that implies. How does the structure and design of such an environment shape our compositional decision-making processes? How might we give students the conceptual and technological tools to subvert them? When we listen to a MIDI rendering of a notated score

through engraving software, what is it exactly we are listening *to*, and how does that inform our understanding of the musical materials in play? How might this environment be amended, re-formulated or structured otherwise to better meet the increasing plurality of artistic priorities both in contemporary classical composition and beyond its borders?

Ecosystems thinking: technology and beyond

This latter question leans towards a more ecosystem-oriented creative practice, as outlined by Keller and Lazzarini (2017, 61), where musical decisions emerge from a tangle of interacting agencies. In this model, creative decision-making is both active and distributed, exhibiting a strong material dimension missing from "anthropocentric and disembodied acoustic-instrumental paradigms" (Ibid.). The wider paradigm of ecological thought in the social sciences from which this stems seeks to overcome the traditional dualism between human concerns and actions from which they are perceived to stand apart (Fox and Alldred 2017, 42). Here, environments, creative or otherwise, are constructed not only from immediate material circumstances, but also from the social forces, broader material conditions, communities of other people, organisations and institutions, and so on, that give rise to them, much of which is beyond the scope of this paper to explore.

A narrower, more immediate application of ecological thinking, shortly to be outlined, forms the framework for much of the forthcoming. It is nonetheless necessary for my purposes to maintain a fuzzy border between the technology-specific and the broader implications of collapsing the distance between the material and social inherent to ecological thinking. Particularly in the latter parts of the paper, which deal more broadly with the educational environment of our discipline, I step beyond the technological towards our role as pedagogues as part of our students' compositional environments.

The ecosystems approach has recently been incorporated into the study of human-computer interaction and combined more forcefully with the new materialist philosophies, such as that of Karen Barad, where agencies emerge from intra-acting assemblages of bodies, devices, and social forces (Frauenberger 2019). In either case, a composer's toolkit becomes a habitat

from which the creative process arises out of the material resources (thought broadly) immediately available to them, and which have been in turn shaped by others (Keller and Lazzarini 2017, 62–63). Although Keller and Lazzarini's main focus is participatory music, the 'others' referred to could just as easily be the communities, developers, and historical forces that have shaped and continue to shape technological environments for creativity in more-or-less silent and seemingly passive ways.

Affordances in notation software

Notation software presents a highly complex array of options and tools primarily geared toward the creation of traditional scores in Western music notation. Its complexity accounts for the impossibility of thoroughly systematising the inconsistent norms and sensibilities that have accrued over hundreds of years of notational practice developed across a wide variety of contexts. The software draws both on our prior knowledge and our concomitant expectations, but also reinforces and develops them in technologically influenced directions (Grier 2021, 5–7). As such, it presents a highly structured environment that allows for some things and not others and that strongly resists some artistic decisions but eases the path to others. Like any workspace, virtual or real, that presents a variety of well-defined objects with predetermined connections between them, software environments of all kinds invite and encourage particular modes of physical and conceptual interaction that, after the concept by philosopher James Gibson, human-computer interaction and user experience analysts call affordances (Mooney 2011, 142–44).

In brief, affordances are a conceptualisation of the possibilities of action that can be made by a particular creature in a particular environment (for a critical overview, see Scarantino 2003). Since Don Norman's (2002, 87–92) application of the notion to design and his emphasis on their perceptibility in the design of designed objects, affordances have become a significant element of human-computer interaction, particularly as applied to the analysis of software user interfaces (Hartson 2003). Affordances coalesce into hierarchies, which might require more or less competence to access, or might be more or less "buried" in complex user interfaces (Mooney 2011, 148). In the context of creative software,

such hierarchies can have a direct impact on our artistic decision-making processes.

As James Mooney (2011, 145–46) has suggested, hierarchies of affordances tend to plasticize with familiarity and experience. In his framework for analysing affordances in a musical context, he points to the inability of a user to take a particular action in a particular software environment, which might either be due to its affordances being inaccessible "due to a lack of training, skills or experience," or else as a result of "the wrong tool being used." Without necessarily contesting this observation, I would add that composers' artistic priorities change as they come into contact with the practicalities and conceptual frameworks afforded by the tools before them. Even, or perhaps especially, among highly experienced practitioners, the pathways, resistances, and correspondences laid out by new working environments form an important part of an artistic exploration and the practice that emerges from it (D'Errico 2022, 102). In other words, while the relationality and perceptibility of affordances gives us useful purchase for analysing design decisions, I will later argue that encounters with the unfamiliar, disorientating and ungrounding can lead to the most critical creative moments: that is, when creative agencies emerge *between* a composer and their tools.

Stilled motion: sketching with notation software

Most of the hierarchies established by notation software are intuitively known to acoustic composers, and there are many musical idioms for which its guiding structure makes at least some sense. MuseScore and Sibelius, two of the more popular options among young composers, both present similar workflows in the opening steps of beginning a new piece. Users are taken through a setup pathway, where they can select from a vast array of instrumentation presets that generally conform to standard notational models for the particularities of the instrument in question. Selecting a violin, for example, will add a 5-line staff with a treble clef; selecting a woodblock will add a 1-line staff with an unpitched percussion clef, so on and so forth.

If one works their way through this setup process to completion, they can also select the opening time signature, key signature, and tempo marker, all of which are customisable within the constraints of standard notation, or they can

exit to the canvas early, where the software assumes an implicit time signature of 4/4 and a tempo of 120 or 60, a default also prevalent in DAWs and presumed from the off to represent the naturalised "neutral" space of clock time, a concept to which I will return. Already, we are presented with a workflow that makes intuitive sense to its originally intended userbase, engravers of pre-existing works where these parameters are usually certain in advance (see Rothman 2013). In making default decisions for us, closing off the setup pathway early does not allow for the sense of fuzzy indecision conducive to creative working processes.

This kind of fixing down, in fact, continues at every level throughout an engagement with notation software because, to the software, the musical materials placed on the staff are necessarily already in a fundamental sense complete. There is no way, for example, to sketch out a rhythm without making a series of decisions, temporary or otherwise, as to its overall metricity, beam groupings, and in the case of pitched instruments, specific notes, or else have them effectively made for us. Even incomplete measures or groups are filled out with rests unless and until they are explicitly removed. Of course, these temporary parameters can be earmarked to be revisited later, but the more frequently softly determined ideas are encoded, the more difficult it is to keep track of what has been decided with intention and what is merely a consequence of the software's inclination to solidify musical materials in particular ways at every moment of indecision.

In this way, rudimentary sketches gain a sense of completion, object-ness or fossilization. As such, notation software encourages ways of thinking about the constituent materials of unfinished pieces that turn sketches, moments in an ongoing process replete with liquid, contingent, and plastic substances into objects in which "all movement is stilled" (Ingold 2021, 126). In other words, the software does not meaningfully afford contingency and indecision without actively and carefully tending to it on a meta level (for example, by colouring placeholder pitches in light grey, or labelling passages based on levels of incompletion).

From a pedagogical perspective, this is often at the crux of opening exchanges with respect to newly sketched material. Trying to pinpoint *where* we are in the sketching process and reanimate it when it is not yet clear to either of us also inevitably fixes some aspects that had originally been undecided. That being said, I have also noticed among some of my students a tendency to defer dynamics and

articulations to the later phases of their compositional process, and I suspect this, too, is as a consequence of workflow. By nature of the software design, rhythm and pitch *must* be encoded together, but dynamics are an implicit mezzo-forte until decided otherwise. When they are decided, dynamics are magnetically attached to pre-existing materials as a secondary horizontal layer. To decide to *decide* interrupts the pitch-rhythm workflow, which moves the cursor along after each note entry.

Notation software and the reinforcement of parametric reification

In general, the software strongly resists the entry of dynamic markings without concomitant rhythms, encouraging composers to defer decisions on dynamics at gesture and phrase-level until later in the process. This deferral mechanism invites ways of thinking about musical materials that can have a distancing effect. Here, pitch and rhythm are parametrically abstracted and foregrounded as the ontological root of a musical idea, as though all else is mere decoration. Further, each parameter is presented as an ontologically separate aspect of a given musical material, rather than a lens through which to momentarily view an otherwise more holistic conception.

Our acceptance and even enforcement, as educators, of notation software as the main space in which the creative work takes place echoes a general tendency of reification in music education, where the categories of analysis we intentionally or otherwise introduce become mistaken for an inherent reality of the object of scrutiny (van der Schyff 2015). As Dylan van der Schyff has pointed out, this can lead to "a rather fixed boundary between some notion of what the music is on one hand, and the environments in which it is created and experienced on the other" (2015, 4).

Both parametric reification and the separation between music and environment are, of course, much older than notation software itself, and it is the beyond the scope of this paper to fully explore its origins. I should stress, too, that it is not necessarily an unproductive approach in every case, but rather one that we have in the past been too eager to take as given, and an all too tempting solution to the problem of that which is less quantifiable and less given to presumptions of certainty as to what exactly we are producing or analysing.

Notation software and the displacement of embodied musical imaginations

To return for a moment to questions of pulse, clock time and the notation of rhythm, our ability to audition our work through this software has led, over time, to an interesting displacement. We accept that, although increasingly sophisticated, notation software playback is an imperfect simulation. We know intuitively, for example, that many the subtleties of expression, timbre, and orchestration are not well conveyed, but we can and do also reason that it is a useful tool for checking voice leading, getting an experiential impression of form, and many other things besides (Watson 2006, 138–39).

Where rhythm is concerned, however, the allure of quantifiability, of the computer playback's perfect accuracy insofar as the limits of our perception is concerned, increasingly wins out over the embodied musical imagination in our understanding of what precisely is before us. As a consequence, the high modernist ontology of the score that Franklin Cox (2004) has identified as an encoding of an ideal performance is strengthened by the rather undignified assumption that a computer is the more capable parser of complex rhythmic information than the embodied human imagination. In this way, the bodies of performer and composer alike are pushed to the background in view of a flawed appeal to the objectivity of floating-point arithmetic.

Alternative ontologies of the score

As Floris Schuiling (2019, 437) has remarked, the visuality of music notation is not "antithetical to the social and creative processes that characterize music-making," but rather a means of "embodied engagement." The vestiges of high modernism mentioned above have led scholars suspicious of the work concept to nonetheless identify notation along lines entirely congruent with it to reach an opposite conclusion. That is, as a wholly failed or compromised attempt at encoding an ideal performance (Schuiling 2019, 429) as opposed to a successful one. From this perspective, the problem is in what it does not or cannot articulate

in comparison to sounding music or the process of making it. Both of these views center the idea that the score is an (im)perfect encoding of a finished product, rather than as an instigator of process and a compositional environment its own right.

The ontological shift necessary to overcome this, I contend, has been somewhat hampered by our reliance as acoustic composers on notation software that violently orders our creative space in its insistence on completeness, in its tendency toward high modernist impulses, in its reification of musical parameters, and in its resistance to unorthodoxy and idiosyncrasy. It is not my intention here to set out a legislative program for pedagogues to adopt, or to presume any of the forthcoming suggestions are going to align sufficiently with the aims of our students to be useful in every case. Rather, I propose that we begin to shift away from the default presumption that notation software serves our students well as a complete compositional environment best suited to their aims. One of the most straightforward ways to begin expanding the creative environment is to suggest more playful, tactile and embodied approaches to working with musical materials that can overcome the limits of notation software without necessarily insisting on a wholesale move beyond it.

Re-embodying the compositional environment

Simply printing out a score and cutting it into small fragments can foreground previously unnoticed relationships, offer new ways of thinking about form and the passage of time, and allow for the very rapid "prototyping" of different visual and chronological arrangements. Pulling the process into a more straightforwardly physical space also illuminates possibilities for drawing our bodies into the compositional process itself. Sticking for the moment with notating as a compositional act, examples include Claudia Molitor's *Voice Box.* Here, the composer re-notates ostensibly the same material in highly unorthodox physical situations, including while trampolining, with her foot, with the pen on the end of a two-meter rod, and so on (Thompson-Bell 2017). The resultant scores viscerally trace out these processes in ways that are immediately invoked in the imaginations of performers and viewers, extending the compositional

act through her own proprioception to theirs. From a pedagogical perspective, Molitor's work starkly demonstrates to composers the impact their environment (physical or virtual) has on what it is possible or impossible to produce (Thompson-Bell 2017, 2). What is more, Molitor is dealing with a compositional toolset that *makes itself felt;* it drives and shapes the work in negotiation with the composer rather than in spite of her.

Embodied approaches to composition need not necessarily involve intense physicality. As a means of foregrounding his own memory as an active force in the compositional process, Morton Feldman worked by copying pages written the previous day from memory, introducing distortions and changes that reflected the idiosyncratic, embodied specificities of his own musical recollections (Volans 2010). Similar acts of transcription harness technological mechanisms, the ear of an alien *other,* as a means of approaching musical materials from otherwise inaccessible perspectives. Cassandra Miller's approach draws on performances of pre-existing music as source material, feeding it through audio-to-MIDI transcription software that hears fundamentally differently to us. Melodyne, normally used for pitch correction in popular music production, picks pitches out of the grain of a voice and spluttering transients, hears overdetermined glissandi in a quiver, and metricizes rhythm with what she has called "fetishistic accuracy" (Miller 2018, 36). This disorientation between the ear of the software, on this occasion used for purposes well outside its designer's intentions, and the ear of Miller as a listener forms the basis of creative engagement from a starting point of unpredictability governed by not-quite-knowable others. That is, the traces of a performing body in the source material, and Melodyne's strange rendering of those traces into the substance of her compositional process (Tilden and Miller 2024).

Productive ungrounding: disorientation and reorientation

What all of these approaches have in common is that they exhibit various different kinds of productive ungrounding that necessarily invite vulnerability to differing degrees (Biggs and Bardzell 2024, para. 1). I use the term "ungrounding" here in reference to Sara Ahmed's (2006, 171) queer phenomenology of disorientation, which takes as its starting point the idea that moments of

disorientation leaned into, without the promise of self-correction, can lead to "new ways of making sense." These are often difficult experiences and, as Ahmed suggests, offer us the potential for "joy and excitement in the horror" (Ahmed 2006, 4).

With the ethics of pedagogy in mind, my evocation of it here is both in recognition of the complexities of asking students to step far beyond familiar territory, and of the possibility that the creative and pedagogical forces are in the ungrounding *itself*, rather than in judgements as to how it is responded to artistically. In embracing ungrounding, we ask our students to have, as Biggs and Bardzell (2024, para. 1) suggest, the "willingness and bravery to go into an unfamiliar and oftentimes cognitively and emotionally confusing and troubling space," and to stray from the habits they associate strongly with what it means to compose. We ought to do so with respect to what they themselves seek to achieve, and to present such as a space as an avenue for creative development in which failure is an acceptable and worthy outcome. Following Patricia Alessandrini (2022, 45) our emphasis on professionalism, such as the presentation of a "professional-level score and parts," can generate risk-aversion that can hamper artistic development. What might an overemphasis on score presentation, for example, have done to Molitor's *Voice Box*?

Career-oriented approaches to pedagogy at tertiary levels have completely understandable motives. Performers are often loath to receive needlessly illegible scores and imperfectly presented prototypes, and our long-term success can often depend on the buy-in and goodwill generated in our interactions with them at those very early stages, where they might, for example, be concertising or workshopping student pieces at the behest of a university department. Nonetheless, as Alessandrini (2022, 45) has suggested, encouraging students to keep lines of communication open, to foster the process as a collaborative partnership as opposed to a value adding supply chain, facilitates an expansion of the compositional environment concomitant with the more immediate disorientations I am about to set out.

In the first chapter of *Queer Phenomenology,* Sara Ahmed examines the materiality of the objects around a philosopher's desk as orienting devices that constantly slip into the background; that which is "posited as given," directs bodies "in some ways and not others." (Ahmed 2006, 27). Through the refrain of the philosopher's writing table in the domestic family home as the place

from which the philosopher's world unfolds (Ahmed 2006, 28), Ahmed argues an orientation towards the writing table can erase the very material forces that enable it, such as the domestic work that distracts and cares for children or supplies sustenance. In other words, the background is not simply incidental, but an active part of orientation: "some things are relegated to the background in order to sustain a certain direction" (Ahmed 2006, 31).

Many of the same materialities are undoubtedly hidden by the same functions as we orientate ourselves towards notation software, too, but I propose that they hide much else besides. Following Ahmed (2006, 30–31), we can evoke Husserl's thoughts of what is yonder from the perspective of his writing desk, and we can ask, in a general sense, what is yonder for the composer: where the composer's mind might "drift," for example, to instrumentalists or to the spaces in which they might perform, away from the here and now of staves, stems, and beams.

What is most material, most pertinent to making music in the immediate sense must recede and be relegated to a distraction in order to sustain our orientation toward the notation software. To do this so effectively, its own materiality must also be concealed; lines of code, interface designs, the hardware on which it runs, the people who made that hardware, so and so forth. Running our fingers along its veneered surfaces, to find and pick at its cracks and fissures, where its deliciated arranged hierarchies of affordances rupture against the intentions of its makers, is to open the potential for moments of disorientation that give rise to creative possibilities.

Some strategies for subverting the software

"The black beams can stretch. They can stretch really high."
(Tantacrul 2018, 17:02)

In 2018, the composer, UI designer and YouTuber Martin Keary, who goes by Tantacrul in his social media posts, released a video attacking Avid Sibelius for its poor user interface design and notorious instability. What starts as a normal review slowly descends into madness, replete with non sequiturs, bleeding sheet music and a very literal representation of software gore, an internet culture phrase referring to visual and semantic glitches arising from bugs. While the

video's main purpose is to eviscerate Avid for their poor maintenance of what is for many essential software, the multitude of frustrations Keary faces become the impetus for the video's dramaturgy as an art piece in its own right.

Although the more artful ending of the video tends toward exaggeration, it is true, for example, that the beams and their accompanying stems have seemingly limitless height for no apparent reason relating to the norms of engraving (perhaps to accommodate Xenakis-style engravings of keyboard music). The surprising flexibility of Sibelius' limit-points give rise to all kinds of possibilities for misuse and abuse at the edges of its design constraints, or where its affordances are at their most accidental or incidental. Like Sendak's Max banging holes in the walls that imprison him, balanced chaotically on a stack of books (Halberstam 2020, 4), these composers use the unstable edge-cases of their surroundings (in this case, the software itself) to break free of them.

Laila Arafah's *Sibelius studies: For your solo Sibelius* (Score Follower 2022) uses Sibelius' playback system against itself, exploring extremes of register and tempo well beyond the physical possibilities of the instruments it imitates and the performers it displaces. The perceptual distances between rhythm, pitch and timbre blur and fade as incoming MIDI events overwhelm buffers. Arafah's piece foregrounds the software's machine materiality, pushing the system from a set of stand-ins to an instrument in and of itself. Its inhuman abilities, its bloody-minded subservience to clock-time, and its imperviousness to interpretation and embodied imagination are amplified such that it is no longer a poor but convenient replacement for humans, but rather a performer in its own right that understands the material before it on its own terms. By disorientating us from the software's pretensions to acoustic performance, Arafah starkly reveals an answer to the question of "what exactly we are listening to" when we use notation software's audition features.

These kinds of subversions hint at the potential for a more interdisciplinary pedagogy in acoustic and/or score-oriented works, but more importantly, they show how the software itself can be turned from the inside out, disoriented from the norms of instrumental music production and reoriented towards things that take advantage of its perceived shortcomings. The end of *Sibelius Studies* adopts distorted and decontextualised mordents, trills, and other musical symbols strewn haphazardly across the staff and being interpreted wildly by the playback engine, a feat that appears to have been achieved entirely within the software.

This section in particular follows in a long line of mischievous reappropriation of the visual possibilities that notation software offers as a means to entirely different ends.

Works like Aaron Cassidy's *String Quartet* (2002) take advantage of Finale's flexibility in staff design, using them to represent multiple strata of physical actions taking place across multiple staves on a single instrument. The piece pushes to its logical conclusion comparable work by Klaus K. Hübler, Brian Ferneyhough, and Richard Barrett, which was largely hand drawn. A trivial observation is that the software's playback machine is rendered entirely incompetent in this scenario, but as Luc Döbereiner has pointed out, Cassidy's approach to musical material throws the concept of mastery itself, on the part of a human performer or otherwise, into question by highlighting the immanence of the material forces at play to the form these pieces ultimately take (Döbereiner 2020, 614). That is, the ideological substrate that *Finale* imposes on its users in this and similar cases is fatally undermined because it neither encodes an ideal performance nor allows for the possibility that an illusory one can be conjured. Cassidy's more recent work, such as *The wreck of former boundaries* (2014-16) abandons notation software altogether in favour of vector graphics software. In the last few years, several of my students, too, have turned to vector graphics and page layout software to take a more fine-grained approach to the *mise en page* of their work, or to add graphics that would be arduous or impossible to realise in the notation software alone.

Bodily affect in the visuality of the score

Simply stepping out of the safe haven an engraving-specific provides is daunting and revelatory for many, and aspects of notation that the software had previously made automatically, such as the precise position of the treble clef or appropriate ledger-line spacing, quickly become opportunities for decision-making and negotiation. Importantly, these are decisions that *must be made* rather than pushed into the background by buried affordances that otherwise fall back to easily overlooked defaults. Introducing another framework, or another set of affordances, forms an interdependent ecosystem where moving from one orientation to the other opens up new possibilities not conducive to either alone.

What in many cases starts as a source of frustration becomes a blend of stylistic idiosyncrasies and notational personality quirks that are rarely seen in professionally engraved scores and, pertinently, that have the potential to become relevant to a performer's interpretation of the piece as it collides with their embodied musical imagination. For example, a recent student of mine pointed to the uncanny imperfection of their scores, edited in Inkscape, as a visual catalyst of bodily-felt affect complementing the qualities of abjection and the erotic essential to the conceptual and sounding aspects of their work. This use of the visual to induce a process of embodied meaning-making is not dissimilar in aim to the solo pieces of Brian Ferneyhough's "Black Scherzo" era (Fitch 2014, 70), the circles, crosses and spirals in George Crumb's *Makrokosmos* (Burns 2004), or, indeed the *Ars Subtilior* manuscripts from which the latter likely took inspiration. The import of visual affect to perceptions of the score in performance has more recently been argued for from a phenomenological perspective by Rob Casey (2015).

This shift back towards the power of the visual in sparking the musical imagination marks an ontological shift in score conception, away from essentialist notions that they are encapsulations of a perfect performance in the mind's ear and away from the idea that they are deficient attempts at it. We arrive, instead, back at an ontology of notation that enables it to be considered part of the stuff of composition itself. First, as part of the complex network of interconnected tools for composition, and second, as a porous and complex interface for performance, the specifics of which arise out of constant negotiation (see Aulich 2016, 12). Although showing students a plethora of historical and contemporary examples is also useful, actively encouraging them to take steps within their own artistic processes, however tentative, beyond the apparent or real limits of their notation software offers a flexible path towards the achievement of their own artistic aims.

In introducing the concept of disorientation, I raised the concomitant "drift" in the consciousness of the composer from the software to the things it relegates to distractions. For this final, more future-oriented part of the paper, I turn my attention to some of the specifics as to how some of these backgrounded elements might be brought forward into a more rounded ecosystem of compositional tools. As before, my use of the word ecosystem here is to continue to signal that loose network of interacting parts, which composers can choose to engage with

or not, rather than suggest we superimpose or substitute one rigid framework for another. While I cannot hope to capture everything notation software excludes or deprioritises, my suggestions for a technologically infused way forward here are drawn from repeated encounters with the creative conundrums my students have faced in their working processes and from exploring the potential for long-term solutions to them.

Acoustics, space and spatialisation

As Emma-Kate Matthews has highlighted, the historical import of architecture and physical acoustics to acoustic composition cannot be overstated, both in terms of resultant qualities of sound and spatialisation, and in terms of the practical and social forces governing the positions of musicians in a given performance environment (Matthews 2019, 2). Similarly, when we engage with stereo sound as it is presented by notation software's playback features, for example, a degree of flattening takes place that "denies the listener the interactive potential inherent in the rich reciprocal diagram between space, sound source and listener" (Matthews 2019, 2). I would go a step further and suggest that the default reverberation generally applied to the output signal from notation software necessarily generates an anonymous, generic and transparent space that precludes spatial thinking during the audition process.

From the perspective of acoustic composition, the sense of space and spatialisation is often beyond our control, being dependent on any number of venues that we hope would play host to repeat performances. Nonetheless, if we know in advance where the premiere would take place, it is possible to keep its specific characteristics in mind throughout the compositional process, which can strongly enrich and inform musical decisions from the precise arrangements of players on the stage (or otherwise) to orchestrational, textural, and gestural considerations, as evidenced by a variety of spatially-aware notated musics from the antiphonal choir music of renaissance composer Adrian Williart (Zvonar 2005) to Xenakis' spatialised percussion piece *Persephassa* (1969) (Barthel-Calvet 2009, 30–31).

Sensitivity to a specific space and the positioning of players and audience in the musical imagination is a learned skill that comes from repeated experience

and exposure. Allowing for something of that experience and exposure to take place throughout the compositional process, even where practicalities and logistics preclude repeated workshopping in a given venue, is a valuable step forward for composers interested in strengthening the immanence of their music to the positions of the instrumentalists and the places in which it is performed.

An imperfect but practical solution I often suggest is to have student composers interested in the spatial aspects of composition replace the built-in reverb with a convolution VST. An impulse response could be selected that closely matches the acoustic properties of the space the composer imagines it will be performed in, producing an artificial reverb that responds to the incoming sounds in a similar way to if it were being played in the space. A slightly more onerous but very valuable exercise would be to visit the premiere performance space if it is known and take a direct impulse response from the position of the audience, specialist equipment permitting, more directly inviting the acoustic properties of the space as an active agential force into the compositional ecosystem.

Since beginning to make these kinds of suggestions to my students, I have embarked on an as-yet-nascent side-project with the UCL-based composer Emma-Kate Matthews to allow student composers to visualise spatialised audio in a 3D-modelled space. Each instrument is represented as a ball that changes size and colour according to incoming MIDI and can be moved around the space using the mouse. Although this project is in its early stages, we hope to eventually implement incoming audio, binaural spatialisation, and a ray-tracing virtual acoustics algorithm similar to those found in architectural 3D modelling packages. Our motivation is emphatically not to displace a real performance or to help expand the capabilities of playback engines to encompass evermore realism, but rather to reorientate composers towards space as an active compositional parameter. As such, it is hoped that this augmentation would draw attention to the ways that musical decisions impact space (and vice versa) in a way that can be immediately attuned to in settings not amenable to trial and error with human performers.

Physicality and instrumentality

Intimately connected to space, the embodied and physical nature of musical performance is easily lost in the abstractions presented by notation software, but it is fundamental to our perception of it in performance and listening (O'Modhrain and Gillespie 2018). One of the tendencies that notation software, used alone, can imbue is a sense of cut-and-paste transferability from one instrument to another. While this is an incredibly practical feature, it can often result in musical materials that have distant relationships with the particularities of any given instrument. Here, I am referring less to so-called idiomatic writing, which most students at a tertiary level have a good grasp of, and more to conceptualisations of musical material that emerge from an embodied sense of instrumentalism, such as in the work of Rebecca Saunders, which "sounds like it is to play" (Adlington 1999, 50).

There is a precedent for drawing direct physical sensations into musical experiences, which could be expanded into the compositional process during audition. Hapticity is becoming an increasingly explicit part of pieces involving live electronics, where a system's outputs can include motorised actuators as well as sound and video (Giordano, Sullivan, and Wanderley 2018). Luke Nickel uses a rollercoaster simulator and its accompanying physics engine to determine constant tempo changes in *Hhiiddenn Vvoorrttiicceess* (2021), which communicates the resultant pulse to a live performer using Soundbrenner's digital haptic metronomes (Nickel 2022) vibrating according to an incoming pulse. Tactile feedback has also been used in educational settings, such as in the teaching and learning of fundamental rhythm skills (Holland, Bouwer, and Hödl 2018).

Such haptic feedback might also be used in compositional pedagogy, as a way of reinforcing associations between musical materials and the physicality of performance as students audition their own work in notation software. For example, the feel and weight of musical materials at extremes of register or volume, involving abnormal levels of backpressure, or involving awkward or strained physical motions, could be communicated from the playback system in real-time using a haptic wristband as a means of connecting the composing body to the materials at hand. This could be accompanied by an automated or

semi-automated visual cue showing the degree of instrumental and physiological resistance present in the material, along similar lines to those present in the lap steel guitar version of Cassidy's *The wreck of former boundaries* (2016).

The possibility of adding physical outputs to the compositional environment also raises the possibility of physical inputs. While keyboard MIDI controllers are ubiquitous among electronic musicians, and a mainstay in the computer music classroom, both for acoustic composition and use with DAWs, they rarely push back in a satisfactorily physical way, nor do they allow for the encoding of physical gestures less conducive to keyboard music. Julie Zhu's *Deep Drawing* (2024) is an intermedia piece that takes as its input the tactile sounds of a graphite pencil against wood, and uses a listening AI to try to recreate the image, which is projected to a live audience (Zhu et al. 2024).

The gestural physicality and presence of the performer is essential to both the production of the sound and the AI's drawing, and in my experience of the piece at the Denis Arnold Hall in Oxford, I found the three to be profoundly and intimately connected. Along similar lines, Patrick Hartono's *Ciung Wanara* (2023), integrates AI analysis of Indonesian shadow puppet battles to interpret hand gestures made by a performer, which controls a spatialised live electronics setup, intimately connecting the production of the music and visuals to the motions of the performer in a context in which there is often a strong degree of disconnect (Hartono 2024).

A potential point of further exploration, then, is to whether it might be possible to render live motions made by a composer into notated, instrumentally appropriate gestures to be further manipulated in a score and eventually performed by a musician, placing the physical gesture at the origin-point of musical material. A less technologically infused solution to this forms part of my own practice, where, for example, I have experimented with building scale models of large instruments to get an impression of how the performing body manoeuvres around them in undertaking particular actions and used those impressions to inform narratives of affective change underpinning large-scale form.

Conclusion: teaching ecologically

It is already clear how expansions of the technological and physical reference points for acoustic composers can give them the power to subvert the ideological underpinnings of their tools or overcome their limitations. In line with ecosystems thinking, many of the strategies I have hitherto outlined have been around softening perceived borders, weakening imposed structures, and prioritizing processes over objects. I now briefly turn to composition pedagogy itself, or rather our construction of the pedagogical environment, as something that can itself be rethought along similar lines.

Such undertakings can give teachers and composers the impetus to break down our own silos and, with the careful and explicit acknowledgement that we are doing so, step beyond our expertise in order to be useful to our students in recognising and cultivating their own compositional environments. I do not mean to suggest that we sideline the bread-and-butter issues of technique, wider context and aesthetics we are perhaps more used to proffering guidance on, but rather, as Ian Power (2022, 61–66) has suggested, that we acknowledge that the models of teaching and assessment we offer are increasingly insufficient to prepare our students, and ourselves, both within and beyond art music. There are more collaborative and interdisciplinary approaches to teaching in the pedagogy of sound art which we can draw into our own discipline, insofar as they are distinct, by taking a more experiential, ludic and open approach than might be possible in the apprentice-master model traditional to the field (see Caines 2019).

As such, an ecological approach to teaching requires us to loosen our instructional structures and weaken their borders, such that students see us as elements in a broader pedagogical network rather than a single point of periodic departure and return within which all the guidance, critique, questioning and learning takes place. This could be as simple (conceptually if not practically) as creating institutional mechanisms for students to meet with other pedagogues from different disciplines, including those whose expertise lies beyond the arts and humanities, and loosening or complicating the hierarchical connection between a single composer as pedagogue and individual students, a form of productive ungrounding that would require us to advocate, wary as I am of the risk, for a more slippery approach to the confines of our discipline.

Weakening such borders can also soften the distinctions between what is permissible inside and outside the academy. It is essential that students are empowered to draw their 'outside' interests into the compositional world they are constructing (Hickey-Moody 2013, 119–31). There are profound things, I contend, that one could learn about speed and motion as it applies to music, for example, from watching wildlife or playing video games, given the means to develop the tools to embark on those lines of thought and analysis.

These are, of course, things many of us already do insofar as it is currently possible. John Godfrey has pointed to the inseparability of technique and imagination, developing a pedagogical practice around recognising "the value of [students'] embodied knowledge" (2022, 52–53), by allowing for a musical creativity that operates outside of our own experience as they learn, incorporate and 'misuse' the techniques we introduce to them. Following where my students lead has brought me from my own comfort zones towards acoustic ecology, eastern cultural traditions, transcultural feminism, and renaissance voice leading and church architecture to name a few. My learnings from all of these encounters are organically finding their own ways into my practice as a composer and will doubtless inform future encounters with students as well.

This speaks to a broader notion in which we allow for a more fluid teacher-learner dynamic; if they are to learn from us, we also need to learn how to teach them *personally.* That is, in the specific, as well as in the general, and as such, allow for our own disorientation in orienting ourselves towards their developing practice. To do this effectively, we might also develop our openness to learning impact of our own approaches, allowing for crosspollination that expands our own creative horizons in the process of working with others in educational settings, a notion ripe for further research at the intersection of an ecosystem-oriented pedagogy and creative practice.

List of References

Adlington, Robert. 1999. "The Music of Rebecca Saunders: Into the Sensuous World." *The Musical Times* 140 (1868): 48. https://doi.org/10.2307/1004495.

Ahmed, Sara. 2006. *Queer Phenomenology: Orientations, Objects, Others*. Durham: Duke University Press.

Alessandrini, Patricia. 2022. "Five Suggestions For An Aspiring Composition Teacher: Towards an Inclusive Compositional Pedagogy." *Tempo* 76 (302): 42–51. https://doi.org/10.1017/S004029822200033X.

Aulich, John. 2016. "Defying Objecthood: Tracing the Beginnings of a Political Aesthetic in My Recent Work." Master's Thesis, University of Huddersfield.

Barthel-Calvet, Anne-Sylvie. 2009. "De L'ubiquité Poïétique Dans L'oeuvre De Iannis Xenakis - Espace, Temps, Musique, Architecture." *Intersections: The Canadian Journal of Music* 29 (2): 9-51,153.

Bayle, Laurent, and Catherine Provenzano. 2021. "The Interface between Classical Music and Technology." In *Classical Music: Contemporary Perspectives and Challenges*, edited by Michael Beckerman and Paul Boghossian, 103–20. Open Book Publishers. https://doi.org/10.11647/obp.0242.

Biggs, Heidi, and Shaowen Bardzell. 2024. "Thrown from Normative Ground: Exploring the Potential of Disorientation as a Critical Methodological Strategy in HCI." In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, 1–11. Honolulu: ACM. https://doi.org/10.1145/3613904.3642724.

Brown, Andrew R., and Steve Dillon. 2016. "Meaningful Engagement with Music Composition." In *The Act of Musical Composition: Studies in the Creative Process*, edited by Dave Collins, 79–109. Oxford: Taylor & Francis Group.

Burns, Steve. 2004. "DRAM: Notes for 'George Crumb: Makrokosmos I & II.'" Mode Records. DRAM. https://www.dramonline.org/albums/george-crumb-makrokosmos-i-ii/notes.

Caines, Rebecca. 2019. "Resonant Pedagogies: Exclusion/Inclusion in Teaching Improvisation and Sound Art in Communities and Classrooms." *Contemporary Music Review* 38 (5): 490–503. https://doi.org/10.1080/07494467.2019.1684062.

Casey, Rob. 2015. "Developing a Phenomenological Approach to Music Notation." *Organised Sound* 20 (2): 160–70. https://doi.org/10.1017/S1355771815000047.

Cassidy, Aaron, dir. 2016. *Aaron Cassidy, The Wreck of Former Boundaries (2016) for Electric Lap Steel Guitar and Electronics*. https://www.youtube.com/watch?v=C2_U7GmnS8E.

Chen, Jason Chi Wai, and Susan A. O'Neill. 2020. "Computer-Mediated Composition Pedagogy: Students' Engagement and Learning in Popular Music and Classical Music." *Music Education Research* 22 (2): 185–200. https://doi.org/10.1080/14613808.2020.1737924.

Cox, Frank. 2004. "Notes toward a Performance Practice for Complex Music." In *Musical Morphology*, edited by Claus-Steffen Mahnkopf, Frank Cox, and Wolfram Schurig, 1st ed. New Music and Aesthetics in the 21st Century, v. 2. Hofheim: Wolke : Published in collaboration with the Bludenzer Tage Zeitgemässer Musik.

Davis, Richard. 2010. *Complete Guide to Film Scoring: The Art and Business of Writing Music for Movies and TV*. 2nd ed. Berklee Guide. Boston: Milwaukee, Wis: Berklee Press; Distributed by Hal Leonard.

D'Errico, Mike. 2022. *Push: Software Design and the Cultural Politics of Music Production*. Oxford University Press. https://doi.org/10.1093/oso/9780190943301.001.0001.

Döbereiner, Luc. 2020. "Materiality, Contingency and Emergence of Compositional Material." *Contemporary Music Review* 39 (5): 602–17. https://doi.org/10.1080/07494467.2020.1852803.

Dorfman, Jay. 2017. "Considering Music Technology and Literacy." In *The Oxford Handbook of Technology and Music Education*, edited by S. Alex Ruthmann and Roger Mantie, 399–404. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199372133.013.37.

Fitch, Lois. 2014. *Brian Ferneyhough*. Edited by Martin Iddon. Bristol: Intellect, Limited. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=3014901.

Fox, Nicholas J., and Pam Alldred. 2017. *Sociology and the New Materialism: Theory, Research, Action*. 1st edition. Thousand Oaks, CA: Sage.

Frauenberger, Christopher. 2019. "Entanglement HCI The Next Wave?" *ACM Trans. Comput.-Hum. Interact.* 27 (1): 2:1-2:27. https://doi.org/10.1145/3364998.

Gall, Marina, and Nick Breeze. 2005. "Music Composition Lessons: The Multimodal Affordances of Technology." *Educational Review* 57 (4): 415–33. https://doi.org/10.1080/00131910500278314.

Giordano, Marcello, John Sullivan, and Marcelo M. Wanderley. 2018. "Design of Vibrotactile Feedback and Stimulation for Music Performance." In *Musical Haptics*, edited by Stefano Papetti and Charalampos Saitis. Cham: Springer International Publishing AG. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=5379780.

Godfrey, John. 2022. "Who Are We Teaching And Why Are We Teaching Them? Thoughts On Musical Diversity In University Composition Teaching." *Tempo* 76 (302): 52–60. https://doi.org/10.1017/S0040298222000341.

Grier, James. 2021. *Musical Notation in the West*. Cambridge Introductions to Music. Cambridge: Cambridge University Press. https://doi.org/10.1017/9781139034821.

Halberstam, Jack. 2020. *Wild Things*. Duke University Press. https://doi.org/10.1215/9781478012627-002.

Hartono, Patrick. 2024. "Ciung Wanara; Interactive Gestural Audiovisual Composition (2023)." *AIMC 2024 (09/09 - 11/09)*, August. https://aimc2024.pubpub.org/pub/w3oacbry/release/1.

Hartson, Rex. 2003. "Cognitive, Physical, Sensory, and Functional Affordances in Interaction Design." *Behaviour & Information Technology* 22 (5): 315–38. https://doi.org/10.1080/01449290310001592587.

Hickey-Moody, Anna. 2013. *Youth, Arts and Education: Reassembling Subjectivity through Affect*. Routledge Advances in Sociology 85. New York: Routledge. https://doi.org/10.4324/9780203855829.

Holland, Simon, Anders Bouwer, and Oliver Hödl. 2018. "Haptics for the Development of Fundamental Rhythm Skills, Including Multi-Limb Coordination." In *Musical Haptics*, edited by Stefano Papetti and Charalampos Saitis. Cham: Springer International Publishing AG. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=5379780.

Ingold, Tim. 2021. *Being Alive: Essays on Movement, Knowledge and Description*. 1st ed. London: Routledge. https://doi.org/10.4324/9781003196679.

Kang, Sangmi, and Hyesoo Yoo. 2021. "Elementary Students' Music Compositions with Notation-Based Software and Handwritten Notation Assisted by Classroom Instruments." *Bulletin of the Council for Research in Music Education*, no. 227 (January), 29–45.

Keller, Damián, and Victor Lazzarini. 2017. "Ecologically Grounded Creative Practices in Ubiquitous Music." *Organised Sound* 22 (1): 61–72. https://doi.org/10.1017/S1355771816000340.

Matthews, Emma-Kate. 2019. "Activating Audiences: How Spatial Music Can Help Us to Listen." *Organised Sound* 24 (3): 297–306.

Miller, Cassandra. 2018. "Transformative Mimicry: Composition as Embodied Practice in Recent Works." University of Huddersfield. http://eprints.hud.ac.uk/id/eprint/34998/.

Mooney, James. 2011. "Frameworks and Affordances: Understanding the Tools of Music-Making." *Journal of Music, Technology & Education* 3 (2/3): 141–54. https://doi.org/10.1386/jmte.3.2-3.141_1.

Nickel, Luke. 2022. "Research Forum." May 18. https://www.youtube.com/watch?v=JRlbWIfqBjA.

Nielsen, Lance D. 2013. "Developing Musical Creativity: Student and Teacher Perceptions of a High School Music Technology Curriculum." *Update: Applications of Research in Music Education* 31 (2): 54–62. https://doi.org/10.1177/8755123312473610.

Norman, Donald A. 2002. *The Design of Everyday Things*. 1st Basic paperback. New York: Basic Books.

O'Modhrain, Sile, and R. Brent Gillespie. 2018. "Once More, with Feeling: Revisiting the Role of Touch in Performer-Instrument Interaction." In *Musical Haptics*, edited by Stefano Papetti and Charalampos Saitis. Cham: Springer International Publishing AG. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=5379780.

Power, Ian. 2022. "Reflections On Teaching Composition For Confidence, Equity And Community." *Tempo* 76 (302): 61–70. https://doi.org/10.1017/S0040298222000353.

Rothman, Philip. 2013. "Bill Holab on Leland Smith and SCORE." Scoring Notes. December 28, 2013. https://www.scoringnotes.com/news/bill-holab-on-leland-smith-and-score/.

Rutherford-Johnson, Tim. 2017. *Music after the Fall: Modern Composition and Culture since 1989*. Oakland, California: University of California Press.

Scarantino, Andrea. 2003. "Affordances Explained." *Philosophy of Science* 70 (5): 949–61. https://doi.org/10.1086/377380.

Schuiling, Floris. 2019. "Notation Cultures: Towards an Ethnomusicology of Notation." *Journal of the Royal Musical Association* 144 (2): 429–58. https://doi.org/10.1080/02690403.2019.1651508.

Schyff, Dylan van der. 2015. "Music as a Manifestation of Life: Exploring Enactivism and the 'Eastern Perspective' for Music Education." *Frontiers in Psychology* 6 (March):345. https://doi.org/10.3389/fpsyg.2015.00345.

Score Follower, dir. 2022. *Laila Arafah — Sibelius Studies: For Your Solo Sibelius [w/ Score]*. https://www.youtube.com/watch?v=PbLyhGAfloE.

Tantacrul, dir. 2018. *Music Software & Bad Interface Design: Avid's Sibelius*. https://www.youtube.com/watch?v=dKx1wnXClcI.

Thompson-Bell, Jacob. 2017. "Part 2: Composing as Performance." British Music Collection. 2017. https://britishmusiccollection.org.uk/article/part-2-composing-performance.

Tilden, Imogen, and Cassandra Miller. 2024. "Deep Listening: The Haunting Sonic World of Cassandra Miller." *The Guardian*, April 11, 2024, sec. Music. https://www.theguardian.com/music/2024/apr/11/deep-listening-the-haunting-sonic-world-of-cassandra-miller-composer.

Volans, Kevin. 2010. "From Memory." The Journal of Music. 2010. https://journalofmusic.com/focus/memory.

Watson, Chris. 2006. "The Effects of Music Notation Software on Compositional Practices and Outcomes." Victoria University of Wellington.

Zhu, Julie, Erfun Ackley, Zhiyu Zhang, and John Granzow. 2024. "Deep Drawing: An Intermedia AI Co-Performer." *AIMC 2024 (09/09–11/09)*, March. https://aimc2024.pubpub.org/pub/859kww47/release/1.

Zvonar, Richard. 2005. "A History of Spatial Music: Historical Antecedents From Renaissance Antiphony To Strings In The Wings." *CEC eContact!* 7 (4). https://www.econtact.ca/7_4/zvonar_spatialmusic.html.

TOWARDS TECHNOLOGICAL ECOLOGIES AS COMPOSITIONAL ENVIRONMENTS IN THE PEDAGOGY OF ACOUSTIC COMPOSITION (summary)

In light of the proliferation of new approaches to contemporary art music, I question the place of music notation software in current pedagogical practice and make some tentative suggestions towards expanding student composers' toolsets through ecosystem-oriented thinking. Beginning with an outline of the usefulness of music notation in the development of elementary musical skills and the importance of familiarity with it in professional settings, I interrogate the ontology of the score from the perspective of music notation software and its playback features. In doing so, I highlight its tendency to imbue a sense of completion on unfinished material and point to the prevalence of high modernist ideological assumptions in the relationship it reinforces between the score and its playback features.

This is followed by a brief examination of the place of the score itself in contemporary art music and the ways in which its ontology can be otherwise, against both the high modernist conceptions of it as an encoding of ideal performance, and against the recently developed notion that it is a deficient attempt at the same. Drawing from work of Claudia Molitor, Morton Feldman, and Cassandra Miller, I then trace out the import of materiality and physicality to composers' working environments, exploring the means by which the materiality of notation software itself might be subverted to creative ends. This includes changes in the physical environment, the use of embodied recollection as a compositional strategy, and the juxtaposition of vocal physicality with the misuse of software.

Using as a starting point Sara Ahmed's notion of disorientation and Patricia Alessandrini's recommendations around failure and collaboration, I follow this by offering a number of possibilities for subverting and/or expanding notation software at its limit-points, first through the examples of early Aaron Cassidy, Tantacrul's infamous video essay on Sibelius' user interface, and Laila Arafah's conversion of Sibelius into an electronic instrument in Sibelius studies: For your solo Sibelius (2022). A series of tentative suggestions for the expansion of students' compositional ecosystem, centered particularly but not exclusively around audition using the playback system, is then drawn from my own peda-

gogical experiences, which explore the different possibilities, primarily technological, around visuality, acoustics, physicality and gesture.

I conclude by inviting further research towards notions of disorientation that we as pedagogues could enter into to develop an ecosystem-inspired pedagogy in opposition to the traditional master-apprentice approach. In so doing, I suggest that we can learn from the often more improvisatory and communal pedagogy of sound art and allow for a more fluid and flexible approach to teacher and learner roles, such that we can further learn how to teach particular composers as individuals who are developing their own creative practice.

Article received: September 15, 2024
Article accepted: November 19, 2024
Original scientific paper

DOI https://doi.org/10.51191/issn.2637-1898.2024.7.13.40

Sanela Nikolić*
Faculty of Music, University of Arts in Belgrade, Serbia

Biljana Leković**
Faculty of Music, University of Arts in Belgrade, Serbia

DIGITAL COMPETENCES IN CLASSICAL MUSIC TEACHING: FROM A CRITICAL VIEW TO THE SYSTEMATIZATION OF DIGITAL RESOURCES[1]

Abstract: The number and variety of online classical music digital resources require specific knowledge to independently search for, select and incorporate appropriate content into the teaching process, as these represent alternative teaching tools that go beyond the primary didactic materials. The basic assumption of this paper is that the digital competences of music teachers imply not only the mastery of tools – concrete digital resources – but also a specific theoretical knowledge of music encoding, storage and transposition informed by computer science as a prerequisite for developing a skill to use digital tools. The main contribution of

* Author's contact information: saneladnikolic@gmail.com.
** Author's contact information: biljana_sreckovic@yahoo.com.

1 This research was carried out as part of the DEMUSIS project, within the preparation of lifelong learning course "Digital classical music resources as a contribution to the enhancement of music teaching" accredited by the Serbian National Institute for the Improvement of Education (ZUOV catalog number 1018). The course aimed to strengthen the digital competences of music teachers in music and general primary and secondary schools for the use of open-source classical music digital resources. The research results were presented within teaching material in Serbian "Digitalni resursi umetničke muzike kao prilozi za unapređenje nastave muzike", which was distributed to the participants during the course implementation. Here we present the derived, revised and improved version of the original text.

this article is therefore to identify the key theoretical knowledge and digital resources that music teachers should understand to successfully develop and utilize their digital competences in the context of classical music teaching. The main principles and practices of music encoding, storage, and transposition are identified and explained regarding relevant academic studies. Based on an analysis and systematization, the open-access classical music digital resources are selected and classified, considering the most representative examples.

Keywords: digital competences; classical music teaching; knowledge; open-access digital music resources; music encoding, storage and transposition; computer programs and databases.

Background

> *Google, Amazon, and other media giants will not destroy, but may well refashion our notion of the book, scholarship, and the university.*
> (Bolter 2019, 9)

The quoted statement underlines one of the main characteristics of contemporaneity: the technological intermediaries in the network of diffuse digital culture profoundly influence the traditional methods of acquiring knowledge. While on the one hand there is a fear that this will call the old values into question, on the other hand the advantages and potential of digital resources in teaching are undeniable. Digital music resources are an inexhaustible source of content that can be useful for teaching classical music. There are various open-access computer programs and structured music databases – such as collections, catalogs, archives, repositories, websites and platforms – as specific aids that have the potential for a more attractive presentation of musical topics and an innovation of the teaching process, while motivating students of all educational levels to research and learn in the field of musicology, music theory and classical music education. In this paper, we consider the existing open-access digital resources for classical music not as a means for teaching music remotely or through individual self-learning, but in terms of their potential contribution to renewing and strengthening formalized music education delivered in a physically mediated classroom environment and with traditional musical instruments.

To successfully achieve the objectives and outcomes of the teaching process in the digitally mediated world, appropriate competencies are required as "a combination of knowledge, skills and attitudes" (European Commission 2019, 5) that enable teachers to meet the requirements of the activity they are carrying out with a specific didactic tool (Sánchez-Tarazaga and Matarranz 2023). Considering the European framework, digital competencies are ranked fourth among the eight key competencies necessary for personal fulfillment, a healthy and sustainable life, employment, active social engagement, and the integration of individuals (European Commission 2019, 5).

Digital competence implies "the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society" (European Commission 2019, 10). The strengthening of the digital competences of teachers is strategically supported through *The European Framework for Digital Competence of Educators* (Punie and Redecker 2017), as the scientifically based framework (EU Science Hub). Compared to the previously published regulations that traced the development of digital competences, this framework published in 2017 represents the improved version based on the comprehension that in today's world teachers must know, among other things, a set of digital competences specific to the field they are dealing with. This framework also provides the conditions for the development of students' digital competences, because "the teacher's role in the contemporary education is not only to promote specific knowledge in individual academic areas, but also to accustom students to an appropriate and safe use of digital technologies as well as to support and empower them" (Zadnik 2021, 282). Besides the mentioned document, we also highlight the "Digital Education Action Plan 2021–2027" (European Commission 2020), which emphasizes high-performance digital education, strengthening digital competences from an early age, supporting teachers, developing advanced digital skills and ensuring equal gender representation in the use of digital technologies (Matović 2021, 11; Vlada Republike Srbije 2020/2023). Regarding the role of digital competences in the educational field in Serbia, 25 digital competences have been proposed as specific for teachers, divided into 6 categories (Kuzmanović et al. 2024, 7–8), having in mind that "modern digital technologies have the potential to support student learning through individualized teaching methods to meet the needs of each individual, to the extent that was unimaginable until recently" (Kuzmanović et al. 2024, 4).

The term *digital technology* pertains to those technological phenomena that require a computer as the main communication and working tool. However, this term does not only refer to technology but encompasses a series of processes that shape the lifestyle and behavioral system of individuals. These are described by the term *digital culture*, which over the last few decades primarily encompasses the Internet and the World Wide Web, the development of mobile technologies, platforms and applications (Gere 2002). What digital tools have brought with them is the digitalization of analog data on the one hand, and the compression and structured storage of a large amount of data in databases on the other. Digital technology "introduces new degrees of both automaticity and flexibility into the process" of classification (Bolter 2019, 140). The volume of knowledge is growing rapidly and with it the methods of acquiring knowledge, to such an extent that "the very notion of what a school is, is changing and expanding […]. Digitally enabled educational activities […] can be adapted to instructors' and students' needs and have been linked to higher grades and greater student satisfaction and motivation in both children and adults" (Chayko 2016, 184). Although the use of digital technology does not exclude the use of traditional techniques and media, they significantly influence the reflection of the relationship between old and new ways of learning: "Injecting digital technologies into the classroom necessarily affects our relationship with every other communications technology, changing how we feel about what can or should be done with pencils and paper, chalk and blackboard, books, films, and recordings" (Jenkins et al. 2009, 7). Digital technologies enable the creation of a specific educational environment in which different formats and tools for knowledge transfer are available as a means of teaching and learning within a multimedia interactive experience that requires cognitive engagement from students that goes beyond the traditional framework of knowledge and learning (Raschke 1999). In other words, today's educational conditions imply a significant level of participation, which especially applies to younger generations. These can be characterized as an "ideal learning environments" or "informal affinity spaces" because "they depend on peer-to-peer teaching with each participant constantly motivated to acquire new knowledge or refine their existing skills, and because they allow each participant to feel like an expert while tapping the expertise of others" (Jenkins et al. 2009, 10). These conclusions could be applied to the sphere of musical education as well. The results of studies concerning the use of digital technologies in music

teaching indicate that – from primary school onwards – "students need access to computer programs that enable them to express themselves musically (listening, playing, singing and moving to music as well as composing) and to focus their activities on certain elements of music" (Šimunović 2013, 229).

Both positive and negative aspects of the use of digital technologies in music education were identified. For example, it was found that working with music software "has enabled pupils to understand better the relationship between music and visual images" (Cain 2004, 216). Also, "the ability to research musical topics on the Internet requires pupils to learn research skills, such as selecting relevant material and rejecting what is irrelevant. […] The ability to create music, layer by layer, to edit any aspect of it and to play it back at virtually any tempo has meant that children are now able to compose music that they cannot physically play" (Cain 2004, 216). Digital technologies allow musicians "to take an interest in the phenomenon of musical sound itself, which can lead to a change in priorities for composers and a move away from traditional musical components such as melody, rhythm and harmony, as the focus shifts to the exploration of sound itself" (Savage 2007, 73). It also raises the question of whether composing involves the manipulation of pre-existing sound samples, and "what the relationship between the performer and the listener is when the performance of music is mediated by a computer" (Cain 2004, 217).

On the other hand, the problems related to the introduction of digital technologies in the process of music learning refer to the weakening of conventional musical skills in certain cases, the greater insecurity of students in live performances, and the inability to distinguish between quality and quantity in the creation of music (Savage 2007, 69–70). One of the reasons is that "the music education system to this point in history has been rooted in traditional beliefs and values towards the production of musical sounds linked with musical instruments and the skill to play them well. […] The majority of teachers interviewed were anxious to maintain this dimension of music education" (Savage 2007, 74). The biggest change that has come with the introduction of technology into music schools has been seen in the area of composing, where technology has brought new tools and approaches, allowing even those students who do not have the traditional skills of a musical instrument to engage with music making. The situation becomes more complex by the spreading of artificial intelligence into the sphere of music and musical education (see: Holland 2000).

If we consider creating, performing, and listening to music as basic musical activities, digital technology in some ways challenges this traditional classification, since when working with music software, none of the activities can be simply labeled in the usual way (Cain 2004, 217). The conclusion is that introducing any kind of technology in music education should support, strengthen and improve existing music education rather than revolutionize it. Some authors therefore conclude that incorporating music technology in teaching is good if students behave primarily like traditional musicians (Mills and Murray 2000, 140). In this sense, our point of view is that digital technology does not threaten traditional ways of learning but builds on them and partially reshapes them intending to rethink the process of efficient knowledge acquisition. Having in mind that media/technological literacy should become an important social skill, technological knowledge should expand existing competencies, "not push aside old skills to make room for the new" (Jenkins et al. 2000, 28).

Aims and Methodology

The number and variety of classical music online digital resources require specific knowledge to independently search, select and implement appropriate digital content into the teaching process, as these represent alternative tools beyond the primary didactic formats of printed scores, books and recordings with which music teachers are already familiar. Here, we understand knowledge as "composed of the concepts, facts and figures, ideas and theories which are already established, and support the understanding of a certain area or subject" and skills "as the ability to carry out processes and use the existing knowledge to achieve results" (European Commission 2019, 5). With this in mind, in our paper, we want to select the most important principles and practices that music teachers need to know about from the rapidly growing and extremely complex field of digital humanities and music (Urberg 2017). The basic assumption is that the digital competences of music teachers imply not only the mastery of tools – concrete digital resources – but also a specific theoretical knowledge of music encoding, storage and transposition, informed by computer science (Gujar and Crawford 1986), as a prerequisite for developing a skill to use a digital tool. If music databases and programs are the end products of structuring the variety of

digital music data, it is important for teachers to know some basic mechanisms, technical aspects, and key terms of music digital encoding to be able to understand and explain different possibilities of working with digital music and music-related data. An "individual should understand the general principles, mechanisms and logic underlying evolving digital technologies and know the basic function and use of different devices, software, and networks" (European Commission 2019, 10). The main contribution of this article is therefore to identify the key theoretical knowledge and digital resources that music teachers should understand to successfully develop and utilize their digital skills in the context of classical music teaching.

To make an appropriate selection of knowledge, an analytical and critical approach has been applied to two types of research material: 1) relevant academic literature on digital humanities related to music, and 2) concrete online classical music digital resources selected to provide a comprehensive overview of the situation. First, the main principles and practices of current technological achievements in the field of music encoding, storage and transposition are identified and explained concerning relevant academic studies (1). Then, based on an analysis and systematization, the open-access digital resources for classical music teaching are selected and classified, considering the most representative examples (2).

MAIN CONTRIBUTION

1. Key principles and practices of digital music encoding, storage, and transposition

A musical work exists reified through concrete physical formats as the basis of musical practice (Lewis 2016). For classical music, the two most important forms of reification are musical scores and audio recordings. Digital technologies update the problem of encoding and storing these formats, bearing in mind that their digital transposition requires appropriate computer methods of data processing, organization, description and connection, as well as intuitive and flexible user programs that enable navigation, search, and analysis of relevant information from digital collections. For example, a score may be in a digital image format or a digital, computer-readable, encoded format. This difference

is important because the image of a score is a collection of pixels whose content cannot be automatically processed by software algorithms, which is not the case with the computer digital encoding methods (Margounakis and Politis 2011). In addition to these two formats, there is also a category of encoded scores suitable for computer performance (MIDI standard) and digital scores suitable for computer musical analysis. Scores adapted for musical analysis are encoded according to the so-called Kern scheme (Ríos-Vila et al. 2023, 349). The best-known software for computer analysis of such encoded scores is Humdrum.

The digital conversion of scores can therefore be done in two ways: by scanning – to obtain digital images of scores in TIFF, JPG or PDF format – and by encoding – to obtain digital symbolic representations of scores that are converted into formats such as MusicXML, LilyPond, Kern or MIDI. This second process is carried out as part of the digital heritage of Western European classical music within the framework of Optical Music Recognition (OMR) and the so-called Music Encoding Initiative (MEI).

OMR practice was introduced in the late 1960s and was intended to overcome the challenges posed by the different notation systems – medieval notation, lute tablature and modern notation. Another challenge was the differences in the precision of visual recognition between clearly printed music editions and manuscripts, which are often confusing and not as cleanly notated. Today, there are several commercial and some non-commercial OMR programs. The three most popular commercial programs are SharpEye, SmartScore and ScanScore. The second and third are adapted for printed scores, while the first enables music manuscripts to be recognized. Three well-known examples of non-commercial OMR toolkits are Gamera, Audiveris and Aruspix (Thomas et al. 2012, 8; Hinchey 2021).

The development of the Music Encoding Initiative (MEI) standard began in 1999 at the University of Virginia intending to create a comprehensive and computer-readable archive of notated music as a basis for music performance and research ("An Introduction to MEI"). As explained: "The work of the MEI focuses on creating a core set of rules for recording physical and intellectual characteristics of music notation documents. [...] The intellectual model governing the design of the MEI schema divides notation functions into four information-carrying domains: logical, visual, gestural and analytical. […] MEI adds a fifth domain, the bibliographic, which captures extensive information

about sources, authors, provenance and many other bibliographic details. The intersection and interplay of these five domains is where the true digital edition emerges from an encoding" (Roland, Hankinson, and Pugin 2014, 609–610). Thus, since 2003, within the Edirom project a set of tools has been developed for the creation of digital critical academic editions of musical works, developing MEI standards with the problem of harmonizing digital facsimiles and their critical annotations. These tools were then used in other projects to create customized repositories of classical music: Beethovens Werkstatt and Bruckner online, where music notations are expertly described using the Edirom tool, then in the case of the multimodal repository Freischütz Digital, which brings together digital versions of the libretto, various editions of the score and a large number of audio/video recordings of performances, and in the structuring of the Gesualdo Online and Measuring Polyphony repositories, where a significant body of modern and early modern notation is encoded in a computer-readable format available for further research and analysis.

Technically speaking, the MEI standards for encoding music into a computer-readable data structure are based on the XML markup language. Today, MusicXML is the standard format for the digital transposition of sheet music and its shared use on the Internet. The music notation represented in this format enables the automated computer processing of sheet music at the music-theoretical level of analysis. Encodings that adhere to the MEI scheme represent a musical data set comprehensively over granular hierarchical structures in which each granule can be assigned a unique identifier – a resource name. In other words, the hierarchical MEI structure of granular data allows each element of a piece of music to be identified and described by a Uniform Resource Identifier (URI) at different levels of granularity, from a piece of music as a whole down to a single note. When searching for material on the Internet, this also enables the creation of linked data and the development of interactive web applications and user interfaces that find and connect physically widely disparate music notations digitalized according to MEI encoding rules (Weigl et al. 2021).

However, the linking of different music databases is questionable if the databases function as closed silos of music data. The reason for this is often the use of individual vocabularies and standards when describing digital music files at a granular or metadata level. In addition to digital sheet music, music archives also contain digital audio files of music in WAV or MP3 format. The

inconsistency of music formats and the description standards used leads to the problem of linking and sharing multiple data sets. This means, for example, that different editions of a score and different performances of the same piece of music cannot be compared with each other. Therefore, a consensus on the encoding format and the way of digital sheet music and audio recording mark-ups is crucial for organizing and indexing large music collections.

It is about the process of unifying the encoding standards of sheet music to create semantically meaningful and functional data sets in the online space that represent the same musical composition and are located in remote music collections (Thomas et al. 2012, 4). "When MEI encodings are matched to performance recordings, through manual or automated alignment processes, they can […] [provide] a basis for FAIR multimedia publishing and communication of musicological materials […] and […] semantically enriched digital music objects" (Weigl et al. 2021, 21). At the heart of the FAIR principle of data storage – Findable, Accessible, Interoperable, Reusable – is the ability of computer systems to find, access and use existing data on the Internet with minimal or no human intervention, and to provide computer support for working with data that is constantly increasing in number, complexity and speed of creation (Wilkinson et al. 2016).

In the field of organizing and linking music databases consisting of different types of formats, this principle has been implemented through the creation of a flexible software platform Music Encoding and Linked Data (MELD) which makes it possible to combine digital representations of music – notations and audio recordings – with contextual and interpretative knowledge about music. As part of the TROPMA project launched in 2020, a virtual environment has been developed that aims to integrate data from publicly accessible music repositories according to the FAIR principle. The aim of the TROMPA project is not to copy descriptions from existing repositories into a central database that uses a standardized data representation scheme, but to describe existing data and objects by reference. The URI protocol is used to address and connect the contents of the repositories and to create layers of extended descriptors that remain hosted on their primary websites (Weigl and Goebl 2021; Weigl et al. 2021).

The two contributions mentioned were realized within the framework of the technological standard of the Semantic Web, which enables the creation of a

computer-readable data network (Raimond et al. 2007; Raimond et al. 2008; Mora-Mcginity et al. 2016). Such a data network consists of interconnected ontologies – a structured set of terms and concepts relevant to the description of digital objects in a particular internet domain. In the case of music, it is the *Music Ontology* as a framework for the distribution of structured music-related data on the web, which was first published in 2006 ("The Music Ontology"; Raimond et al. 2007; Raimond and Sandler 2012; Wu and Shi 2016). The technology of the Semantic Web offers access to a multitude of different settings of a piece of music via suitable user programs, that are stored in their digital transpositions in separate databases.

Therefore, the ability to link, search and analyze large amounts of digital music and music-related data is the most important principle in the above-mentioned practices of digital encoding, storage and transposition of music. As a result of these practices, databases are created as structured sets of digital music objects and related data that support the storage, but also retrieval, analysis and processing of data. In the context of a computer-mediated culture, understanding the basic genesis of structuring and presenting digital music data can provide a useful foundation for further research, application and a deeper relationship with technology to music teachers.

2. Key classical music open access digital resources

In the following, we interpret selected classical music digital resources by classification and divide them into two main groups according to their purpose and potential function in music teaching:

2.1 digital resources for teaching basic musical skills: creating (composing and notating), performing (singing and playing) and perceiving music;

2.2 digital resources to strengthen contextual and interpretative knowledge of classical music.

2.1 Digital resources for teaching basic musical skills

This group includes computer programs, websites, applications, and platforms, as well as mobile applications, that we refer to as digital tools for learning music. By this we mean a range of disciplines that systematically deal with various aspects of the creation, performance and perception of music:

Music Theory, Solfeggio, Harmony, Counterpoint, Theory of Musical Forms and Orchestration. This group of resources can be used as teaching tools for the above disciplines or as potential tools for improving the various musical skills of students at different levels of learning: perception, listening capability, memorization and reproduction of melodies, rhythm, harmony and the ability to understand tonality. The main feature of most of these tools is that "the student is constantly in 'control' of their playing. This is achieved by marking the notes played with appropriate colors when the material is mastered, by controlling the rhythm through the sound of the metronome when the student wishes, and by allowing the student to practice various musical parameters specifically – melody, rhythm, agogics, dynamics, and there are also numerous options for accompaniment and other elements that facilitate learning" (Prodanov, Crnjanski, and Milojković 2021, 89).

Programs	
Audacity	audio editing and recording.
LenMus Phonascus	"studying music theory that allows you to focus on specific skills and exercises, on both theory and aural training".
Lilypond	"engraving complex notation, early music, modern music, tablature, vocal music, lead sheets, educational materials, large orchestral projects, customized output, and even Schenker graphs."
Minuet	music theory education software for beginners, amateurs and music enthusiasts.
MuseScore	notation.
Nootka	understanding "the basics of music notation: reading and practicing playing musical scores […] in real time checks if the notes were played correctly."
Vocal Remover and Isolation	"separate voice from music out of a song creating a karaoke version of the song (no vocals) and acapella version (isolated vocals)."

Websites, applications, and platforms	
Dave Conservatoire	"a music school for everyone".
Good Ear	ear training.
Hansen Media	collection of "Music Theory courses and resources for both students and instructors."
Harmonagon	"uses simple geometric shapes to teach music, compatible with every instrument and style of music."
Metronom online	digital metronome.
Music Courseware	perception of tones, scales, intervals, tonality, chords, and harmonic functions.
Musictheory.net	music theory lessons, exercises, and tools.
Open Music Theory	"interactive, online textbook for college-level music theory courses."
Open Sheet Music Education	"generator of MusicXML sheet music primarily aimed at music teachers and musicians, who manually create exercises for improving sight reading skills for their instruments for themselves or their students."
Pojmovnik muzičke teorije	Music Theory glossary of the Serbian Society for Music Theory.
Rhythm Trainer	rhythm perception training.
Teoria.com	"dedicated to the study and practice of music theory and the development of aural skills."
Theta Music Trainer	"games for ear training and Music Theory."
YouTube	Music Matters, Christopher Brellochs and Adam Neely; in the local context, in the Serbian language: Muzikul, Muzička kultura – muzika za osnovce, Jaccoled C and Pevaj sa Sandrom

Mobile applications	
Bring Back the Beat	Various applications on Google Play and in the Apple Store, in the Music Appreciation Apps category, for practising playing, singing, acquiring knowledge of music theory and music history, as well as applications for composing and notating – for younger age groups and children who are in the process of musical literacy. For more on mobile applications and their use in teaching solfege and music in primary school see Jeremić 2020.
Noten learnen	
Rhythm Teacher	
Solfeg.io	

2.2 Digital resources to strengthen contextual and interpretative knowledge of classical music

These digital resources include collections for performing and listening to, analyzing and researching classical music. They differ in their organization, the topics and the formats they contain.

The open-access search engine Digital Resources for Musicology of the Packard Institute for the Humanities (Stanford University) lists over 300 open project presentations on thematic and diverse areas of classical music. The search engine was first structured in 2014 to make sense of the growing field of heterogeneous music resources available online (Nikolić 2023). It is complemented by Harvard University's Online Resources for Music Scholars, which serves as a search engine for various content relevant to Historical Musicology, Ethnomusicology, Music Theory, composition and performance practice. The idea behind both search engines is to create a database of links to relevant websites to facilitate online searches on various musical topics. Both engines are in open progress – they are updated regularly with new information. Most of the examples we have selected as important resources for developing contextual and interpretive knowledge of classical music are also part of the Digital Resources for Musicology. In this category we have divided the selected examples into seven subcategories according to the type of content:

2.2.1 Databases with music-related metadata and catalogues
2.2.2 Repositories for sheet music
2.2.3 Composers – life and work
2.2.4 Historical and contemporary music audio and video recordings

2.2.5 Music iconography databases
2.2.6 Resources for researching the history of Music Theory and Aesthetics
2.2.7 Other

2.2.1 Databases of music-related metadata and catalogs	
Cantus Index	"a catalogue of chant texts and melodies for the liturgical Office and Mass, and a search of online chant resources." It combines the databases of 11 projects, all of which follow the same standards for texts and music encoding. It is possible to search for both texts and melodies.
Chopin Online Catalog	catalog of the first editions of Chopin's compositions – 85 compositions printed before 1881 and found in various collections of European and American libraries.
MusicBrainz	"an open music encyclopedia that collects music metadata".
RISM	"comprehensively document extant musical sources worldwide: manuscripts, printed music editions, writings on music theory, and libretti that are found in libraries, archives, churches, schools, and private collections. […] records what exists and where it can be found." Muscat is also created as a special open-source program for projects describing primary music sources, digitizing them and linking them to the RISM catalog (Ward 2017).
RILM	the most important bibliographic catalogue of writings on music.
RILM abstracts of music literature	among other things, it contains more than 200 full-text music journals.
RILM Music Encyclopedias	presents full texts on the most important areas and topics of Historical Musicology, Ethnomusicology and Music Theory in a comprehensive, encyclopedic manner.
MGG online	"the preeminent digital encyclopedia for music researchers worldwide."
Index to Printed Music	"the digital finding aid for locating musical works contained in published collections, sets, and series."
RILM Publications	"bibliographies for a collections of scholarly essays on the history of academic disciplines."

Sheet Music Consortium	"grouping of libraries working toward the goal of building an open collection of digitized sheet music using the Open Archives Initiative Protocol for Metadata Harvesting."
Stockhausen Concerts Database	contains data on all concerts at which Stockhausen's music was performed in the period from 1952 to 1972.
ViFaMusik	a virtual musicological library in the format of an aggregator of web links grouped into several categories: choral music and folk music from different parts of the world – photos, videos, podcasts and descriptive materials.

2.2.2 Music sheet repositories	
Art Song Central	"printable public domain sheet music for singers and voice teachers. An emphasis is placed on standard classical and traditional repertoire."
Bodleian Library Broadside Ballads Catalogue	a collection of sheet music of English ballads from the 16th to the 20th century.
Digital Scores and Libretti from the Collections of the Eda Kuhn Loeb Music Library	"digital collection of scores and libretti, selected for their rare or unique natures and their popularity as objects of research and teaching."
Early Music Online	Contains "over 320 volumes of 16th-century anthologies of printed music, from holdings at the British Library."
IMSLP	also known as the Petrucci Music Library – one of the most important and largest collections of sheet music. An important source for musicians and researchers looking for printed editions of classical music, with multiple editions of a single composition.
Jean-Baptiste Lully Collection	scores of nearly 30 rare 17th- and 18th-century opera, ballet, and movement scores written by Lilly and his sons.
Juilliard Manuscript Collection	140 autograph manuscripts, sketches, engravers proofs and first editions of works by various composers.
KernScores	library of encoded music scores in Humdrum kernel format, over 100,000 files.

Open Score	public domain music scores in MusicXML format created by a community of enthusiasts, for download, performance and editing; standard and classical repertoire.
Music Manuscript Online	over 700 manuscripts of music by the most important composers from the 18th to the early 20th century.
Mutopia Project	score, 2124 compositions in open access for download in PDF and MIDI formats, as well as for editing in the LilyPond program.
Sheet Music International	"music library of the world's greatest music."
The Computerized Mensural Music Editing Project	encoded scores of early music together with software tools that make them accessible to musicians and researchers.
The Düben collection with catalogue	scans of facsimiles and annotations of a large collection of music manuscripts and scores from the 17th and 18th centuries.
The Lost Voices Project	16 sets of books published by the Parisian printer Nicolas Du Chemin between 1549 and 1568, containing facsimiles, contemporary transcriptions, scholars' commentaries and research tools; digitized according to MEI standards.

2.2.3 Composers – life and work	
Arnold Schönberg Center	extensive collection; film recordings, personal documents and photographs, biographical sources; sketches, manuscripts, theoretical, pedagogical and literary works, lectures, teaching materials; personal documents; complete Schönberg library; programs, posters; audiovisual documents.
Bach Digital	almost complete digital library of all works by Johann Sebastian Bach and his sons as well as other primary sources on their work; resources of the Bach Archive in Leipzig, the University of Leipzig and the National Libraries in Berlin and Dresden.
Beethoven Autographs online	Centre for Beethoven Research, Boston University; collection of Beethoven manuscripts: fragments, cadenzas, sketches, but also complete manuscripts from libraries and private collections throughout Europe and North America.

Beethoven-Haus Bonn	a huge collection of digitized material: over 6,000 documents, over 37,000 scanned pages of sheet music and high-quality manuscripts, 1,600 audio recordings of compositions and audio letters, 7,600 text files.
Beethoven Werkstatt	digital critical music edition; presentation of the genesis of certain compositions, comparison of sketches and various editions of Beethoven's compositions.
Brahms digital	various types of material on Brahms' life and music: autographs, early editions, letters, concert programs, drawings, photographs.
Bruckner online	digital catalog of Bruckner's works, scanned images of about 700 autographs; digital copies of early printed editions; an encyclopedia with information on his life and works; MEI-encoded scores with computer harmony analysis; quotations about Bruckner from previous literature – almost 10,000 citations.
Digital Interactive Mozart Edition	the most important part of the Digital Mozart Edition (DME), developed by the Mozarteum Foundation in Salzburg and the Packard Institute for the Humanities, Stanford University, which consists of several thematic collections: music, libretto and poems, letters and documents, sources and catalogues, reception and interpretation, Mozart's library. It is possible to listen to the compositions synchronized with the sheet music.
Edvard Grieg Archive	shortly before his death, Grieg decided to donate his legacy to the Bergen Library; the digitization project began on the composer's 150th birthday in 1993.
Gesualdo Online	critical digital edition of the complete works of Gesualdo da Venosa; 200 arranged compositions and 39 references to musical sources; the download is free and the edition is available in three formats: pdf, Sibelius and MEI files.
John Cage Living Archive	manuscripts and video materials.
Schubert Online	documentation on Schubert's life and work; 636 autographs, letters and other materials.
Swedish Musical Heritage	a collection representing Swedish composers through various formats of copyright-free material: biographical information, scores, recordings.
The Aaron Copland Collection	a comprehensive collection of everything to do with Copland's life: Manuscripts, sketches, typed speeches, photographs (about 5,000), childhood memories, letters, 981 digital items in all.

2.2.4 Historical and contemporary music audio and video recordings	
Archives Sonores CNRS	the digital archive of the Center for Ethnomusicological Research based in Paris; contains a catalog with data on music recordings on various sound carriers since 1900; about 30,000 recordings, of which about two thirds contain sound; 5,000 recordings are classified as rare.
Berliner Gramophone Disc Collection	a digital collection of records published by Berliner Verlag between 1892 and 1912.
CHARM Archive	the result of a project aimed at researching the history of music exclusively based on sound recordings; contains around 5,000 recordings. Interesting collection: The House Conductors – biographies and discographies of eight famous conductors from the period after the advent of the gramophone.
Classical Discography	a catalog of classical music records found in the archives of major publishers in Europe, America and Japan. It consists of commercial LP records from the period 1950 to 1979, supplemented by a small number of examples dating back to 1980, i.e., the period before 1950; contains no audio samples.
Europeana	the largest digital collection of European cultural heritage, which collects digitized material from more than 3,500 European institutions intending to facilitate and promote its use. A special project – Europeana Sounds – with the slogan "the sound heritage of Europe at your fingertips". Over 600,000 recordings, divided into the following groups: music (all genres), spoken performances (historical speeches, interviews, stories, theatrical performances, recitation, languages and dialects), environmental sounds (animal sounds, ambient sounds and recordings of soundscapes of large cities), radio programs (news, documentaries, radio broadcasts) and sound effects. Over 300,000 files linked by recordings: scores, music manuscripts and images.
Europena Music Collection	a thematic digital exhibition dedicated to Europeana's music collections; each month, a specific institution is responsible for the digital design and presentation of a specific musical theme related to a music collection that the institution owns.
Geman Music Archiv	the largest non-commercial collections of sound recordings can be found in specialized music archives and libraries, which are often part of national libraries. However, these collections are usually not open to the public, except for use on a computer network within the institution to which they belong.

Internet Archive	contains 15 million of sound recordings – music of all genres, audio books, sound archives, important radio news, political speeches, organized by collection. There is also a subcategory containing recordings of concerts by famous world musicians.
Ivey Collection of Electronic Music	a collection related to the work of the first electronic music studio established in 1969 at the Peabody Conservatory, Johns Hopkins University; recordings of 234 works.
Muzickweb	over 600,000 compact discs and 300,000 LPs described according to international library standards; contains digitized audio recordings that can be used for analysis, as well as high-quality metadata.
New Zealand Pianola Site	recordings of music for mechanical piano, period from 1900 to 1930, over 3,500 files.
Silent Film Sound and Music Archive	silent film music archive, for research and performance.
The Gleen Gould Archive	a collection of tapes, mainly from the 1970s and 1980s, showing Gould as a performer, at home, in concert, in the studio.

2.2.5 Music iconography databases	
Bildpostkarten	historical music postcards; postcards from the period from 1880 to 1945 showing musical scenes: portraits of composers, musicians, composing, performances.
Digital Image Archive of Medieval Music	originally a website for viewing rare manuscripts in various image sizes and resolutions; today it is a unifying website of various projects dealing with mediaeval music, containing detailed information on all known sources of European polyphonic (vocal) music, high quality images and manuscripts.
Early Music Sources: Iconography Database	iconographic database of early music: images, instructions, music performers.
Iconoteca	portraits of musicians; a collection of painted portraits of composers and musicians from the 18th century, then lithographs, photographs of musicians and composers; over 1,500 objects that were often used to illustrate book editions and concert programs. It also contains over 6,000 letters.

Joseph Muller Collection of Music and Other Portraits, New York	contains over 6,000 portraits of musicians and composers, which were often used as the basis for illustrations in music publications. The pictures date from the 16th century to the early 20th century; they are drawings, lithographs and engravings.
Jaconde (Mona Liza)	French national catalog of museum exhibits with a tool for finding exhibits related to music.
Louvre digital collection	contains half a million photos (pictures, objects, books and other types of material), including those related to music.

2.2.6 Resources for researching the history of Music Theory and Aesthetics	
Early Music Theory	digital edition of the theoretical works of Johannes Tinctoris.
Saggi musicali italiani (SMI)	archive with texts on music theory and aesthetics, in Italian, from the Renaissance to the 19th century.
Thesaurus Musicarum Latinarum (TML)	archive of texts on music theory and aesthetics in Latin; the idea of making every known Latin text on music, from late antiquity to the 17th century, searchable by transcribing the original sources.
The Traités en français sur la musique (TFM)	texts in French, from the Middle Ages to the 19th century.
Treatises on Music in English (TME)	texts in English, from the 14th to the 18th century.
Thesaurus Musicarum Italicarum	musical treatises in Italian, from the Renaissance to the early Baroque period; among them the works of the most famous Italian authors of that period, Pietro Aaron and Joseph Carlino.

2.2.7 Others	
Freischütz Digital	digital critical music edition; combines digital versions of the libretto, various editions of the score and a large number of audio/video recordings of the performance.
Historical Tenors	editions of records and information about singers, tenors.
MDZ digital music collections	various thematic collections of music manuscripts, scores, autographs, libretti, music literature, including materials from the Bavarian State Library.

Measuring Polyphony	platform for the encoding of late medieval music; modern and early modern notation are encoded in a computer-readable format that is available for further research and analysis.
MIMO	Musical Instruments Museum Online – the largest database of information about musical instruments in public collections.
Monuments of Partimenti	a collection of musical instructions that once served as training exercises for musicians at European courts.
Music Gifts for the Russian Emperors	a collection of music given to the Romanov imperial family by visitors from France, Italy, Germany and other countries in the period from the 18th to the 20th century. Many gifts also came from Russia itself, where Western European music was introduced at the beginning of the 18th century.
The Cello Music Collection of the University of North Carolina at Greensboro	the only database dedicated exclusively to the cello; contains sheet music, monographs, videos, personal documents related to cello music.
The International Harp Archives at Brigham Young University	a selection of harp music scores and other materials, from the 18th to the early 20th century.
The Library of Congress: The Moldenhauer Archives	over 3,500 documents of Western classical music, from the Middle Ages to the present; music history from primary sources.
VifaMusik Libretto Portal	catalogue of the libretti of the Bavarian State Library, the Frankfurt University Library and the German Institute in Rome; over 8,000 libretti of operas, oratorios and ballets from the 17th to 19th centuries; it is possible to search by criteria of the composer or the name of the work.
Virtual Music Rare Book Room	the focus is on rare music editions, especially sheet music, in particular French operas of the 18th century.

Implications

Systematizing and classifying open access classical music resources is essential due to their vast number and diversity. While the presentation of the principles and practices of digital music encoding, storage and transposition is designed in a linear narrative flow of text, this systematization is done by structuring lists of the main categories of digital resources and specific examples within each category, accessible via hyperlinks, considering that this list is exemplary, but by no means final. Intentional structuring of this section of text as a collection of listed items reflects the logic of the database as a prevailing way of understanding the world in the computer age (Manovich 2001, 219–221). In other words, the chosen methodology that resulted in this conceptual framework reflects the complexity of the contemporary technological context, which can be described by the phrase "digital plentitude" – "a universe of products […] and practices […] so vast, varied, and dynamic that is not comprehensible as a whole" (Bolter 2019, 8). By writing a text in which the perspectives of linear and structured thinking are equally engaged, we put forward the initial thesis that digital competences in music teaching require both narratives of computer science-based theoretical knowledge about the encoding, storage and transposition of music and knowing of programs and databases as the outputs of these practices, functionalized as concrete digital teaching tools.

Acquiring relevant theoretical knowledge is crucial for music teachers to effectively apply digital competencies in demonstrating their expertise within the specific context of the educational process. The availability of digital resources represents an additional category of knowledge that enhances music teachers' ability to apply digital technologies in the music education process and develop the necessary skills. If "engagement with digital technologies and content requires a reflective and critical, yet curious, open-minded and forward-looking attitude to their evolution" (European Commission 2019, 10), then possessing specific knowledge and skills is necessary to foster a positive attitude as the third element of competence alongside knowledge and skills. But "at this moment, we identify the teachers who quickly recognize the pedagogical potential of digital technology and easily adapt it to the needs of their students, and the teachers who resist it, even though the transformation of teaching practice is necessary to adapt

the school to the reality deeply touched by technological progress" (Kuzmanović et al. 2024, 5). However, it is certain that things are not always black and white, and it cannot be said definitively whether technological influences are certainly good or bad. Here, we will refer to Sherry Turkle, who states: "At every step we have to ask, as educators and citizens, whether current technology is leading us in directions that serve our human purposes. Such questions are not technical; they are social, moral, and political. […] Technology does not determine change, but it encourages us to take certain directions. If we make those directions clear, we can more easily exert human choice" (Turkle 2004). Furthermore, this situation is complicated by the rapid pace of innovation, and it is also uncertain whether we can effectively keep up with every new technological development in the educational process.

We hope that the presentation of the main principles and practices of music encoding, storage and transposition as well as the systematization of various and numerous classical music online digital resources will support the formation of a conciliatory and acceptable attitude towards the role of digital technologies in the music teaching process and support the development of digital competences of teachers. The presentation of knowledge and tools as key principles, practices and examples of music encoding programs and databases is intended to help and encourage teachers to understand the mechanisms of technologically mediated knowledge transfer, successfully navigate the multitude of resources available and select those that meet the specific objectives and outcomes of each subject and lesson.

List of References

"An Introduction to MEI". 2024. Music Encoding Initiative. https://music-encoding.org/about/.

Bolter, Jay David. 2019. *The Digital Plentitude: The Decline of Elite Culture and the Rise of New Media*. Cambridge, Londond: The MIT Press.

Cain, Tim. 2004. "Theory, technology and the music curriculum". *British Journal of Music Education*, 21 (2): 215–221. https://www.researchgate.net/publication/231754986_Theory_technology_and_the_music_curriculum.

Chayko, Mary. 2016. *Superconnected: The Internet, Digital Media, and Techno-Social Life*. Thousand Oaks: SAGE Publications Inc.

EU Science Hub. "Digital Competence Framework for Educators (DigCompEdu)". European Commission. https://joint-research-centre.ec.europa.eu/digcompedu_en.

European Commission, Directorate-General for Education, Youth, Sport and Culture. 2019. "Key competences for lifelong learning, Publications Office". https://data.europa.eu/doi/10.2766/569540.

European Commission. 2020. "Digital Education Action Plan 2021–2027". European Education Area. https://education.ec.europa.eu/focus-topics/digital-education/action-plan.

Gere, Charlie. 2002. *Digital Culture*. London: Reaktion Books.

Gujar, Uday G., and Claudia A. Crawford. 1986. "Computer encoding, storage and transposition of musical scores". *Computers & Graphics*, 10 (1): 37–49. https://doi.org/10.1016/0097-8493(86)90067-1.

Hinchey, John. 2021. "A review of optical music recognition software". January 12, 2021. https://www.scoringnotes.com/reviews/a-review-of-optical-music-recognition-software/.

Holland, Simon. 2000. "Artificial Intelligence in Music Education: A Critical Review". In *Readings in Music and Artificial Intelligence. Contemporary Music Studies*, edited by Eduardo Reck Miranda, 239–274. London: Routledge.

Jenkins, Henry, Purushotma, Ravi, Weigel, Margaret, Clinton, Katie, and Robison, Alice J. 2009. *Confronting the Challenges of Participatory Culture. Media Education for the 21st Century*. Cambridge, London: MIT Press.

Jeremić, Mirko R. 2020. "Mobilne (muzičke) aplikacije i njihova upotreba u nastavi solfeđa i muzičke kulture u osnovnoj školi." In *Srpski jezik, književnost, umetnost. Zbornik radova sa XIV međunarodnog naučnog skupa održanog na Filološko-umetničkom fakultetu u Kragujevcu (25–27. X 2019). Knj. 3. Ekspresivnost i intimnost u muzici & tako male stvari: intimno u umetnosti i kulturi*, edited by Biljana Mandić and Jelena Atanasijević, 189–205. Kragujevac: Filološko-umetnički fakultet u Kragujevcu.

Kuzmanović, Dobrinka, Uglješa Marjanović, Bojan Lazarević, Danijela Šćepanović, Branislav Ranđelović, Zlatko Grušanović, Katarina Aleksić. 2024. *Okvir digitalnih kompetencija – nastavnik za digitalno doba*. Beograd: Zavod za vrednovanje kvaliteta obrazovanja i vaspitanja, Centar za obrazovnu tehnologiju. https://ceo.edu.rs/wp-content/uploads/2024/02/2024_ODK_Nastavnik-za-digitalno-doba-2023-1.pdf.

Lewis, Jonathan. 2016. *Reification and the Aesthetics of Music* (1st ed.). London: Routledge. https://doi.org/10.4324/9781315647425.

Manovich, Lev. 2001. *The Language of New Media*. London: The MIT Press.

Margounakis, Dimitrios, and Dionysios Politis. 2011. "Music Libraries: How Users Interact with Music Stores and Repositories". In *E-Publishing and Digital Libraries: Legal and Organizational Issues*, edited by Ioannis Iglezakis, Tatiana-Eleni Synodinou, and Sarantos Kapidakis, pp. 111–130. Hershey, PA: IGI Global.

Matović, Marijana. 2021. "Programi digitalnih kompetencija u Republici Srbiji". Beograd: OSCE Mission in Serbia – USAID. https://www.osce.org/files/f/documents/d/7/495181.pdf.

Mills, Janet, and Andy Murray. 2000. "Music technology inspected: good teaching in Key Stage 3". *British Journal of Music Education*, 17 (2): 129–156. https://doi.org/10.1017/S026505170000022X.

Mora-Mcginity, Mariano, Alo Allik, György Fazekas, and Mark Sandler. 2016. "Musicweb: Music discovery with open linked semantic metadata." In *Metadata and Semantics Research: 10th International Conference, MTSR 2016, Göttingen, Germany, November 22–25, 2016, Proceedings*, pp. 291–296. Springer International Publishing. https://qmro.qmul.ac.uk/xmlui/bitstream/handle/123456789/31886/Fazekas%20MusicWeb%3A%20Music%202016%20Accepted.pdf?sequence=1.

Nikolić, Sanela. 2023. "'Digital Resources for Musicology'" and Its Potential for Musicological Interpretation". In *Interpreting of/through/by/in Music*, edited by Ana Stefanović and Dragana Stojanović-Novičić, pp. 335–346. Belgrade: Faculty of Music.

"Optical Music Recognition Research". https://omr-research.net/.

Prodanov, Ira, Nataša Crnjanski, and Milan Milojković. 2021. *Muzičko obrazovanje u digitalnom okruženju*. Novi Sad: Akademija umetnosti Novi Sad. https://akademija.uns.ac.rs/wp-content/uploads/2021/09/Muzicko-obrazovanje-u-digitalnom-okruzenju-e-book.pdf.

Punie, Yves (author), and Christine Redecker (editor). 2017. *European Framework for the Digital Competence of Educators: DigCompEdu*. Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/159770.

Raimond, Yves, Samer Abdallah, Mark Brian Sandler, and Frederick Giasson. 2007. "The Music Ontology." *Proceedings of the 8th International Conference on Music Information Retrieval.* ISMIR, pp. 417–422. https://www.researchgate.net/publication/200688653_The_Music_Ontology.

Raimond, Yves, Christopher Sutton, and Mark B. Sandler. 2008. "Automatic Interlinking of Music Datasets on the Semantic Web". *LDOW* 369. https://ra.ethz.ch/CDstore/www2008/events.linkeddata.org/ldow2008/papers/18-raimond-sutton-automatic-interlinking.pdf.

Raimond, Yves and Mark Sandler. 2012. "Evaluation of the Music Ontology framework". In *The Semantic Web: Research and Applications. ESWC 2012* (Lecture Notes in Computer Science, vol 7295), edited by Elena Simperl, Philipp Cimiano, Axel Polleres, Oscar Corcho, Valentina Presutti. Berlin, Heidelberg: Springer, pp. 255–269. https://doi.org/10.1007/978-3-642-30284-8_24.

Raschke, Peter J. 1999. "Review of Music-Theory Web Sites for the Beginner". *Music Theory Online. Journal of the Socitey for Music Theory*, 5 (2): 1–4.

Ríos-Vila, A., Rizo, D., Iñesta, J.M. et al. 2023. "End-to-end optical music recognition for pianoform sheet music." *International Journal on Document Analysis and Recognition* (IJDAR) 26, 347–362. https://doi.org/10.1007/s10032-023-00432-z.

Roland, Perry, Andrew Hankinson, and Laurent Pugin. 2014. "Early music and the Music Encoding Initiative." *Early Music*, 41 (4): 605–611. https://doi.org/10.1093/em/cau098.

Sánchez-Tarazaga, Lucía, and María Matarranz. 2023. "The teaching profession in European Union education policy". *Revista de Educación*, January–March: 125–49. https://doi.org/10.4438/1988-592X-RE-2023-399-564.

Savage, Jonathan. 2007. "Reconstructing Music Education through ICT". *Research in Education*, 78 (1): 65–77. https://doi.org/10.7227/RIE.78.6.

"The Music Ontology". http://musicontology.com/.

Thomas, Verena, Christian Fremerey, Meinard Müller, and Michael Clausen. 2012. "Linking Sheet Music and Audio – Challenges and New Approaches". In Meinard Müller, Masataka Goto, and Markus Schedl, eds., *Multimodal Music Processing* (Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, 1–21. http://www.dagstuhl.de/dagpub/978-3-939897-37-8.

Turkle, Sherry. 2004. "How Computers Change the Way We Think". http://www1.udel.edu/educ/whitson/897s05/files/turkle.

Šimunović, Zrinka. 2013. "Interdisciplinarna povezanost informacijske i komunikacijske tehnologije i sadržaja nastave glazbene kulture i umjetnosti". In *Glazbena pedagogija u svjetlu sadašnjih i budućih promjena 3*, zbornik radova s trećeg međunarodnog simpozija glazbenih pedagoga, Pula 18–20. travnja 2013, Interdisciplinarni pristup glazbi: istraživanje, praksa i obrazovanje, uredila Sabina Vidulin, pp. 227–239. Pula: Sveučilište Jurja Dobrile u Puli.

Urberg, Michelle. 2017. "Pasts and Futures of Digital Humanities in Musicology: Moving Towards a 'Bigger Tent'". *Music Reference Services Quarterly*, 20 (3–4): 134–50. https://doi.org/10.1080/10588167.2017.1404301.

Vlada Republike Srbije. 2020/2023. "Strategija razvoja digitalnih veština u Republici Srbiji od 2020. do 2024". https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2020/21/2/reg/.

Ward, J. A. 2017. "Getting Back to the Source, Virtually: RISM". *Arti musices: Croatian Musicological Review*, 48 (2): 281–294.

Weigl, David M., Tim Crawford, Aggelos Gkiokas, Werner Goebl, Emilia G, Nicol Guti, Cynthia C. S. Liem, and Patricia Santos. 2021. "FAIR Interconnection and Enrichment of Public-Domain Music Resources on the Web". *Empirical Musicology Review*, 16 (1): 18–33. https://doi.org/10.18061/emr.v16i1.7643.

Weigl, David M., and Werner Goebl. 2021. "Playing with a Web of Music: Connecting and Enriching Online Music Repositories". In *Music – Media – History. Re-Thinking Musicology in an Age of Digital Media*, edited by Matej Santi and Elias Berne, 263–282. De Gruyter. https://doi.org/10.1515/9783839451458-015.

Wilkinson, Mark D., Michel Dumontier, IJsbrand Aalbersberg, et al. 2016. "The FAIR Guiding Principles for scientific data management and stewardship." *Scientific Data* 3, Article number 160018. https://doi.org/10.1038/sdata.2016.18.

Wu, Dan and Jinsong Shi. 2016. "Classical Music Recording Ontology Used in a Library Catalog." *Knowledge Organization*, 43 (6): 416–430. https://doi.org/10.5771/0943-7444-2016-6-416.

Zadnik, Katarina. 2021. "Interactive learning materials for subjects music theory and solfeggio in the Slovenian primary music school". *Metodički ogledi*, 29 (2): 281–301.

DIGITAL COMPETENCES IN CLASSICAL MUSIC TEACHING: FROM A CRITICAL VIEW TO THE SYSTEMATIZATION OF DIGITAL RESOURCES (summary)

The number and variety of online classical music digital resources require specific knowledge to independently search for, select and incorporate appropriate content into the teaching process, as these represent alternative teaching tools that go beyond the primary didactic materials. The basic assumption of this paper is that digital competences of music teachers imply not only the mastery of tools – concrete digital resources – but also a specific theoretical knowledge of music encoding, storage and transposition informed by computer science as a prerequisite for developing a skill to use digital tools. The main contribution of this article is therefore to identify the key theoretical knowledge and digital resources that music teachers should understand in order to successfully develop and utilize their digital competences in the context of classical music teaching. The main principles and practices of music encoding, storage and transposition are identified and explained with reference to relevant academic studies. Based on analysis and systematization, the open-access classical music digital resources

are selected and classified, taking into account the most representative examples.

The available classical music digital resources are classified into two main groups according to their purpose and potential function in music teaching. While the presentation of the principles and practices of digital music encoding, storage and transposition is designed in a linear narrative flow of text, the classification is done by structuring lists of the main categories of digital resources and specific examples within each category, accessible via hyperlinks, considering that this list is exemplary, but by no means final. By writing a text in which the perspectives of linear and structured thinking are equally engaged, we put forward the initial thesis that digital competences in music teaching require both narratives of computer science-based theoretical knowledge about the encoding, storage and transposition of music and knowing of programs and databases as the outputs of these practices, functionalized as concrete digital teaching tools.

Acquiring relevant theoretical knowledge is crucial for music teachers to effectively apply digital competencies in demonstrating their expertise within the specific context of the educational process. Availability of digital resources appears as an additional category to theoretical knowledge that drives the ability of music teachers to apply digital technologies in the music education process and develop a necessary skill. The possession of specific knowledge and skills is necessary to form a positive attitude as the third element of competences alongside knowledge and skills. The presentation of knowledge and tools as key principles, practices and examples of music encoding programs and databases is intended to help and encourage teachers to understand the mechanisms of technologically mediated knowledge transfer, successfully navigate the multitude of resources available and select those that meet the specific objectives and outcomes of each subject and lesson.

Article received: September 15, 2024
Article accepted: November 7, 2024
Original scholarly paper

DOI https://doi.org/10.51191/issn.2637-1898.2024.7.13.69

Peter W. Stone*
University of Derby,
Derby, United Kingdom

RISE OF THE MICROSONG: THE PLATFORMIFICATION OF MUSIC ON TIKTOK AS AN ARTFORM

Abstract: The platformification of music has led to a significant reorganisation of music culture with the rise of microsongs on short-form video platforms such as TikTok, YouTube Shorts, Facebook Stories, and Instagram Reels. This paper analyses the current state of microsongs on social media platforms, focusing on TikTok, and explores the challenges faced by musicians in navigating the digital reimagining of their art and the new aura this creates. The paper argues that the challenges facing the 21st century musicians whose work is based in the digital environment echo those faced by creators of newly mechanically reproduced art, as critiqued by Walter Benjamin. The symbiotic relationship between social media platforms and artists is examined, highlighting the benefits for musicians and songwriters, as well as the potential pitfalls of algorithmic based user direction. Data is gathered from a range of secondary sources and presents an analysis based on user behaviour and interaction with music content on TikTok. The findings suggest that while established artists and music production teams are best placed to overcome the challenges of platformification, the creation of microsongs remains a significant challenge for all musicians and their authenticity.

Keywords: TikTok, microsong, platformification, digital music, streaming .

* Author's contact information: pete.stones@gmail.com.

Background

Platformification refers to the movement of information, culture, and communication on digital platforms across various economic sectors (Poell et al. 2019). Platforms have become increasingly "influential in shaping cultural habits and identity formations", particularly regarding music (Valtysson 2022). This has been viewed negatively by some within the music industry, regarding it as the "pervasive reach and impact of platforms on cultures" (Abidin & Lee 2023). It can be argued that the greatest cultural impact of social media on modern society lies in the realm of music. Information is "the new mode of production" (Pal & Harris 2024, 232). This is evident within a digital world "which looks extremely capitalist" in the way music is managed and reproduced, challenging those new to it (Pal & Harris 2024, 244). Digital reimagining of music and songs through platformification and the reframing of the original into smaller microsong formats has created a new sector in the music business. Microsongs are defined as shortened forms of the original song that have been cropped into a clip of less than one minute. This new format has become part of the complete "reorganisation of cultural practices" that are engaging with a growing number of users (Poell et al. 2019). The term microsong is used in this paper to clarify that once music is cropped, it is not only part of the original song but also becomes a unique entity with a new aura. The consumption of these microsongs seems to be most prevalent on TikTok.

Listening to microsongs takes place across a range of user-generated and content-driven platforms, such as Instagram or TikTok, as well as well-established streaming sites, such as Spotify and Apple Music. The latter allows full access to musical works, with the former focusing on the clipped, adapted, or cropped forms of the original musical work, defined here as microsongs. The platformification and success of microsongs across this range of sources works in different forms but is inherently linked to the algorithm that drives user access to content. While user-generated platformification of music has allowed emerging artists greater understanding of target listeners, this is not without a range of challenges that musicians need to navigate. However, even considering these challenges, it has never been easier for musicians to distribute their music (Nwagwu & Akintoye 2023).

Music listening is embedded within social media usage, with evidence suggesting that 90% of regular social media users engage in music-related activities (Crupnick 2018). Accessing music through social media has grown steadily over the past decade. Evidence suggests that the growth of many short-form social media video platforms was supported by the social isolation many faced during the COVID-19 pandemic in 2020 (Radovanović 2022, 59). At this time, many platforms, such as TikTok, presented a new form of social media, contrasting the more blog-focused output of already established social media platforms such as Facebook. A change in focus towards video-dominated feeds began to impact the interactions of users with music. While they hold many benefits for users, songs and concepts began to be completely reframed through this platformification. Reframing a song for short-form consumption, as a microsong, follows many of the same concepts challenging twentieth-century artists, set out by Walter Benjamin (1935) in his seminal work *The work of art in the age of mechanical reproduction.* The reframing of portraits, photography and film created new auras through mass digital reproduction and reframing. There have been calls for the view of digital reproductions to be seen as the "transformation of objects to information" and the redefining of the format as having a new "digital aura" (Betancourt 2015, 37). Benjamin (1935) critiqued the changes made to a work of art when it is recreated for consumption in non-original form, as microsongs lose a sense of the aura from the original musical composition. The sense of aura being lost is debated though and research such as Bolter et al. (2006, 35) see digital arts as leading the way in many areas and call on "the viewer to reflect on their own conditions of representation". Bolter et al. (2006, 36) also question the claims of "auratic art" or art consumed in person as the only "legitimate style".

Despite debate around the loss of aura in the music, microsongs are the sole way of listening to music through many social media platforms, such as TikTok. Streaming of works through established platforms, showcasing the original format, is not directly available. The challenge facing the modern musician is creating a work of art that can both stand alone as a full entity that can be consumed through traditional manners, as well as creating a clipped work that can draw in a listener. This challenge is further compounded by the fact that the musical creator may not be the one clipping the song, and therefore, may not be the editor or creator of the microsong. While the artistic value comes from the

musician, the perspective the microsong creator, or the one cutting the song to fit the video on the platform, brings to editing alienates the musician from how their work is used. This reworking of the artform affects a wide range of genres and musicians, not simply those involved in popular music. Working to promote music on the internet, established artists and music production teams are best placed to overcome these challenges, further alienating less established musicians and ensembles. To illustrate this, large record labels have developed partnerships with platforms to favour their musical output, such as the partnership between Sony Music Entertainment (SME) and TikTok, making SME artists' music more widely available (TikTok Newsroom 2020). In comparison, those new to the process must navigate this alone; although new markets may be easily accessible, they might still find themselves just as distantly placed in terms of reaching them (Nwagwu & Akintoye 2023). While this is a challenge across many platforms, this appears to be particularly true for TikTok users, who have a unique interaction with music. TikTok as a social media platform has a specific link to music creation and listening, with the prominence of audio and music features described as one of its unique selling points to users (Vizcaíno-Verdú & Abidin 2022, 884). The relationship between TikTok and the artist is symbiotic. Evidence suggests that the wealth of user-generated content available from fans benefits musicians with connections and insights, such as topic ideas for songwriting and valuable marketing information (Nwagwu & Akintoye 2023). However, this is always conducted through the lens of an algorithm that tailors viewable content for users and musicians alike, shaping the discourse to confirm established positions (Bilic 2024, 20). This can create an echo chamber of social views and acceptable attitudes which could share misleading opinions, excluding those outside of the digital sounding board (Mosley et al. 2016). Nevertheless, the symbiotic relationship between TikTok, the musical audience, and the music artist has some benefits for all parties. More traditional forms of music making and their fields have embraced this platformification, including, for example, the Eurovision Song Contest's decision to brand TikTok as the official entertainment partner (Radovanović 2022, 64). Huge networks of listeners can be accessed, and music can be shared to create a global reach, which may not otherwise be possible.

Questions could be asked about whether the audience is connecting with the original work or simply the reframed microsong. Studies show that TikTok

users generally watch videos less than one minute long (Metricool 2023). Rapid movement between short videos suggests that listeners are unlikely to consider the music within each deeply. This dream-like slideshow of musical platformification through TikTok is also viewed with visual imagery that is often not at the control of the music artist themselves. Pellegrini (2022) stated that "emplacement and temporalization" of the experience is "completely disconnected from the original music," describing the cultural input as akin to a "hallucinatory experience" (95). The artist is, in turn, completely unaware of how their artform has been 'hallucinated' or experienced in this new micro-form. Musicians are then powerless to interact with their audience and communicate further ideas that do not fit into TikTok's short video format. TikTok may have the ability to predict a probable desired viewing for the audience, but without establishing the relationship that exists between audience and music artist, further listening to the artist's work is not assured.

TikTok's growing number of users and engagement with music through the platform could be linked to the algorithm powering the user experience. The experience of music on TikTok is individually tailored by an algorithm, with musicians or artists using the platform and algorithms promoting their work (Radovanović 2022, 69). Algorithmic usage shapes the experience of each individual user, blinding them from certain angles and opportunities and encouraging them to choose those that the algorithm believes best suits their previous positions (Bilic 2024, 15). Arguments have been made that the new media landscape only serves to maintain the existing power structures held within the global north and continues to exclude musicians without the financial means to adapt to the new landscape (Pal & Harris 2024, 243). Algorithms have been critiqued by many researchers, including Noam Chomsky (2023). Chomsky states in a 2023 New York Times editorial that the challenges of shaping the experience of the user centre in the complex space between what is possible and what is probable, with the algorithm unable to fully understand the balance between these (Chomsky 2023). Chomsky's editorial goes on to explain that the human mind has a superior ability to "create explanations" regardless of the data available to the algorithm (Chomsky 2023). The editorial also explains that human understanding is not always correct, "we are fallible" but that our processing "gradually limits what possibilities can be rationally considered" (Chomsky 2023). To view this through a musical lens, the process of musical

experimentation allows us to limit what we do or do not do. Platformification predetermines "what could and could not be the case", eliminating the holistic learning that takes place from listening to new music and listening to the possible over the probable (Chomsky 2023). This relationship between the probable and possible is the centre of algorithmic choice and platformification, including on TikTok. The platformification of the arts only empowers algorithms to choose the listening that is consumed. In turn, it is fair to say that this is not the algorithm choosing the music to be consumed but choosing the microsong. Choosing a small part of the music to be consumed is all that is available, as the full experience of the art form does not feature on TikTok. The choice of what makes the microsong rests with the human, deciding which part of the song should be exhibited in the video they create, which is often not under the artist's control. This consumption of microsongs has only increased in the digital world through the growth of social media platforms, although it is not a new concept. Short pieces of music, listened to in isolation from the original work, have actually formed a part of our daily life away from social media.

Microsongs have long been around us, through humble elevator music or hold music that has soundtracked our lives prior to the Internet age. As a concept, however, this has not been placed at the forefront of musical consumption and has taken the role of background sound. On TikTok, user experience dictates whether the music is at the forefront or in the background for a listener, as videos are constantly paired with the microsong. The consumer, previously, has always been aware that the artwork is not original. For example, when listening to music in a lift, no passenger is under the assumption that they are listening to the entirety of a piece or a piece written for their lift experience. It is unclear if this is the case for TikTok users. Microsongs are also prevalent in advertising. More than 90% of advertising includes music; therefore, it is clear that a large number of musical compositions have been reimagined as microsongs to best reflect brand values in the advertising time available (Allan 2008). Music has been shown to be a powerful tool to influence consumer behaviour and a marketing approach, with songs being perceived to hold experiences that cannot be explained plainly in the limited time of a short television or radio advert (Anglada-Tort et al. 2022). The popularity of songs has also been shown to support advertising. Evidence suggests that familiarity with music is important within the advertising world, with Anglada-Tort et al. (2022) suggesting that

several studies have shown positive links between listening to known music and supporting a given brand. Within the digital world, microsongs may continue to promote or advertise feeds or videos on TikTok. Digital consumers are repeatedly fed the same clipped version of the musical work, which in turn has no clear link to the original full version unless it is already well known. This leaves the majority of the original artwork lost unless it is specifically sought out by the audience through another platform. This fragmented reality is well suited to a sense of cultural distraction, which has grown throughout the digital age (Pellegrini 2022, 89). The challenges of cultural distraction and microsongs may lie in TikTok's use of the vertically framed video.

Social media's usage of video was forced to adapt to the rise in platforms such as TikTok, increasing the use of vertically framed videos on other platforms. This led to the creation of Reels (on Instagram) and Shorts (on YouTube) competing with TikTok, which forced creators to focus on an almost entirely mobile phone-based consumption of content (Radovanović 2022, 54). This change in video format has led to the inevitable consumption of microsongs as longer videos are less comfortable to consume through vertically framed video. Musical content moved further away from the original artform even when the video was paired with it. The traditional music video, which had been created for consumption on television or computer screens, paired the original song with original artistic video content. Through forced adaptation, artists either created costly new videos specific to the new vertical format or tried to adapt videos by cropping and cutting the original. The habit of consuming music through vertical-framed videos has become the cultural norm for many. Established artists are able to support this reimagination and this change further challenges emerging artists to adapt to a multi-format market. While this new format has been viewed as initially easier for creators, there is no consensus on the level at which the situation impacts emerging artists (Caliandro et al. 2024, 12).

Methods

The research in this study is mainly descriptive and uses a range of secondary data sources. The aim was to utilise datasets highlighting the usage of music within TikTok and how this may relate to a wider movement of platformification. The advantage of this review process is that data existing in some format can be

evaluated to draw links with a wider understanding of how music is increasingly used on social media platforms, such as TikTok. Initially, publicly available datasets were collected using online scoping tools, including Google Dataset search, Matomo, Databox, and Statica. Datasets were reached when searching using the following keywords: TikTok, music, streaming, music usage, listen/listening, platformification, and microsong. Findings were then evaluated and coded with the data analysed and conclusions were drawn. Insight was also gained from journal articles and public articles to support this initial search, as well as the analysis of microsongs from TikTok presented in other formats, such as physical entities or Spotify streams. The research design centred on organising, collating, and assessing collected data samples before conclusions could be drawn. The scope of this study is limited to TikTok and its impact on music listenership, creation, and publication; therefore, other social media platforms and streaming services were only assessed when relating directly to TikTok music usage.

Results

Through analysis of the datasets, several key themes could be drawn. Evidence suggests that TikTok users are more likely to participate in music-related activities both on and away from the platform. A study for Statistica (2022a) found that TikTok users are more than twice as likely to meet an artist in person (17% of respondents compared to 8%), nearly twice as likely to purchase an artist's merchandise (29% compared to 15%) and discover an artist that would later go on to be repeatedly listened to (42% compared to 20%). There is also evidence that songs heard on TikTok may lead to listenership through streaming services, with more than half of the participants in a study (54%) stating that they had done this (Statistica 2022a). However, there are challenges to this final statement. A 2023 report conducted by TikTok in collaboration with Luminate provided a range of insights related to TikTok's impact on music. Music on TikTok is more global, with 77% of TikTok users in the United Kingdom wanting access to international music artists and 46% of TikTok users in the USA listening to tracks not in the English language (Luminate 2023). The study also found that those regularly listening to music on TikTok were more likely to use a paid streaming service, and evidence suggests that high levels of TikTok streaming was paired

with higher levels of streaming on other platforms (Luminate 2023). Evidence also suggests that new music discovered through TikTok within a microsong format is more likely to be shared in this format than the average user of another social media platform (Luminate 2023).

Information from a study conducted by PEX (2024) stated that measuring listenership and the impact of tracks can be complex, with clipping of songs combined with tempo alterations to circumvent copyright law or to best fit the creator's video content. Modified microsongs can "divert royalty payments away from rightsholders and into the hands of other creators" (MBW 2024). PEX (2024) estimates that more than one-third of songs are modified in this way by TikTok, making true estimations of the listenership for a specific song complex.

Despite the increased growth of TikTok and other platforms utilising microsongs, evidence suggests that when asked, more than two-thirds of consumers prefer streaming services for active consumption of music (IFPI 2022). With the growth of platformification the evidence is that this will only increase (Radovanović 2022, 59). Globally, studies have found that users are three times more likely to avoid regular adverts interrupting their listening and would rather seek out a paid subscription, with the choice of music video-based consumption, such as through YouTube, also being more popular than video streaming services with adverts (IFPI 2022).

TikTok's success is powered by the interactions individuals have with the platform, rather than business-focused accounts. Personal use accounts post, on average, three times more every month (Metricool 2023). Personal use accounts are also viewed more; on average there are 12,500 more views per video compared to business accounts (Metricool 2023). The video length for users is on average between 30 seconds and one minute, with the majority of videos paired with microsongs (Metricool 2023). A wide range of nationalities and song styles are popular across TikTok, with the popularity of songs leading to huge numbers of streams in a short period for some musicians (Metricool 2024).

Discussion

Does the evidence suggest TikTok is good for musicians?

Data clearly presents that TikTok users interact more frequently with music both on and away from the platform. The argument could be presented that

the format of microsongs may have a similar impact on the user to that of a traditional television or radio advert for an established product. It can be argued that the microsong provides an advert to the user for the more traditional catalogue of works that a TikTok user could find in another format. The impact this may have on Spotify streams or physical sales of leading TikTok artists could be further examined, though it may be unclear whether musical interaction away from TikTok is directly linked to the platform's impact.

The impact of artists producing microsongs as an advert for their work must also be considered in relation to their creative process. Arguments could be made that genres of music, such as pop or hip-hop, have been built on the strength of a catchy hook. The skill in writing a hook and building a song around this could then be established as key to the success of any artist, both on TikTok and away from the platform. This could be presented as a reason for the relative successes in listenership within genres such as hip-hop and pop. Even when comparing the use of classical music, for example, in platformification on TikTok or more traditional radio and television adverts, this could still hold true. The success of classical music in these fields has often centred on the 'pop-ifacation' of the work, reducing *Für Elise* or *O Fortuna* to a microsong of several bars.

Questions can be raised about how certain genres might evolve in an increasingly platform-centred music landscape. Will the future of jazz become a more popified, hook-centred style? How can folk music stay loyal to the population it represents while storytelling in a microsong? While the interaction of the TikTok user with music is clear, if the popularity of the microsong is linked to this then the likelihood of success centres on a microsong-centric process.

How does the microsong impact the listener's relationship with the musician?

The artist's relationship with the listener has changed through the movement away first from the physical form and then from the digital form in its entirety. Platformification, such as that of TikTok, and the increase in listenership of the microsong presents a new type of interaction in the music world. This interaction has altered the power structure between listener and creator, with an increasing number of factors creating a less direct and more distracted picture of the initial

song format. One part of this is perhaps the challenge of the listener 'knowing' the music artist or creator.

Evidence suggests that TikTok listeners are more likely to interact with music away from the platform (Statistica 2022a). This would suggest that some of the listening from TikTok may result in active listening away from the platform, interaction with full length tracks and developing a further understanding of the artist they have listened to. However, this does not account for the passive listening that may occur on the platform. When the music is presented in a microsong format, perhaps with video content that does not relate to the artist, questions can be asked about the understanding of the artist away from the platform.

PEX (2024) further questions this through the re-imagining of tracks and tempo changes. The reformatting of sections of a song into slightly different microsongs, with different tempos, may cause miscalculation in this area. These microsongs could be misinterpreted as global music if created by non-English speaking users or fused with other genres of music. The flexibility and creativity on the part of the content creator supports new microsong imagining, but further isolates the listener from the aura of the original creation through the increased layers of reproduction.

Does TikTok promote global music?

Data suggested that TikTok listeners were more likely to listen to songs from international artists (Luminate 2023, Metricool 2024). One possible reason for this could be that a popular artist in their own country would attract a lot of clicks, which could lead the algorithm to believe it is probable that users from other regions would want to listen to the song. Through systems like this it is more difficult for local artists without established profiles to break through within an increasingly global market (Nwagwu & Akintoye 2023). Some of the songs classified as global are also performed in English or Spanish, the dominant languages of many currently popular songs across the globe on TikTok (Metricool 2024). Evidence suggests that many languages may not be widely listened to on TikTok (Metricool 2024). "Alibi" by Sevdaliza, Pabllo Vittar and Yseullt is one of the most popular songs on TikTok at the time of writing; despite a range of international artists it is performed in English (Metricool 2023). The

opportunities for global artists are shown to be there, with the chance for music publicists to target TikTok and platformification for their publicity. Microsongs as a concept may promote a chance for artists to introduce their work to new audience.

TikTok and music in a state of distraction

TikTok listenership may present a divided picture of engagement with the music on the platform. Statistics presented by TikTok (Luminate, 2023) suggest that music consumers are not receiving music in a state of distraction and that listening to microsongs leads to increased listenership in other formats. This data though only provides positive interactions on both platforms and does not necessarily provide an outline of passive listenership. Passive listening in other forms, such as advertising, may not necessarily lead to wider interaction with a song or artist. Therefore, a greater understanding of how passive listenership of microsongs could impact interaction with a genre, artist or song is needed.

Viral TikTok songs and non-artist video content

Challenges such as lip syncing have helped to promote music across TikTok and have provided listeners with interactive experiences with the music (Metricool 2024). One challenge facing music artists is that they are not in control of the video content accompanying their music. This does, though, allow a personalisation of experience that is not available away from the platform. One example of this is a microsong form of "Help me" by Real Boston Richey, which is used by TikTok creators to pair with selfies or fail videos (Metricool 2024). The relationship between music and a context or a particular theme is evident on TikTok. For example, microsong versions of "beamer boy" by Lil Peep and Nedarb is linked to fashion or tattoo content (Metricool 2024). While these examples are successful microsongs, it is questionable whether these themes or topics are approved by the musician in the same way that contextual usage of a song would require to be approved in the fields of film or advertising. The longer TikTok is established as a platform it may prove to be more difficult for emerging artists to have success in promoting their work as algorithms favour existing and previous choices over the unknown.

Challenges and opportunities for musicians

Platformification offers musicians a new opportunity to promote their music to a diverse audience. Language and international opportunities are clear for artists, as well as the opportunity for engagement with an audience through new means such as challenges or dances (Metricool 2024). However, the challenge of developing successful microsongs faces music artists. Microsongs rely on short music clips and catchy parts of a songs, conveying values to the listener in less than one minute. Musicians must be careful to keep the integrity (or aura) of their original work and, if possible, direct their audience to listen to their artistic ideas in the complete form.

Conclusion

An analysis of a range of data provides a picture of how TikTok impacts the music industry and musicians. Platformification is established as having an increasingly important impact on listeners' interaction with music. Music is also key to the success of platforms such as TikTok and there is a symbiotic relationship between music and the platforms on which it is listened to. Musicians are impacted by the increased platformification of their work and there are a range of challenges and opportunities that face them. Financial means to support overcoming these challenges puts new music artists in an increasingly difficult position. The algorithms that direct listenership also challenge musicians when producing artwork and the microsongs that are created from initial artforms pose musicians work in a new light. The strategies that musicians use to work with microsongs requires further research and the impact of the microsong on the long-term future of platformification presents challenges and opportunities for musicians.

List of references

Abidin, Crystal, and Jin Lee. 2023. "K-pop TikTok: TikTok's expansion into South Korea, TikTok Stage, and platformed glocalization." *Media International Australia* 188 (1): 86–111. https://doi.org/10.1177/1329878X231186445.

Anglada-Tort, Manuel, Kerry Schofield, Tabitha Trahan, and Daniel Müllensiefen. 2022. "I've heard that brand before: The role of music recognition on consumer choice." *International Journal of Advertising* 41 (8): 1567–1587. https://doi.org/10.1080/02650487.2022.2060568.

Benjamin, Walter. 1935/2018. "The work of art in the age of mechanical reproduction." In *A museum studies approach to heritage*, 226–243. Routledge.

Betancourt, Michael. 2015. "The critique of digital capitalism: An analysis of the political economy of digital culture and technology." Brooklyn, NY: punctum books.

Bilić, Paško. "Platforms and the critique of political economy." *Etkileşim* 13 (2024): 12–23. http://dx.doi.org/10.32739/etkilesim.2024.7.13.239.

Caliandro, Alessandro, Alessandro Gandini, Lucia Bainotti, and Guido Anselmi. 2024. "The platformization of consumer culture: A theoretical framework." *Marketing Theory* 24 (1): 3–21. https://doi.org/10.1177/14705931231225537.

Chomsky, Noam. 2023. "The False Promise of Chat GPT." NY Times- Opinion. March 8, 2023. https://www.nytimes.com/2023/03/08/opinion/noam-chomsky-chatgpt-ai.html.

Crupnick, Russ. 2018. "Music scores a gold record on the social media charts." August 6, 2018. https://musicwatchinc.com/blog/music-scores-a-gold-record-on-the-social-media-charts/.

IFPI. 2022. "IFPI releases Engaging with Music report 2022." November 17, 2022. https://www.ifpi.org/ifpi-releases-engaging-with-music-2022-report/.

Luminate. 2023. "2023 Music Impact Report." December 17, 2023. https://sf16-sg.tiktokcdn.com/obj/eden-sg/fuuvieh7uvzpsh/TikTok-Luminate-Report-2023.pdf.

Metricool. 2023. "Metricool: TikTok study 2023" December 1, 2023. https://lookerstudio.google.com/u/0/reporting/8b8c35c2-a36e-465d-a6a5-f71f33bc1204/page/4ByGD?s=v3UlzRZZhpc

Metricool. 2024. "Top 10 Most Popular TikTok songs this week." August 25, 2024. https://metricool.com/tiktok-songs/?_gl=1*10dxxvb*_up*MQ..*_ga*MTM3OTU0MDA5OS4xNzIzMzIzNTc1*_ga_XNWPVKYTBS*MTcyMzMyMzU3NC4xLjAuMTcyMzMyMzU3NC4wLjAuMA.

Mosley, Della V., Roberto L. Abreu, Ashley Ruderman, and Candice Crowell. 2017. "Hashtags and hip-hop: exploring the online performances of hip-hop identified youth using Instagram." *Feminist Media Studies* 17 (2): 135–152. https://doi.org/10.1080/14680777.2016.1197293.

Nwagwu, Williams E., and Ayobola Akintoye. 2024. "Influence of social media on the uptake of emerging musicians and entertainment events." *Information Development* 40 (4): 667–692. https://journals.sagepub.com/doi/pdf/10.1177/02666669221151162.

Pal, Maïa, and Neal Harris. 2024. "Capital is Dead. Long Live Capital! A Political Marxist Analysis of Digital Capitalism and Infrastructure." *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society* 22 (1): 232–247. https://doi.org/10.31269/triplec.v22i1.1431.

Pellegrini, Sascia. 2022. "The Culture of Distraction: Fragmented Vision and the Misery of the Senses." *INSAM Journal of Contemporary Music, Art and Technology* 9: 88–98. https://doi.org/10.51191/issn.2637-1898.2022.5.9.88.

Poell, Thomas, David Nieborg, and José van Dijck. 2019. "Platformisation." *Internet Policy Review* 8 (4). https://doi.org/10.14763/2019.4.1425.

PEX. 2024. "The state of modified audio: Which UGC platform had the most modified songs in 2023?" February 28, 2024. https://pex.com/blog/the-state-of-modified-audio-which-ugc-platform-had-the-most-modified-songs-in-2023/.

Radovanović, Bojana. 2022. "TikTok and sound: Changing the ways of creating, promoting, distributing and listening to music." *INSAM Journal of Contemporary Music, Art and Technology* 9: 51–73. https://doi.org/10.51191/issn.2637-1898.2022.5.9.51.

Statistica, 2022a. "Influence of TikTok on music related activities in the last year in the United States in 2022". May 29, 2022 https://www.statista.com/statistics/1351549/tiktok-music-influence-united-states/.

Statistica, 2022b. "Most popular songs used on TikTok worldwide from January to June 2022." December 1, 2022. https://www.statista.com/statistics/1343559/tiktok-most-played-sounds/#:~:text=Most%20played%20TikTok%20sounds%20and%20songs%202022&text=Between%20January%20and%20June%202022,first%20six%20months%20of%202022.

Statistica. 2024. "Average TikTok video length in 2023 and 2024." August 14, 2024. https://www.statista.com/statistics/1372569/tiktok-video-duration-by-number-of-views/.

TikTok Newsroom. 2020. "TikTok announces agreement with Sony Music Entertainment." November 2, 2020. https://newsroom.tiktok.com/en-us/tiktok-announces-agreement-with-sony-music-entertainment.

Valtysson, Bjarki. 2022. "The platformisation of culture: Challenges to cultural policy." *International Journal of Cultural Policy* 28 (7): 786–798. https://doi.org/10.1080/10286632.2022.2137150.

Vizcaíno-Verdú, Arantxa, and Crystal Abidin. 2022. "Music challenge memes on TikTok: Understanding in-group storytelling videos." *International Journal of Communication* 16: 883–908. https://ijoc.org/index.php/ijoc/article/view/18141.

World Economic Forum. 2023. "Infographic: How does the world consume music?" February 9, 2023. https://www.weforum.org/agenda/2023/02/world-consume-music-infographic/.

RISE OF THE MICROSONG: THE PLATFORMIFICATION OF MUSIC ON TIKTOK AS AN ARTFORM (summary)

This paper examines the impact of platformification on music, focusing on the rise of microsongs on short-form video platforms like TikTok. It argues that the challenges faced by 21st-century digital musicians echo those faced by creators of newly mechanically reproduced art in the early 20th century, as critiqued by Walter Benjamin. The symbiotic relationship between social media platforms and artists is explored, highlighting the benefits and potential pitfalls of algorithmic-based user direction. The microsong as a concept is analysed with consideration to the role it plays in advertising as well as social media.

Using secondary data sources, the study finds that TikTok users are more likely to engage in music-related activities both on and off the platform. However, the true impact on listenership is complex due to song modifications. While TikTok promotes global music discovery, it also presents challenges for musicians in maintaining the integrity of their original work. The paper concludes that platformification significantly impacts listeners' interaction with music, and there is a symbiotic relationship between music and platforms like TikTok. Musicians face both challenges and opportunities in this landscape, with financial means playing a role in overcoming challenges. Further research is needed on the strategies musicians use to work with microsongs and the long-term impact of platformification on the music industry.

Article received: August 25, 2024
Article accepted: November 12, 2024
Scholarly analysis/debate

Reviews

Bakir Memišević*
University of Sarajevo – Academy of Music
Sarajevo, Bosnia and Herzegovina

14TH INTERNATIONAL SYMPOSIUM "MUSIC IN SOCIETY", SARAJEVO, OCTOBER 24–26, 2024.

Two years have passed since the 13th edition of the Symposium, which was marked by the 25th jubilee of The Musicological Society of the Federation of Bosnia and Herzegovina. This year, as the time arrived for the newest edition, the organizers once again faced the challenge of making the latest 14th edition as memorable and impactful as ever.

Figure 1. Symposium poster.

The Musicological Society of the Federation of Bosnia and Herzegovina remains one of the key institutions in musicology, playing a vital role in all areas of music science, a fact underscored by the continued success of the International Symposium "Music in Society". This enduring legacy is also reflected in the Symposium's central theme, which highlights its commitment to a multidimensional, diverse,

* Author's contact information: monynok@gmail.com.

and transdisciplinary approach to contemporary musicology, both within Bosnia and Herzegovina and internationally.

The newest edition, held from October 24 to 26, was organized in collaboration with the University of Sarajevo – Academy of Music, the Gazi Husrev-Bey's Library, the Bosnian Cultural Center and the National Museum of Bosnia and Herzegovina. It was supported by the Sarajevo Canton's Ministry of Science, Higher Education and Youth and the Ministry of Culture and Sports, the Federal Ministry of Science and Education, the Foundation for Musical, Performing and Visual Arts, the Publishing Foundation and lastly AMUS – Association of Composers – Music Authors.

This three-day edition of the Symposium brought together leading experts in musicology, ethnomusicology, music theory, music pedagogy, and related scientific and artistic fields from as many as 12 countries. Over the course of 13 sessions, they shared the latest research findings. The event also featured a diverse program, including two insightful keynote lectures, a pre-symposium lecture for musicology students, two concerts, a workshop, a panel discussion, and an exhibition. The main activities were held in the conference rooms of the Gazi Husrev-Bey's Library. The Bosnian Cultural Center hosted one of the concerts, while the National Museum of Bosnia and Herzegovina hosted the exhibition.

As a prelude to the official program, on October 23rd the Music Academy hosted a captivating lecture titled *East-West Transfers in Popular Music: Three Case Studies from the Yugoslav Disco Repertoire* by Juri Giannini. The official program of the Symposium started with the first session on the October 24th. The sessions were thematically divided into those focused on music theory, music pedagogy, musicology, and ethnomusicology. On the first day, two sessions on musicology and music pedagogy took place, and one focused on music theory. The first musicology session was moderated by Fatima Hadžić, featuring four lecturers: from Stanislav Tuksar, Petra Babić, Marija Benić Zovko, and Lucija Konfic. The lectures in this session were somewhat based on musicological research related to specific phenomena in Croatian music history, touching on topics such as piano quadrilles, the Zagreb magazine *Vienac,* Croatian professional music terminology, and even military music, specifically from the Habsburg era. As for the first music pedagogy session, Nermin Ploskić talked about *Integration and Implementation of Musical Creative Activities in Primary*

School Music Education, after which Valida Akšamija-Tvrtković presented a study that addresses the issue of *Inclusion in the Teaching of Music Culture in Primary Schools.* Also, Tihana Škojo and Dunja Keža presented the results of a qualitative study conducted with the aim of determining the opinions of solfeggio and instrument teachers in primary music school regarding the teaching challenges they face when working with Generation Alpha students. The last lecture of the session, conducted by Ivana Hadžihasanović, showed the methods of work used in the *Silent Dance* educational program, the research results, and the new needs that have arisen from this particular program. The second musicology session consisted of three studies. The one lectured by Tamara Jurkić Sviben followed the reception of the Lujo Šafranek Kavić's Opera *Hasanaginica* in the Croatian press from 1924 to 1931. Ružica Ješić's lecture offered a captivating case study on Darius Milhaud, highlighting a fresh approach to musicology with an interdisciplinary perspective that blends sociology, culture, politics, and music history. The third presentation, lectured by Lada Duraković, followed ways of concatenating the intentions of educational policy makers with the capabilities of teachers and students in early socialism. On the first day of the Symposium, Richard Cangro held a workshop titled *Teaching Strategies for Discovering Meaning in Music in School-aged Students*, which aimed to offer practical strategies for providing powerful language arts experiences for students. Later on, the first music theory session was moderated by Amra Bosnić. The four lectures of the session opened up questions concerning the *Plautus*, an ancient metric system, the science of harmony, as well as Stevan Mokranjac's *Rukoveti* in the context of different development methods of musical analysis and different perspectives of associative tonality. The last session of the Symposium's first day was the second music pedagogy session where *Application of Musical and Non-musical Activities in Working with Children, Perspectives on Creativity and Intuitive Music Teaching and Learning* and *Family Musicking* were discussed.

After the sessions, the ceremonial part of the first day of the Symposium followed, which included the official opening of the Symposium. During the opening, the importance of the Academy of Music Sarajevo, the Musicological Society of the Federation of Bosnia and Herzegovina, and the Symposium itself was discussed by the Dean of the Academy of Music, Ališer Sijarić, and the President of the Musicological Society, Amila Ramović. After the official inauguration of the 14th edition of the Symposium, the first keynote lecture

titled *Ethnomusicology in Wartime: A View from Bosnia and Herzegovina* was presented by Jasmina Talam. In her presentation, Talam discussed the research and social engagement of ethnomusicologists during the war, as well as post-war research on the musical practices of refugees from Bosnia and Herzegovina. She especially referred to the research she conducted in Sweden in 2018 and 2019. After the first keynote lecture, the *Concert of the Traditional Music from Bosnia and Herzegovina* by Ensemble *Etnoakademik* followed.

Figure 2. "Music in Society", opening ceremony © Vanja Čerimagić.

On the second day, six more sessions were held, as well as the second keynote lecture by Leon Stefanija. In his lecture titled *Musical Archetypes: Intertones of Music Research in the Internet Age*, Stefanija mainly provided a historical overview of the stylistic analysis in musicology as a concept that has entered narratives about music, particularly in the modern period, focusing on genres and national styles. As for the sessions, the first one of the day was the second music theory session, moderated by Silvana Jakupović Bečei. The lectures at this session focused on the compositional work in Bosnia and Herzegovina. Maja

Baralić-Materne and Bakir Memišević recalled the pioneering steps in the field of electroacoustic music in Bosnia and Herzegovina through the work of the composer Rada Nuić, Snježana Đukić-Čamur talked about the influence of the Polish compositional school on the work of Vojin Komadina, and Amra Bosnić and Naida Hukić discussed the formal and harmonic aspects of Milan Prebanda's solo songs.

Figure 3. Leon Stefanija, keynote lecture © Vanja Čerimagić.

On the second day, the first ethnomusicology session was also held and Maja Radivojević had the pleasure of moderating it. In this session, Damir Imamović explored the role of the *makam hijaz* in the traditional Bosnian song, *sevdalinka,* and its application in the modern tuning systems of tempered instruments such as the accordion, piano, guitar and bass. In their presentation, Antoaneta Radočaj-Jerković, Zdravko Drenjančević and Magdalena Mišković examined nine sound recordings of songs from Bosanska Posavina dedicated to the Virgin Mary. They analyzed the structure of the songs, the context of their origin, and their significance in the faith practices of the local Catholic population. The

third session related to music pedagogy followed. For this occasion, Biljana Veskovska discussed the impact of political system changes in Macedonia, while Merima Čaušević and Amer Osmić addressed the role of art education in the development of contemporary Bosnian society. Alma Ferović-Fazlić examined the significance of music education for actors, and Aleksandra Pavićević focused on children's musical events and their value in children's education. Afterward, an exciting musicology session took place, featuring talks on the historical views of specific musical instances in Yugoslavia. Among the topics were: a booklet edited by composer Bruno Bjelinski, which included sketches and event caricature; the debut performance of the Yugoslav composers at the Warsaw Autumn Festival; and the music collections titled *Popular Compositions,* published by *Prosveta.* The next session focused on a variety of cultural studies presented of the lecturers, covering topics such as the music of minorities, the Vlachs in Vienna, and the Bosniaks in the Istrian region, as well as the work of Ahmed Taib. Later on, Senad Kazić moderated a session where Denis Vasilj discussed Elly Bašić's impact on music pedagogy at the Academy of Music in Sarajevo, and Martina Mičija covered Sofija Deželić's contribution to piano and music education in Sarajevo. Ena Plakalo clarified the issue of terminological determinants of cognitive processes in solfeggio.

Following the last session of the day, a panel was held where Jasmina Talam, Naida Hukić, Valida Akšamija-Tvrtković and Nermin Ploskić presented their research on the project *Music for Children and Youth in Bosnia and Herzegovina in the period from 1945 to 1991.* After the panel, all present had the opportunity to attend the book launch of *The Life and Work of Elly Bašić,* written by Denis Vasilj. As a conclusion to the second day, a concert entitled *Towards the 70th anniversary of the Academy of Music of the University of Sarajevo: A selection from the oeuvre of the MAS UNSA composition professors* took place at the Bosnian Cultural Center.

On the third, and last, day two more sessions took place, both of which were based on musicological research. The first session examined the history and impact of the Sarajevo Chamber Music Festival. It highlighted how musicological research can be applied in smaller environments using Sena Jurinac's example at the Local Museum in Travnik, and examined how classical piano compositions can be reinterpreted in pop music. At the second session, moderated by Amila Ramović, speakers Rijad Kaniža, Aida Adžović, Bojana Radovanović, and

Vesna Andree-Zaimović had the opportunity to present topics ranging from a retrospective overview of the development of *SONEMUS*, the importance of editorial work, streaming platforms in the context of domestic music, to the positioning of Conlon Nancarrow within the broader discourse on technological determinism.

The last event of the Symposium was the guided exhibition *Počimalja*, which took place at the National Museum of Bosnia and Herzegovina and featured Lala Raščić's works, with a focus on her interdisciplinary research of regional, women's, folklore practice – *tepsijanje.* After the exhibition Raščić talked about her process and motives in a dialogue with Damir Imamović.

We can conclude that the 14th International Symposium "Music in Society" was a successful gathering that brought together experts to explore various aspects of music. Through engaging talks and performances, it fostered thoughtful discussions and sparked new ideas across various areas of musicology and music in general. The event highlighted the continued importance of music in both academic and everyday life, leaving a lasting impression on all who attended.

Article received: December 1, 2024
Article accepted: Decemebr 10, 2024

Aida Adžović*
Sarajevo, Bosnia and Herzegovina

REFLECTIONS OF THE SONEMUS FEST 2024: RESISTING WARIATIONS

In the midst of an increasingly globally unstable socio-political environment, and the many (bureaucratic) challenges faced by the music community, The Society of New Music – SONEMUS is expanding its activities with a relentless dedication to presenting the new sound experiences guided by the belief that art remains one of the few areas of human activity where genuine communication and the pursuit of truth are still ideals worth striving for. Corresponding not only with current musical trends but also with the turbulent nature of the *Zeitgeist*, SONEMUS Fest 2024 took

* Author's contact information: adzovicaida@gmail.com.

place in Sarajevo in an extended format from October 31 to December 9, comprising three concerts and masterclasses, bringing together local and internationally acclaimed artists, devoted friends of the festival, and emerging musicians, who performed Bosnian and world premieres of representative contemporary works, representing the diversity of musical ideas of our time.

Referring to the destructive effects of the dominant political power and the misuse of technology, which have led to widespread anxiety, intellectual apathy, dulled empathy, and a diminished ability to hear the Other (and/or the different), in a spirit of resistance SONEMUS Fest 2024 was thematically framed under the program title *Wartiations*. This wordplay juxtaposes the concept of musical variation, as a fundamental expression of rationalism and Enlightenment in music, with "wariations" that allude to war and conflict [an amalgamation: war + (var)iation].

***

No to Wariations, Welcome Variations!

***

In a notion of a musical monologue, the opening concert titled *Soliloquies* took place on October 31 at the Academy of Music – University of Sarajevo. According to the thematic concept, the repertoire featured a series of compositions for solo instruments. Saxophonist Rijad Šarić started with Karlheinz Stockhausen's *In Freundschaft* (1977), where the musical development of the piece, based on the theme-melody formula and its mirror shape, was enhanced by the soloist's movements, physically expressing the process of the composition. After evoking the delicate experimental sonic weaving of the piece *Wolves and Winds* for bassoon and tape (2021) by Estonian composer Elo Masing, bassoonist James Aylward performed *Axis Mundi* (2012/13) by Liza Lim, exploring the changing "behaviors" of the bassoon, reflected through sonic "knots" of the series of irregular scales and microtonal intervals, the richness of timbres, and complex multiphonics. The program included the challenging composition *Dah* [Breath, 2012] for bass flute by the renowned Bosnian composer Ališer Sijarić, which explores the patterns of breathing rhythm and their ability to convey emotional states on the flute. During the performance, flutist and composer Hanan Hadžajlić demonstrated the expanded interpretative capacities and reinvention

of the flute techniques and expression. The concert concluded with David Lang's *catchy* work *Press Release* for bass clarinet (1991), characterized by its pop mood, based on rhythmic shifts and contrast between a high melody and a low, driving funk bass line. The clarinetist Armin Smriko brought their sense of "groove" to the stage.

Figure 1. Hanan Hadžajlić © Aida Adžović.

The focal point of the second festival concert, held on November 1 in the Gallery of the Bosnian Cultural Center, was (primarly) the musical exploration of the sound micro-qualities, performed by the acclaimed Ensemble for New Music Tallinn (ENMT), comprising six exceptional musicians: Karolina Leedo (flute), Mirjam Avango (clarinet), Toomas Hendrik Ellervee (violin), Talvi Nurgamaa (viola), Paul-Gunnar Loorand (cello) and Talvi Hunt (piano), under the direction of Arash Yazdani, an Iranian composer and conductor based in Tallinn, with the "guest member", musicologist Rijad Kaniža, responsible for the live sound mixing of all the festival concerts.

Figure 2. Ensemble for New Music Tallinn © Vanja Čerimagić.

On this occasion, the Ensemble for New Music Tallinn premiered the piece *Ghetto 2024:* دومص for ensemble and tape composed by Hanan Hadžajlić, a Bosnian composer with an international career, as a commission for the SONEMUS Fest. Connecting the aesthetics of contemporary classical music with EDM, trap, and musical elements from the Middle East and North Africa, this composition follows the transformation of individual marginalized voices into a collective expression of protest through intercultural musical dialogue, reflecting how immigrant subcultures have transformed the global music scene despite marginalization. Using the Arabic term دومص [ṣumūd; perseverance/resistance/steadfastness/struggle] as part of the title, *Ghetto 2024:* دومص resonates with the decades-long suffering of the Palestinian people. After its world premiere in Sarajevo, the Ensemble for New Music Tallinn performed this piece two weeks later in Berlin as part of the Sound Plasma Festival program.

The repertoire featured Liisa Hõbepappel's piece *The Jangling Lightness of Solace* for ensemble (2022), which reflects a bright and mosaic-like sound with intricate details that come together in an interwoven web of meanings. During the performance of Sonja Mutić's piece *Resound II* for ensemble and fixed media (2021), listeners were immersed in an ambiental landscape of the rich and subtle world of harmonics, shifting from acoustic instruments to electronics, within

their dynamic sonic interiors. After a nuanced aural meditation, Karolina Leedo (flute), Paul-Gunnar Loorand (cello) and Talvi Hunt (piano), as a cohesive musical trio, performed Ališer Sijarić's *Drei Farben* [Three Colors] for flute, cello and piano (1999), dealing with the "fluid mechanics" of the piece, and creating a sonorous kaleidoscope of the unusual density and expressiveness built on structural processes derived from the overtone sequence, translated into the rhythmic divisions.

In the concluding piece by Arash Yazdani, titled *Dimension II, Destruction* for sextet and pre-recorded instruments (2012), the composer adopts a direct approach to the sound as a lively source of energy, treating it not only as the "material" of music but the music itself. By utilizing interference beatings and summation frequencies, and the constant shifting of their net, Yazdani creates a microtonal environment of expanding intensity and loudness, that results in an intense, occasionally unpleasant, and physically painful but powerful ecstatic auditory experience. The "sediment" of the frequencies extremely close in pitch can be felt in two ways: as the (transcendent) destruction of sound or as the sound of destruction.

The concert *Monochromophonia*, held on December 9 at the Academy of Music – University of Sarajevo in two program blocks, featured the Sarajevo Saxophone Quartet, consisting of Rijad Šarić (soprano and alto saxophone), Lev Pupis (alto saxophone), Mirza Sijerčić (tenor and alto saxophone), and Zoja Vuković (baritone saxophone), an ensemble recognized as an emerging "driving force" in the interpretation of contemporary music within the Bosnian context.

During the first section of the program, Rijad Šarić and Mirza Sijerčić performed *Dan za dnem* [Day After Day, 2003], a composition for two alto saxophones by Slovenian composer Urška Pompe, inspired by the feeling of helplessness in response to unpleasant events reported in daily newspapers. It is characterized by a musical dialogue between the two instruments, featuring a line of multiphonics alongside a layered line utilizing slap and *flatterzunge* techniques, that evolve through quarter-tone harmony and transform into a speech-like rhythm in the end. The quartet delivered an impressive performance of the *Saxophonquartett* (2014) by the prominent Austrian composer Georg Friedrich Haas, which relies on microtonal juxtapositions and interference effects that emerged from twelfth-tone intervals with the shading effect that creates a feeling of the continuous *glissando*.

Complementing the aural ambient of the previous section, the highlight of the program was the premiere of *Monochromophonia* for saxophone quartet and live electronics (2024), a microtonal composition by Ališer Sijarić. In search of the sonorous equivalent of photon motion and the visual imagery of a glittering light beam reflection, the interference beatings of the interaction of two saxophone quartets – one positioned at the center of the hall, while the other reproduced as a layer on the tape with speakers placed at the edges – created an immerse sonic space of endless microtonal monochromo(pho)nic weaving.

Figure 3. Monochromophonia concert © Vanja Čerimagić.

***

What does the future hold?

***

The Power of Children's Musical Creativity: The First Edition of the SONEMUS New Generation Festival

In alignment with one of its crucial missions – to foster creativity among young musicians and enhance their development in contemporary art music – the Society of New Music – SONEMUS has established a youth festival called SONEMUS New Generation. The first edition, held on December 14 and 15, 2024, at the University of Sarajevo – Academy of Music, brought together primary and secondary music school students, offering them a unique platform to explore innovative musical ideas.

The two-day program, conducted by teachers from the Academy of Music, as well as members of the SONEMUS Ensemble and Impro Ensemble MAS, included an interactive multidisciplinary workshop, divided into four thematic units: *Extended Techniques and Improvised Instrumentation* (led by violinists Sara Barbara Bilela and Alex Mateescu, flutist and composer Hanan Hadžajlić, saxophonists Rijad Šarić and Zoja Vuković, and pianist Mirza Gološ); *Free Improvisation* (led by composer Hanan Hadžajlić); *Introduction to Composition: From Musical Idea to New Piece* (led by composer and professor Ališer Sijarić); and *World of Electronic Music* (led by musicologist Rijad Kaniža).

Figure 4. SONEMUS New Generation © Vanja Čerimagić.

After exploring various aspects of composing and performing contemporary improvised music in an accessible and comprehensive way, the workshop participants, including Selver Durić (clarinet), Jan Zeherović (saxophone), Umihana Uma Halilović (violin), Tara Zovko (violin), Erliha Mekić (violin), Lana Avdović (double bass), Timur Sokolović (accordion), Omar Hukić (piano), and Sofian Sijarić (piano), developed the final concert program under the mentorship of Hanan Hadžajlić, the artistic director of the festival SONEMUS New Generation. On December 15, they performed as the SONEMUS New Generation Ensemble at the University of Sarajevo – Academy of Music, alongside members of the SONEMUS Ensemble and the Impro Ensemble MAS.

The concert's first part featured compositions based on graphic notation, stemming from the workshop *Introduction to Composition: From Musical Idea to New Piece*. Violinist Alex Mateescu, a member of the Impro Ensemble MAS, played a graphic composition for violin by ten-year-old Tara Zovko. Following this enchanting performance, the concert's dynamics heightened with a piece that was collaboratively composed by the SONEMUS New Generation Ensemble members.

On this occasion, the participants presented their works developed during the workshop *World of Electronic Music*. Erliha Mekić and Jan Zeherović showcased their piece titled VCOs, followed by the presentation of the concept *Granular Microphonia*, a short electroacoustic work created in real-time. After the pianists Sofian Sijarić and Omar Hukić gave musical patterns as an input recorded by Tara Zovko, these two samples were used as the initial compositional material and processed with different processors by Timur Sokolović (delay processor) and Selver Durić (granulator).

The first movement of the final *Impro Concept in G* (I & II) emerged from the workshop *Free Improvisation* and was enthusiastically performed by Selver Durić (clarinet), Jan Zeherović (saxophone), Umihana Uma Halilović (violin), Tara Zovko (violin), Erliha Mekić (violin), Lana Avdović (double bass), Timur Sokolović (accordion), and Omar Hukić (piano), all impressively conducted by Sofian Sijarić. During the second movement, the talented and promising members of the SONEMUS New Generation Ensemble shared the stage with their mentors Hanan Hadžajlić (bass flute), Rijad Šarić (saxophone), Zoja Vuković (saxophone), Sara Barbara Bilela (violin), Alex Mateescu (violin), Mirza Golош (piano), and Rijad Kaniža (electronics).

During the concert, one of the main ideas behind the overall project was highlighted in a speech by Ališer Sijarić, a composer, dean of the Academy of Music – University of Sarajevo, and the founder and artistic director of the Society of New Music – SONEMUS, who emphasized the importance of musical improvisation in the educational process for children from an early age, and underlined free creativity as a crucial factor in developing their overall cognitive abilities. Creating space for youth voices and growth is essential for tracing new musical paths rooted in genuine energy and an open-minded perspective. The new generation has the potential to break the "hermetic aureole" of the institutional narrative on music (occasionally isolated from reality) and overcome the emptiness of the repetition of those strict outdated patterns.

Let's switch positions! Children, the podium is yours!

Figure 5. SONEMUS New Generation © Vanja Čerimagić.

Article received: December 16, 2024
Article accepted: December 18, 2024

Contributors' Biographies

John Aulich is a composer and creative technologist from Manchester, England. His music has been performed internationally, including by ELISION Ensemble and International Contemporary Ensemble. John earned his PhD at the University at Buffalo in New York in 2022 under the auspices of Prof. David Felder. Since his return to the UK, he has taken part in LSO Soundhub, Impuls Festival in Graz and a variety of small collaborations. His solo percussion piece, six doors of the invisible, was shortlisted by Sound and Music for the British section of ISCM World Music Days 2023. Alongside his freelance work, John teaches composition part-time at the University of Edinburgh.

Biljana Leković, Ph.D., musicologist, Assistant Professor at the Department of Musicology, Faculty of Music in Belgrade. She is also a Lecturer at the Interdisciplinary master studies of the Department of Theory of Arts and Media, University of Arts in Belgrade. She is a President of the Centre for Popular Music Research. Her fields of interest include contemporary music, new media practices, sound art, sound studies, and popular music. She is the author of two books: *Modernist Project of Pierre Schaeffer – From Radiophony Analysis to Musical Research* (2011) and *Sound Art/Zvukovna umetnost: Musicological Perspective – Theories* (2019).

Sanela Nikolić with a Ph.D. in Theory of Arts and Media and a B.A. in Musicology is affiliated as an Associate Professor of Applied Aesthetics at the Faculty of Music, University of Arts in Belgrade, Serbia, where she holds courses at Bachelor, Master, and Doctoral studies and coordinates Applied Research of Music (PRIMA) MA study program. She is the Managing Editor of an academic journal *AM Journal of Art and Media Studies*. Her fields of interest include avant-garde art schools and practices, applied aesthetics as a critical history of the humanities, interdisciplinarity and transdisciplinarity in the humanities, and digital humanities.

Peter W Stones is a music teacher, doctoral student at the University of Derby, performing trombonist and published composer. He began studying at Birmingham Conservatoire, completing his BMus (Hons) in 2011, before completing a PGCE at Birmingham City University in 2013. Peter studied a MSc. in

Educational Research at the University of Exter and has been working on his EdD since 2022. His primary research interests are: instrumental music education, community studies, decolonised curriculum and anthropology of creativity. Peter has presented recently at *Foucault: 40 years after* conference (University of Derby) and *Supplementary Education in Theory, Policy & Practice* conference (Philosophy of Education Society of Great Britain) as well as having several papers prepared to be printed in academic journals.

Guidelines for Authors

Guidelines for authors

Authors must submit original, unpublished articles.

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, 178h 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.

Manuscripts can be equipped with photos, illustrations, drawings, and tables. These should be of good quality (resolution higher than 300 dpi), in .jpg or .tiff formats, and submitted as files separate from the text. All visual materials must have permission for publishing from the author, photographer or the respected owner of the rights.

Word count:

- Original scholarly papers (Main Theme and Beyond the Main Theme sections) – 4000-8000 words
- Book, conference, and festival reviews – 1000-1500 words
- Interviews – 1000-2000 words

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’.