Univerza *v Ljubljani*
Filozofska fakulteta

MUZIKOLOŠKI ZBORNIK

MUSICOLOGICAL ANNUAL

LVIII / 2

ZVEZEK / VOLUME

LJUBLJANA 2022

Uredništvo • Editorial address
Oddelek za muzikologijo
Filozofska fakulteta
Aškerčeva 2, SI-1000 Ljubljana, Slovenija
e-mail: muzikoloski.zbornik@ff.uni-lj.si
https://journals.uni-lj.si/MuzikoloskiZbornik

Lektorici za angleški jezik • English proofreading
Maia Juvanc, Christina Thaler

Lektorica za slovenski jezik • Slovene proofreading
Ana Kodelja

Prevajanje • Translations
Maia Juvanc, Christina Thaler

Cena posamezne številke • Single issue price
10 €

Letna naročnina • Annual subscription
20 €

Založila • Published by
Založba Univerze v Ljubljani

Za založbo • For the publisher
Gregor Majdič, rektor Univerze v Ljubljani

Izdaja • Issued by
Znanstvena založba Filozofske fakultete, Oddelek za muzikologijo Filozofske fakultete Univerze v Ljubljani

Za izdajatelja • For the issuer
Mojca Schlamberger Brezar, dekanja Filozofske fakultete Univerze v Ljubljani

Tisk • Printed by
Birografika Bori d. o. o., Ljubljana

Naklada 150 izvodov • Printed in 150 copies

Rokopise, publikacije za recenzije, korespondenco in naročila pošljite na naslov izdajatelja. Prispevki naj bodo opremljeni s kratkim povzetkom (200–300 besed), izvlečkom (do 50 besed), ključnimi besedami in kratkimi podatki o avtorju. Nenaročenih rokopisov ne vračamo. / *Manuscripts, publications for review, correspondence and annual subscription rates should be sent to the editorial address. Contributions should include a short summary (200–300 words), an abstract (not more than 50 words), keywords and a short biographical note on the author. Unsolicited manuscripts are not returned.*

Izdajo zbornika je omogočila Javna Agencija za Raziskovalno dejavnost Republike Slovenije. / *With the support of the Slovenian Research Agency.*

Vsebina • Contents

Predgovor

V vročičnem vzponu interdisciplinarnih prizadevanj se znanstveni zborniki, revije in konference, pa tudi projektne in ostale institucionalne tvorbe čedalje pogosteje odmikajo od izrecne disciplinarne zamejitve. Svoj prostor čedalje pogosteje odpirajo projektom večdisciplinarnih raziskovalnih skupin, a kljub temu »tisti, ki delujejo v eni disciplini, ne vedo vselej, kaj se dogaja v nekaterih drugih.«[1] Tokratna številka *Muzikološkega zbornika* je namenjena osvetlitvi povezovalnih aspiracij sodobnega muzikološkega raziskovanja, zlasti dejavnosti na področju računalniško podprtega raziskovanja glasbe.

Proučevanje glasbe se izvaja v različnih domenah. V povezavi s kognitivnimi študijami se medij glasbe uporablja kot stranski ali osrednji pojem za raziskovanje kognitivnih in emocionalnih procesov, medtem ko mnoge družboslovne študije glasbo obravnavajo kot sociokulturni, socioekonomski ali povsem zgodovinski pojav. Dobršen del muzikoloških dejavnosti glasbo v veliki meri obravnava kot osrediščeno strukturo, osmišljeno že s samo notranjo ureditvijo notacijsko simbolne (ali zvočne) materije, brez vključitve zunajglasbenih fenomenov. Poleg predhodno izdelanih glasbenoteoretičnih izhodišč (kamor sodijo zlasti različni pristopi in teorije glasbenih analiz) se v analizi glasbe vedno pogosteje uveljavljajo tudi metodološke predpostavke akustike, matematike, ikonografije in drugih ved. Četudi je teoretska osnova v tovrstnih pristopih praviloma ukrojena po meri posameznega raziskovalnega primera, se proučevalci glasbe s svojo metodologijo dandanes vse pogosteje zatekajo k uporabi računalniških orodij.

To, kar so bili sprva eksperimenti tehnoloških zmožnosti, so na področju računalniško podprtega raziskovanja glasbe sčasoma prerasli v povsem novo institucionalno *disciplino* ali, še bolje, *skupino poddisciplin* pridobivanja podatkov iz glasbe (MIR).[2] Raziskovalci tega gibanja so povečini naravoslovni znanstveniki, ki so se z željo po analizi glasbe organizirali okoli dveh vodilnih skupin: ISMIR in SMC.[3] Ob neobvladljivi poplavi podatkov sta jim večdisciplinarna metodologija in aplikativni smoter njihovih projektov odprla vrata tako v širše naravoslovno kot tudi družboslovno in humanistično polje,

1 Peter Burke, *Kulturna hibridnost*, prev. Polona Glavan (Ljubljan: Studia humanitatis, 2020), 12.

2 MIR = *Music Information Retrieval*.

3 Čeprav sta ISMIR (International Society for Music Information Retrieval – Mednarodna skupnost za pridobivanje podatkov iz glasbe, https://ismir.net/) in SMC (Sound and Music Computing (network) – Računalniška mreža za zvok in glasbo), https://smcnetwork.org/) še vedno največji skupnosti, pa MIR mreža vsakoletno pridobi vsaj en nov (začasni ali stalni) prostor (tj. konferenco, raziskovalno ekipo, zbornik, revijo itn.), v katerem lahko udejanja delček svojega poslanstva.

glasbenoinformacijski metodološki postopki pa so se začeli pojavljati tudi v prenekaterem študijskem kurikulumu. S širitvijo področja postaja še pred leti ožje zastavljena domena področja MIR vedno bolj heterogena, vseeno pa imajo skupine, kot je ISMIR (sicer nezapisane) nišne preference, zlasti ko gre za vprašanja metodologij.[4] Najrazličnejše računalniške metode za proučevanje, poučevanje ali ustvarjanje glasbe se danes pojavljajo tudi drugod, na primer v prispevkih za EMR,[5] SysMus,[6] IAML[7] in FMA,[8] nenazadnje pa tudi v pričujoči številki *Muzikološkega zbornika*.

Raznovrstna uporaba metodologij postaja praksa mnogoterih raziskovalnih skupin in posameznikov; tisti, zadržani do nastajajočega »disciplinarnega kaosa,« pa na svojih toriščih vztrajajo pri že preverjenih metodoloških prijemih. Na razne zadržke, ki spremljajo nekoherentno komunikacijo med disciplinami, je opozarjalo že mnogo avtorjev.[9] Namesto celostnega pregleda partikularnih izzivov bomo na tem mestu opozorili na tri večje problemske skupine: *institucionalno organiziranost*, *tehnološkointerakcijsko* in *tehnološkometodološko* plat računalniško podprtega raziskovanja glasbe.

Prva zavora razvoja in/ali preobrazbe institucionalne ureditve, tako na področju glasbenih oziroma muzikoloških smernic kot tudi znotraj ostalih področij, izvira iz kategorične zasidranosti v kalup akademske ureditve. Nekateri raziskovalci so že opozorili,[10] da se ta udejanja vse od trdne, a nikakor samoumevne disciplinarne razporeditve (npr. delitev na muzikologijo, sociologijo, psihologijo itd.), do pomanjkljivosti bolonjske ureditve visokošolskega izobraževalnega sistema in zlasti načina točkovanja produktivnosti raziskovalca, ki namesto t. i. timskega dela vzpodbuja (nesmiselno) tekmovalnost med posamezniki. Vse našteto pogosto otežuje pogoje prostega preoblikovanja ne le formalnega, temveč tudi vsebinskega dela akademskega dela in kurikuluma, ter hkrati precej omejuje aktiven pretok znanja med disciplinami in njihovimi institucionalnimi nosilci. V kolikor uspe priti do sodelovanja, pa se mora vsaj ena izmed disciplin podrediti sistemu tistega, ki je glavni nosilec razpisanih

4 Trende lahko zaznamo že iz tematskega nabora letno sprejetih prispevkov na konferenco ISMIR. V zadnjih nekaj letih so to gotovo tisti s področji nevronskih mrež in globokega učenja nevronske mreže in globoko učenje.

5 »Empirical Musicology Review,« dostop novembra 2022, https://emusicology.org/.

6 »Systematic Musicology Conference,« dostop novembra 2022, https://www.sysmus22.ugent.be/.

7 »International Association of Music Libraries,« dostop novembra 2022, https://www.iaml.info/.

8 »Folk Music Analysis,« dostop novembra 2022, https://www.folkmusicanalysis.org/.

9 Gl. na primer Stephen Downie J., »Music Information Retrieval,« *Annual Review of Information Science and Technology* 37 (2003): 295–340; Turek Dahling in dr., ur., *Musicology (Re-)Mapped: Discussion Paper* (Strasbourg: European Science Foundation, 2012); Frans Wiering in Emmanouil Benetos, »Digital Musicology and MIR: Papers, Projects and Challenges,« v *International Society for Music Information Retrieval Conference* (2013); Laurent Pugin, »The Challenge of Data in Digital Musicology,« *Frontiers in Digital Humanities 2* (2015): 4; in drugi.

10 Avtorska skupina, *Kaj po univerzi?* (Ljubljana: Založba /*cf, 2019).

dejavnosti (tj., inštitut, razpis (npr. ARRS), laboratorij, univerza, revija ali konferenca in tako naprej).[11]

Drugič, četudi bi želeli verjeti, da strukturne ureditve akademskega sveta v večini podpirajo interdisciplinarnost, se pri povezovanju muzikologije in glasbene informatike (kot tudi pri drugih hibridih) zaplete tudi pri vprašanju metodologije. V procesu epohalnih tehnoloških sprememb nikoli ne prihaja do nenadne zamenjave stare tehnologije z novo, temveč so spremembe medija vselej rezultat tranzicijskega procesa. Ta v uporabniško izkušnjo umešča že znane podobe pripomočkov,[12] ki v procesu računalniškega zapisovanja namesto izvajanja dejanskih funkcij uporabniku omogočajo enostavnejše prehajanje iz enega na drug, v svojem jedru za uporabnika tudi povsem nerazumljiv medij. Za razliko od prostočasne uporabe digitalnih pripomočkov je računalniška analiza glasbe oziroma njeno digitalno raziskovanje doživelo veliko manj postopen preskok. Večji del računalniško-analitičnih (glasbenih) orodij v ozadju (aplikacije, vmesniki itn.) ali celo v ospredju (neposredno srečanje s kodami algoritmov, ki izvajajo določen proces brez vizualno prijetnejših vmesnikov ali aplikacij) poganja v mrežo algoritmov spletene matematične operacije, ki imajo le malo skupnega z dejanskim objektom ali procesom analize. Nenadni preskok iz fizičnega sveta v svet računalniških kod je muzikologom z izostankom tranzicijskega momenta otežil proces vključevanja, saj jih abstraktni algoritmi in njihovi produkti (na primer niz »matematičnih« znakov, ki opisujejo glasbene pojave) ne nagovorijo na razumljiv način. Glavnini raziskovalcev, ki ji računalniških procesov mehanskega učenja, nevronskih mrež, pa tudi enostavnejših algoritmičnih struktur ne uspe usvojiti, meglena predstava o metodoloških postopkih tudi onemogoči uporabo pridobljenih rezultatov tovrstne analize. Če takšna zameglitev ne ustavi povprečnega uporabnika algoritemsko vodenega postopka analize (kot to velja denimo za zajemanje avto-retuširanih posnetkov s pametnimi telefoni ali za še aktualnejšo prakso prostočasnega ustvarjanja

11 To se kaže na primer pri prijavljanju na razpise, ki so načeloma urejeni po ustaljenih merilih ene discipline. Prav tako je verjetnost za objavo prispevka v sklopu revije drugih disciplin veliko večja takrat, ko je prispevek strukturno in vsebinsko prilagojen prevladujočim formatom tiste druge discipline. Če pogledam konkretno: ko muzikolog objavi prispevek na konferenci ISMIR, mora ta upoštevati vsaj: 1. strukturo članka (šest dvostolpičnih strani, urejenih v LaTex predlogi, drugačen tip navajanja virov, vnaprej določena oblika sosledij poglavij (na primer, uvod, pregled relevantne literature, metodologija, študija primera ali preveritev podatkov, zaključek)) in 2. vsebinsko primernost, za katero se mora izreči ob oddaji prispevka (v kolikor ta ni zastopana, mora izbrati naslednjo najbližjo tematsko skupino, pri čemer tvega vsebinsko neustreznost in s tem zavrnitev prispevka v objavo). 3. Nato je tu še nabor urednikov in recenzentov z (zgoraj omenjenimi) tematskimi preferencami, ki so le redko povsem kompatibilne z muzikološko dejavnostjo. Z vsakim odstopanjem tako muzikološki prispevek tvega svojo izključitev iz procesa, kar kaže na to, da le stežka govorimo o ugodnih pogojih za meddisciplinarno sodelovanje.

12 Tako na primer delujejo prenos podobe čopiča in »platna« v digitalna slikarska okolja, ohranitev notnega črtovja in celo mimika teksture papirja v programih za digitalno zapisovanje simbolne glasbe (MuseScore, Sibelius, Finale, itd.).

ikonografskih podob z jezikovnimi označevalci),[13] je za raziskovalno delo muzikologa vpletenost v kolesje algoritmov nepogrešljiva. Nuja po vključenosti pri slednjem največkrat izvira iz *funkcionalnih* razlogov,[14] medtem ko je soudeležba v vsakdanji, prostočasni digitalni uporabi večinoma naddoločena z željo po svobodnem izbiranju končne usode naše interakcije,[15] zaradi česar popolno razumevanje ozadja, dokler se počutimo vključene, ni relevantno.

Tretjič, računalniške metode ostajajo na določenih področij – kot so analiza vertikalnih glasbenih struktur v odnosu s horizontalnimi, pomanjkljiva strategija za raziskovanje nezahodnih ali netemperiranih zapisov (in posnetkov) glasbe itn. – zelo omejene. Prav tako je z neenakomerno porazdelitvijo sredstev digitalizacija glasbenega gradiva v zahodnih institucijah neproporcionalno pogostejša, medtem ko ostajajo glasbene tradicije z manjšimi pokritji tako fizično kot metodološko manj zastopane v raziskovalnem prostoru. Zbiranje in dostopnost raznolikega glasbenega materiala (p)ostaja odvisna od usmeritve finančnih in infrastrukturnih sredstev, ki jih nemalokrat naddoloča »tržna« zanimivost. Tretja skupina omejitev je tako v resnici plod prvih dveh problematik, prostorsko-časovne omejitve raziskovalnega prostora in nezmožnosti množičnega neposrednega sodelovanja z (za področje) relevantno tehnologijo. Raziskovalca, ki želi raziskovati s pomočjo računalnika, omenjeni problemi danes v veliki meri prepuščajo usodi večnega zbiranja in pretvarjanja formatov materije (iz fizičnega zapisa (npr. rokopis) v digitalni (sken) in nato še računalniško berljiv format (MusicXML, Sibelius, Finale idr.)) namesto dejanskega raziskovanja ali pa omejitev raziskave na zgolj dostopno metodologijo in digitalizirane materiale.

Za vzpostavitev *tranzicijske ere* računalniškega udejstvovanja muzikologov je torej nujna konsolidacija obeh bregov: muzikološkega in informacijsko-tehnološkega. Tako strukturni kot tudi tehnično-metodološki zapleti narekujejo potrebo po kritični refleksiji ureditve področij, še zlasti pa izpostavljajo okornost utečenih poti naše primarne domene in njenih interdisciplinarnih podmladkov. Ne glede na to, da MIR že zagotavlja hiperprodukcijo (digitalnih) glasbeno-analitičnih orodij, so ta le redko (če sploh) aplicirana onkraj računalniške stroke. Vzajemno krmarjenje je tisto, ki lahko zagotovi ploden interdisciplinarni razvoj.

Če si za zaključek dovolimo preobraziti uvodoma navedeni komentar zgodovinarja Petra Burka, bi se misel glasila takole: »kdor deluje interdisciplinarno, ne pozna vselej omejitev svoje lastne discipline.«

13 Gl. na primer: OpenAI, »Dall-e,« dostop novembra 2022, https://openai.com/blog/dall-e/.

14 To velja na primer za korektno uporabo orodij ter ustrezno pridobitev in interpretacijo rezultatov, ki nam jih orodje ponudi.

15 Tu gre zlasti za občutek avtentičnega izražanja pred »umetnim,« povsem nenadzorovano izvršenim dogodkom, četudi je naš aktivni vložek v primerjavi s celotnim procesom skoraj povsem neopazen.

Večina prispevkov, ki jih ponuja tokratna tematska številka *Muzikološkega zbornika*, razgrinja paleto aktualnih interdisciplinarnih, računalniško podprtih muzikoloških projektov. Raznovrstnost vsebin odstira pogled na dinamiko sodobnega muzikološkega delovanja, še zlasti pa razmerij z (bolj ali manj računalniško osrediščenimi) naravoslovnimi disciplinami. Namesto zgleda ali leporečja o interdisciplinarnosti naj se ta številka bere kot pobuda k aktivnemu in kritičnemu dialogu o prihodnosti(h) muzikološkega dela v vladavini tehnologij. Kot je zapisala Johanna Drucker,

> *humanistika ne igra le vloge interpreta in kritika vnaprej pripravljenih računalniških tvarin. Humanistična teorija lahko zagotovi drugačne načine razmišljanja, značilne za probleme in principe interpretativnega raziskovanja – naš izziv je prevzeti ta teoretična načela in jih vključiti v ustvarjanje takšnih metod, ki bodo ustrezale temeljem našega dela.*[16]

Tudi te temelje si je treba najprej ustvariti.

Vanessa Nina Borsan, urednica
Leon Stefanija, urednik

16 »the humanities are not a mere afterthought, simply studying and critiquing the effects of computational methods. The humantistic theory can provide ways of thinking differently, otherwise, specific to the problems and precepts of interpretative knowing – our challenge is to take up these theoretical principles and engage them in the production of methods, ways of doing our work on an appropriate foundation.«

Introduction

In the feverish rise of interdisciplinary endeavors, scientific proceedings, journals, conferences, project groups, and other institutional formations, are increasingly moving away from explicit *disciplinary* boundaries. Progressively, they are opening up their space to multidisciplinary projects, yet "workers in one discipline are not always aware of what is happening in some of the others."[1] This issue of the Proceedings of Musicology is dedicated to highlighting the integrative aspirations of contemporary musicological research, in particular activities in the field of computer-assisted music research.

Music research is carried out in different domains. In relation to cognitive studies, the medium of music is used as a secondary or central concept to investigate cognitive and emotional processes, while many social science studies consider music as a sociocultural, socio-economic, or purely historical phenomenon. A good part of musicological activity treats music as a focal structure, conceived by the very internal arrangement of notational-symbolic (or sonic) matter, without the inclusion of external musical phenomena. In addition to foundations of music theory (in particular, the various approaches and theories of music analysis), the methodological assumptions of acoustics, mathematics, iconography, and so on, are increasingly being applied to music analysis. Even if the theoretical basis in such approaches is usually tailored to the individual research case, nowadays, many of these are increasingly turning to the use of computational tools in their methodology.

What commenced as experiments of technological capabilities in the field of computer-assisted music research, evolved over time into a whole new institutional discipline or, better still, a group of sub-disciplines of Music Information Retrieval (MIR).[2] Most of the researchers in this movement are natural scientists who, with a desire to analyze music, have organized themselves around two leading groups:[3] ISMIR[4] and SMC.[5] In the era of an overwhelming flood of data, the multidisciplinary methodology and applied focus of MIR projects enabled these ideas to migrate to natural sciences in general as well as the social sciences and humanities. Apart from research activity, music information methodologies began to appear in many academic curricula. With

1 Peter Burke, *Cultural Hybridity* (Cambridge: Polity Press, 2009), 5.

2 MIR = *Music Information Retrieval*

3 Despite ISMIR and SMC being two of the largest research communities, MIR endeavors yearly gain at least one (temporary or permanent) space (e.g., conference, research team/unit, journal, etc.), within which a portion of their ideas can be executed.

4 ISMIR = *International Society for Music Information Retrieval*, https://ismir.net/.

5 SMC = *Sound and Music Computing*, https://smcnetwork.org/.

the expansion of the field, the narrowly represented domain of the MIR field of only a few decades ago has become increasingly heterogeneous, although groups such as ISMIR, despite expanding their initiative, maintain some (unofficial) niche preferences or trends, especially when it comes to questions of methodology.[6] Apart from the two communities, a wide variety of computational methods for studying, teaching, or making music are now also appearing elsewhere, for example in contributions to EMR,[7] SysMus,[8] IAML,[9] FMA,[10] and last but not least, in the present issue of the Musicological Annual.

The diverse use of methodologies is becoming the practice of many research groups and individuals. However, those reluctant to embrace the emerging "disciplinary chaos" continue developing their research activities within rather traditional frames. Many authors[11] have pointed out the various reservations that accompany incoherent communication between music research and hybrid or fully computational disciplines. Rather than providing an overall overview of particular challenges, we will focus on three major problem groups, from the point of view of 1. the institutional organization, 2. technological interactions, and 3. technologically-methodological barriers of computer-assisted music research.

The first obstacle – the development and/or transformation of institutional systems, both in the field of music or musicological aims and within other fields – stems from a categorical entrenchment of academic structures. As some have already observed,[12] this issue originates from the rigid, but by no means self-evident, *disciplinary* distribution (e.g. the division into musicology, sociology, psychology, etc.), to the shortcomings of the Bologna Process for higher education. It is particularly evident in the way in which research productivity is scored. The scoring system encourages (meaningless) competition between individuals on the "academic market" rather than assuring a collaborative atmosphere. All of the above often complicates the conditions for

6 Trends can be observed already on the surface level, meaning the thematic selection of yearly accepted proceedings to the ISMIR conference. In the last couple of years, we can surely observe an increased interest in neural networks and deep learning.

7 "Empirical Musicology Review," accessed in November 2022, https://emusicology.org/.

8 "Systematic Musicology Conference," accessed in November 2022, https://www.sysmus22.ugent.be/.

9 "International Association of Music Libraries," accessed in November 2022, https://www.iaml.info/.

10 "Folk Music Analysis," accessed in November 2022, https://www.folkmusicanalysis.org/.

11 See, for example: Stephen Downie J., "Music Information Retrieval," *Annual Review of Information Science and Technology* 37 (2003): 295–340; Turek Dahling, et. al., eds., *Musicology (Re-) Mapped: Discussion Paper*, (Strasbourg: European Science Foundation, 2012); Frans Wiering and Emmanouil Benetos, "Digital Musicology and MIR: Papers, Projects and Challenges," *International Society for Music Information Retrieval Conference* (2013); Laurent Pugin, "The Challenge of Data in Digital Musicology," *Frontiers in Digital Humanities 2* (2015): 4; and others.

12 Avtorska skupina, *Kaj po univerzi?* (Ljubljana: Založba /*cf, 2019).

the free transformation not only of the formal but also of the substantive part of academic work and curricula and is severely restricting the active flow of knowledge between disciplines and their institutional carriers. If cooperation is to take place, at least one of the disciplines must submit to the system of the main institution, which (financially) initiates that particular collaboration. The further apart the disciplines, the less interaction is possible under such terms.[13]

Second, even if we would like to believe that the structural arrangements of academia are mostly supportive of interdisciplinarity, the integration of musicology and music informatics (as well as other hybrids) is also restricted by the constitution of methodology. In the process of epochal technological change, there has never been a sudden replacement of old technology for a brand-new solution. Instead, a change of medium occurred through a process of transition. This process, in a computational sense, took advantage of "the known," thus familiar images of gadgets or implemented the features of "instinct," physical actions of an old apparatus, and implemented those to the user experience of the new medium.[14] These mediators enable the comprehension of the frontal functionality of the digital tool even though the core "machinery" of such application is completely incomprehensible to an average user. In contrast to the leisurely (or similar) use of digital gadgets, the computational analysis of music, or its digital exploration, has undergone a much less gradual leap. The background (applications, interfaces, etc.) or even the foreground (codes of algorithms that carry out a given process without a visually pleasing interface) of most computationally analytical (music) tools are driven by adapted mathematical operations woven into a web of algorithms and chiffres that have little, if anything at all, in common with the actual object or the process of (physical) analysis. The sudden leap from the physical world into the world of incomprehensible codes has made the process of integration more difficult for

13 This is most evident through observing calls for project fundings, which are usually tailored according to the structure of one discipline (but not necessarily fit with the other(s)). Likewise, it is more certain that one's contribution will be published in the journal or conference of another discipline, when that contribution is tailored to the measurements of the journal preferences. If we concretely consider ISMIR: when a musicologist publishes a contribution to ISMIR conference, they have to oblige to (at least) 1. The structure of the contribution (six two-column pages, edited in ISMIR's LaTex preset, different citation rules, preferred internal structure (e.g.: introduction, related work, methodology, case study and/or evaluation, conclusion)), and 2. content category, which needs to be indicated upon submitting an article (if none of the offered categories correspond with one's contribution, the author is forced to choose the closest one, by which he risks the content inadequacy and with that, refusal of the article, no matter its value). Next to the two conditions, there is a selection of editors and reviewers, which usually agree in majority with the current trends. And these are rarely compatible with musicological activity. With each deviation, the musicological contribution drifts away from being published, which indicates that we, in fact, cannot speak about a fruitful environment for multidisciplinary collaboration.

14 For example, the transfer of brush and "canvas" as icons to digital painting environments, the preservation of musical notation sheet format and even the mimicry of paper texture in programs for the digital notation of symbolic music (MuseScore, Sibelius, Finale, etc.).

musicologists. With the absence of a transitional moment, the abstract algorithms and their products (for example, sequences of "mathematical" symbols describing musical phenomena) do not manage to address them in an intelligible way. For the majority of researchers, who do not manage to adopt the computational processes of machine learning, neural networks, or even simpler algorithmic structures, insufficient familiarity with methodological procedures prevents them from using the results obtained from this type of analysis, simply, because they do not understand how or where these solutions emerged from. If such obfuscation does not stop the average user of an algorithmically guided interface (for example, the capture of auto-retouched images with smartphones or the even more current practice of leisurely creating iconographic images with linguistic markers[15]), involvement in the nuts and bolts of algorithms is indispensable for the research work of the musicologist. The urge to be involved in the latter most often stems from *functional reasons*,[16] whereas participation in every day, leisurely digital use is mostly overdetermined by the desire to freely choose the final fate of our interaction, making a full understanding of the background irrelevant as long as one feels involved.[17]

Third, computational methods remain very limited in certain areas – such as the analysis of vertical musical structures in relation to horizontal ones, the lack of a strategy for exploring non-Western or non-tempered musical notations (and recordings), etc. Also, with the uneven distribution of resources, the digitization of music material is disproportionately more common in Western institutions, while musical traditions with smaller coverage remain both physically and methodologically less represented in the (computer-supported) research landscape. The collection and accessibility of diverse musical material primarily depends on the direction of financial and infrastructural resources, which are often over-determined by its "market" value and/or attractiveness. The third set of constraints is thus a product of the first two issues, the spatio-temporal limitation of the research space and the inability to engage directly with (field-relevant) technology on a large scale. The researcher who wants to do computationally-supported research is largely limited by the above-mentioned problems. Today, these processes commonly leave the researcher to the fate of either eternally collecting and converting the material[18] instead

15 See, for example: OpenAI, "Dall-E," accessed in November 2022, https://openai.com/blog/dall-e/.

16 Here, I generally consider the favoring feeling of authentic expression opposed to the "fake," uncontrolled event, even though the impact of our active participation, in comparison to the whole process that is being executed in the back, is barely recognizable.

17 For example, a conversion from a physical format (e.g. manuscript) to digital (scan) and then to computer-readable formats (MusicXML, Sibelius, Finale, etc.), all of which is extremely time consuming.

18 Johanna Drucker. "Humanistic Theory and Digital Scholarship," *Debates in the Digital Humanities* 150 (2012): 85–95.

of actually executing the research on those materials or limits their research to only accessible computational methodology and ready-made materials, e.g., the already digitized contents, regardless of the alignment of the latter with their field of interest.

In order to create a transitional era of computational engagement of musicologists, it is, therefore, necessary to consolidate both sides – the musicological and the information-technological. Both structural and technical-methodological complications dictate the need for a critical reflection on the organization of the domains and in particular highlight the cumbersomeness of the established paths of our primary domain and its interdisciplinary subfields. Even though MIR already provides hyper-production of (digital) music-analytical tools, these are rarely (if ever) applied beyond the computational disciplines. It is thus only mutual navigation that can ensure fruitful, active interdisciplinary development and knowledge exchange.

If we take the liberty of paraphrasing the comment by historian Peter Burke quoted in the beginning, the thought would go as follows: "those whose research is interdisciplinarily are not always aware of the limitations of their own discipline."

The contributions offered in this issue of the Proceedings of Musicology reveal a range of current interdisciplinary, computer-assisted musicological projects. The diversity of topics offers a view of the dynamics of contemporary musicological activity, in particular of its relations with (more or less computer-centered) natural sciences. Rather than setting an example of interdisciplinarity, this issue should be read as an encouragement towards an active and critical dialogue on the future(s) of musicological work in the reign of technology. As Johanna Drucker observed,

> *the humanities are not a mere afterthought, simply studying and critiquing the effects of computational methods. The humanistic theory provides ways of thinking differently, otherwise, specific to the problems and precepts of interpretative knowing – partial, situated, enunciative, subjective, and performative. Our challenge is to take up these theoretical principles and engage them in the production of methods, and ways of doing our work on an appropriate foundation.*[19]

However, it is this foundation that yet needs to be established.

Vanessa Nina Borsan, editor
Leon Stefanija, editor

19 For example, a correct use of the options that the tool provides, as well as successfully obtaining and correctly interpreting those options or its results.

DOI: 10.4312/mz.58.2.15-49
UDK 781(497.4):004

Zgodovina in izzivi digitalne etno/muzikologije v Sloveniji

Leon Stefanija,[a] Vanessa Nina Borsan,[b] Matevž Pesek,[c] Matija Marolt,[c] Drago Kunej,[d] Zoran Krstulović[e]

[a, c]Univerza v Ljubljani
[b]University of Lille
[d]Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti
[e]Narodna in univerzitetna knjižnica v Ljubljani

IZVLEČEK

Procese razumevanja glasbe kot niza pojavov, ki so tesno povezani z IT praksami iskanja glasbe v slovenski raziskovalni skupnosti, skiciramo s treh osnovnih vidikov: etnomuzikološkega, bibliotekarskega (bistvenega, ko se glasbi približamo računalniško) in IT. Članek ocenjuje doprinos teh perspektiv k razumevanju glasbe, in predlaga, da tri obravnavane perspektive niso poljubne.

Ključne besede: digitalna muzikologija, sistematična muzikologija, glasbena analiza, slovenska glasba, digitalna muzikologija v Sloveniji, e-muzikologija

ABSTRACT

We sketch the processes of understanding music as a set of phenomena intricately involved with the IT practices of music retrieval within the Slovenian research community from the three basic perspectives: ethno-/musicological, librarian (essential when approaching music computationally), and IT. The article assesses what these perspectives have brought to the understanding of music and suggests that the three addressed perspectives are not arbitrary.

Keywords: digital musicology, systematic musicology, music analysis, Slovenian music, digital musicology in Slovenia, e-musicology

Uvod

V predgovoru knjige *The Style of Palestrina and the Dissonance*, prvič natisnjene v 1920-ih, je Knud Jeppesen zapisal, da disonanca še ni bila *znanstveno* raziskana: »čeprav splošno priznana kot pomemben del glasbenega raziskovanja, tej še ni bilo namenjenih resnih, znanstvenih besedil.«[1] Za razliko od svojih sodobnikov, katerih glavni cilji so bili »praktično, pedagoško naravnani,« se je Jeppesen Palestrinove glasbe loteval iz »generičnega« zornega kota.[2] Njegov najpomembnejši cilj je bila namreč slogovna analiza.

Skoraj pol stoletja pozneje, leta 1959, je Alan Lomax prvič podrobno predstavil svoj projekt Kantometrika. Ideja je bila zelo ambiciozna: analizirati glasbene stile ter jih povezati z družbenimi spremenljivkami. Njegova analiza, ki je vključevala 37 glasbenih lastnosti, nepričakovano ni našla poti v širši krog akademskih glasbenih analitikov. Toda The Music Genome Project, katerega eden izmed glavnih »pridelkov« je bil Pandora Radio, izhaja iz lomaxovskih pogledov. Z več kot 450 glasbenimi lastnostmi štejejo utemeljitelji Projekta glasbenega genoma svoj pristop – upravičeno – za »nabolj celovito analizo glasbe«: »It's the most comprehensive analysis of music ever undertaken.«[3] Tu ne gre zanemariti »ideoloških« razhajanj obeh, na eni strani A. Lomaxa, ki je na problem pogledoval iz vidika humanističnega raziskovalca, ki kot družboslovec analizira glasbene univerzalije in opazuje vzorce družbene ureditve, in na drugi strani The Music Genome projekta, katerega cilj je oblikovati čim bolj personalizirano ponudbo poslušanja glasbe.[4] In vendarle so postopki analize v obeh primerih enaki: opredeljevanje vzorcev glasbene oblikovnosti (slogovna analiza) in iskanje njihovih učinkov pri poslušalcu.

Teorija je bodisi izhodišče bodisi cilj vsake analize, je zapisal Dahlhaus.[5] Živimo v dobi, ko se področje raziskovanja glasbe nenehno širi, ožje področje analize glasbe pa se razvejuje zlasti v zadnjih dveh desetletjih. Teoretično gledano, znotraj akademskega glasbeno-raziskovalnega kroga obstajata dva tipa analitikov. Prvega kaže povezati z Evropskim kongresom za glasbeno analizo (European Music Analysis Congress ali EuroMAC).[6] Gre za platformo, ki povezuje nacionalna društva za glasbene teorijo oz. glasbenoanalitična prizadevanja. V temeljih gojijo akademsko (etno)muzikološko tradicijo analize glasbenih del. Pri drugem tipu analitika se z glasbeno analizo srečamo v okviru Mednarodnega združenja za pridobivanje glasbenih podatkov (The International Society for Music Information Retrieval

1 Knud Jeppesen, *The Style of Palestrina and the Dissonance* (New York: Dover Publications, 1971), 1.

2 Prav tam.

3 Pandora: Music Genome Project, dostop 30. novembra 2022, https://www.pandora.com/about/mgp.

4 Grace Note, dostop 30. novembra 2022, https://www.gracenote.com/.

5 Carl Dahlhaus, *Analyse und Werturteil* (Mainz: Schott, 1970), 8.

6 *10th European Music Analysis Conference, Moscow, September 2021*, dostop 30. novembra 2022, https://euromac.mosconsv.ru/.

ali ISMIR),[7] ki ga v glavnini zastopa računalniška stroka. Glavni poudarek je na analizi množice podatkov bodisi o posameznih glasbenih prvinah v določenem opusu, zvrsti, obdobju, bodisi na analizi množičnih metapodatkov o glasbi, kot je razvidno denimo iz publikacij tega številčno naraščajočega združenja ali pa iz revij, kot sta *Empirical Musicology Review*[8] ali pa *Journal of New Music Research*.[9] V kolikor vzamemo področje glasbene analize pod drobnogled, bi lahko seveda dodali še najmanj eno skupino, kot je na primer Mednarodna delavnica za analizo tradicijske glasbe (International Workshop on Folk Music Analysis).[10] Tu gre za profilno pester nabor analitikov, ki se ukvarjajo zlasti z antropološko-družboslovnimi vprašanji in združujejo oba zgoraj omenjena tipa analitikov (glej tudi Shemo 4). Poenostavljeno naznačene tipe analize bi lahko označili kot »fenomenološko« ali akademsko analizo glasbenega stavka pri prvem tipu analitika, pri drugem tipu analitika kot e-muzikološko analizo ali analizo podatkov *iz* glasbe in *o* glasbi, tretjega pa kaže razumeti kot prizadevanje po povezovanju obeh – skupno pridobivanje informacij *iz* in *o* glasbi, saj se samo *razumevanje* glasbe med njimi pogostoma razlikuje. Grobo rečeno, cilj, h kateremu danes stremi digitalna humanistika,[11] je usmerjen k obdelavi množic podatkov, medtem ko se računalniško manj podprti pristopi lotevajo bodisi (delne) analize posameznih glasbenih primerov ali kakega glasbenega pojava bodisi se osredotočajo na posamezna družboslovna in humanistična vprašanja, kjer so glasbenoanalitični izsledki bolj ilustracija kake teorije kakor pa sistematično pretresanje značilnosti glasbe.

Nakazana razlika med računalniško podprtim *analiziranjem* meta/podatkov in fenomenološkim *razumevanjem* glasbe seveda nikakor ne govori o medsebojno izključujočih si pogledih na analizo glasbe. Gre za epistemološko dopolnjujoča si pogleda, katerih različice lahko spremljamo v sodobnem raziskovanju glasbe. Zato je cilj prispevka izris procesov razumevanja glasbe skozi tri področja ali gledišča računalniško podprte obravnave glasbe v Sloveniji: (etno)muzikologija, arhivistično-bibliotekarsko delo in računalništvo. Ravno ta področja so namreč doslej najbolj tehtno prispevala k razvoju digitalne etno/muzikologije ali na tem mestu e-etno/muzikologije[12] v Sloveniji. Pregled se

7 ISMIR, dostop 30. novembra 2022, https://www.ismir.net/.

8 *Empirical Musicology Review: Special Issue on Open Science in Musicology* 16, št. 1 (2021), dostop 30. novembra 2022, https://emusicology.org/.

9 *Journal of New Music Research*, dostop 30. novembra 2022, https://www.tandfonline.com/toc/nnmr20/current.

10 *Folk Music Analysis – FMA*, dostop 30. novembra 2022, https://www.folkmusicanalysis.org/.

11 Izraz je rabljen v smislu Evropskega združenja za digitalno humanistiko, ki si prizadeva delovati »across the entire spectrum of disciplines that research, develop, and apply digital humanities methods and technology.« [» v celotnem okviru *disciplin*, ki raziskujejo, razvijajo in uporabljajo metode in tehnologijo digitalne humanistike.«] *European Association for Digital Humanities – EADH*, dostop 30. novembra 2022, https://eadh.org/.

12 Izraz e-muzikologija gre v prispevku razumeti kot približno sopomenko vsem ostalim izrazom, ki trenutno obstajajo v akademskem diskurzu, npr. digitalna muzikologija, računalniško podprta muzikologija, itd.

sprva drži kronološkega načela po metodi opisa vloge računalnika pri analizi glasbe po posameznih področjih, sklene pa ga pretres možnosti smiselnega nadaljevanja uporabe računalnika pri analizi glasbe v okviru integrativne e-etno/muzikologije kot dela digitalne humanistike.

Ozadje

Nico Schüler je eden tistih, ki so najbolj izčrpno raziskali zgodovino glasbene analize s pomočjo računalnika. V svojih prispevkih med drugim podarja:

> *Že na začetku »računalniške dobe« glasbene analize je bila komunikacija med raziskovalci bolj počasna.* [...] *Zdi se, kot da se od tedaj ne bi kaj dosti spremenilo: raziskovalci namreč niso najbolje seznanjeni z zgodovino svojega raziskovalnega področja, ne z uspehi kot tudi ne z neuspehi. Napake se zato podvajajo, predsodki pa 'cvetijo.'*[13]

Nicholas Cook je v svojem ISMIR prispevku »Towards the Compleat Musicologist?« govoril o *priložnostih* združevanja muzikologije in računalništva in razmišljal o »nekaterih dejavnikih, ki zavirajo sodelovanje muzikologov s področjem informacijske tehnologije.«[14] Cook je misel uvedel »z nečim, kar na srečo ni problematično: odpor muzikologov do tehnologije«[15] in nadaljeval »z dvema točkama, ki imata opraviti s pomanjkanjem podatkov«[16] – prvič, »muzikologi so večinoma navajeni dela z majhnim obsegom podatkov,«[17] in drugič, »muzikologi največkrat upravljajo z majhnim naborom podatkov.«[18] Obe točki osmisli skoraj tavtološko: »mislim, da je zaključek vnovič očiten: delo z večjim naborom podatkov bi lahko utiralo nove muzikološke poti.«[19] Četudi nekaj novega vselej ne pomeni tudi nekaj boljšega, problematika, na katero opozarja Cook, jasno tematizira problem *prenosa teorij* ali gledišč med ptičjo in žabjo perspektivo. Vprašanje v enaki meri velja tudi v obrnjeni smeri, a se ga v tem prispevku zaradi obsežnosti zastavljene problematike ne moremo lotiti.

Omenjeni *odpor do tehnologije* s strani muzikologov dandanes predstavlja zlasti metodološko vprašanje. Medtem ko danes akademski raziskovalci glasbe pri proučevanju in poučevanju uporabljajo najrazličnejše digitalne pripomočke, so bile še do konca devetdesetih let prejšnjega stoletja v obtoku vinilne plošče,

13 Nico Schüler, »Reflections on the History of Computer-Assisted Music Analysis I,« *Muzikološki zbornik* 41, št. 1 (2005): 38–39.

14 Nicholas Cook, »Towards the Compleat Musicologist?,« paper presented at *Ismir 2005*, http://ismir2005.ismir.net/documents/Cook-CompleatMusicologist.pdf.

15 Prav tam, 2.

16 Prav tam.

17 Prav tam, 3.

18 Prav tam, 5.

19 Prav tam, 5.

kasete in izjemoma še celo snemalni trakovi, poleg maloštevilnih CD-jev, medtem ko so v zadnjem stoletju postale stalnica pretočni portali za glasbo oziroma avdio in zlasti video zapise. Danes je torej težko govoriti o odporu do primerljive uporabe tehnologije, vsekakor pa analiza glasbenega stavka s pomočjo računalnika še ni razširjena v akademski muzikologiji, čeprav je vključevanje tehnologij v glasbeno raziskovanje in izobraževanje vedno bolj pereča problematika v celotni humanistiki. Zdi se, da gre v tem primeru največkrat za »preprosto nejasnost med tehnologijo in epistemologijo«[20] in razjasnitev le-te bi morala zadostovati za spodbudo »konceptualnih sprememb« v glasbenem raziskovanju.[21] Kaj konceptualnega se je spremenilo znotraj področja glasbenega raziskovanja ob računalniško podprti analizi glasbe?

Vprašanje je lahko zavajajoče. Guido Adler je muzikologijo v zadnji četrtini devetnajstega stoletja začrtal kot interdisciplinarno področje, ki vključuje primerjalne poglede med kulturami in obdobji. Raziskovanje glasbe, kot tudi druge sorodne panoge, od Adlerjevega časa postopoma napreduje v razvejano mrežo z glasbo povezanih študij. Četudi nimamo trdnih statističnih podatkov, se zdi, da večina glasbenoraziskovalnih podpodročij vključuje interdisciplinarnost, a hkrati je videti, da ostajajo večidel razmeroma nevedna glede teoretičnih konceptov in praktičnih dosežkih ostalih. Kot je zapisal Jochen Hörisch, se zdi interdisciplinarnost le »razpisna retorika v humanistiki,« ki je »inflacijska in obenem slabokrvna.«[22] Čeprav ostaja interdisciplinarnost v znanstvenoraziskovalni skupnosti spoštovan pristop, imajo mnoge analize glasbe, ki se nanj izrecno ali implicitno sklicujejo, redko opredeljene teoretične ali konceptualne »drugačnosti« drugih strok: v nobeni od večjih glasbenih enciklopedij ni gesla o interdisciplinarnem raziskovanju glasbe, čeprav so sklicevanja na komplementarnost različnih gledišč vedno bolj izrazita in zaželena na domala vsakem razpisu za raziskovalne projekte. Povezovanja med strokami in prenosi konceptov in teorij pri analizah družbenih in »čisto glasbenih« pojavov tako ostajajo dokaj nejasna: med več kot dva tisoč vnosi RILM-ove zbirke, pri kateri je sicer način »prenosa« ključen del koncepta, je mogoče razbrati, da gre pri prenosu teorij za pragmatične rešitve, odvisne od vsakega primera posebej, o kaki interdisciplinarni paradigmi prenosa pa je težko govoriti. Zamisli o prenosih idej, pojmov in ljudi iz enega konteksta v drugega so vseprisotni, celo nujni za razumevanje naše »postmoderne modernosti«[23] in njenega »transverzalnega smisla.«[24] A

20 Prav tam.

21 Prav tam, 6.

22 Jochen Hörisch, *Theorie-Apotheke: Eine Handreichung zu den humanwissenschaftlichen Theorien der letzten fünfzig Jahre, einschließlich ihrer Risiken und Nebenwirkungen* (Berlin: Suhrkamp Verlag, 2012), 168.

23 Wolfgang Welsch, *Unsere postmoderne Moderne* (Berlin: Akademie Verlag, 2008).

24 Wolfgang Welsch, *Vernunft: Die zeitgenössische Vernunftkritik und das Konzept der transversalen Vernunft* (Berlin: Suhrkamp Verlag, 1996).

za obseg interdisciplinarnosti ali vsaj določenih profilov meddisciplinarnosti, intra- ali holistične transdisciplinarnosti v povezavi z glasbo ni jasnih meril: ni jasno, kako se »estetski« in »anestetski« (»Anästhetik«) pojavi med seboj prepletajo glede na disciplinarne meje, in zato smo pogosto postavljeni pred dejstvo, da je treba »problematizirati elementarni sloj estetskega, njegovih mej in omejitev.«[25] Pregled prispevkov v edini strokovni reviji za interdisciplinarno raziskovanje glasbe *Journal of Interdisciplinary Music Studies* (JIMS) razume koncept interdisciplinarnosti kot »sinergijsko generiranje novega znanja – za razliko od multidisciplinarnosti, kjer gre za akumulacijo znanja različnih disciplin«.[26] Če torej razumemo interdisciplinarnost kot povezovanje različnih disciplin v imenu pridobivanja novega znanja, gre za idealno obliko *prenosa znanja* ne le med disciplinami – med Welschevimi omenjenimi »estetskimi« in »anestetskimi« pojavi – ampak tudi zunaj akademskega raziskovalnega prostora.

V nadaljevanju se omejujejemo na »pretekle uspehe in neuspehe« e-etno/muzikologije v Sloveniji ne glede na to, ali se jim danes pripisuje znanstvenoraziskovalni ali strokovni pomen. Opisane zgodovinske postaje slovenske e-etno/muzikologije, ki predstavljajo temelj tega, kar danes sodi k e-humanistiki na področju raziskovanja glasbe, obenem ponujajo izhodišča za sklepne predloge in vprašanja nadaljnjega razvoja tega dela raziskovanja glasbe.

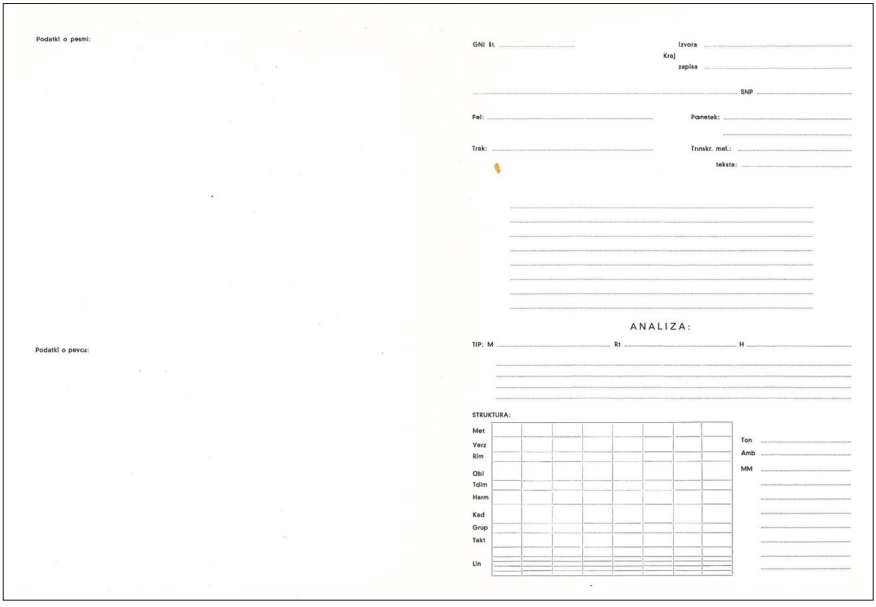
Predhodniki slovenske e-etno/muzikologije

Glasbene zbirke, ki na geografskem območju Slovenije obstajajo že vrsto stoletij, v času interneta pridobivajo vedno večjo vlogo tako za strokovnjake kot za laike. Poslanstvo zbiranja ne le ljudskega, temveč tudi umetnostnega gradiva si je zadala Glasbena matica (1872). Kot glavna slovenska glasbena ustanova je bila odgovorna za zbiranje in ohranjanje nacionalne glasbene dediščine: za glasbeno založništvo, ohranjanje in proučevanje glasbene dediščine, glasbeno izobraževanje in tudi glasbeno poustvarjalnost. Glasbena matica je leta 1934 spodbudila ustanovitev Glasbenonarodopisnega inštituta (GNI) – najstarejšega inštituta Znanstvenoraziskovalnega centra (ZRC) Slovenske akademije znanosti in umetnosti (SAZU). Valens Vodušek (1912–1989) je zanj zasnoval

25 »Das ist nicht erst in der Philosophie, sondern schon in der Medizin so: Durch Anästhesie schaltet man die Empfindungsfähigkeit aus – und der Wegfall des höheren, des erkenntnishaften Wahrnehmens erweist sich als bloße Folge davon. Anästhetik problematisiert also die Elementarschicht des Ästhetischen, seine Bedingung und Grenze.« [»Ni tako samo v filozofiji, temveč že v medicini: anestezija izklopi sposobnost čutenja – izguba višjega, spoznavnega zaznavanja se izkaže samo za posledico tega. Anestetika torej problematizira elementarno plast estetskega, njegovo pogojenost in njegove meje.«]; Wolfgang Welsch, *Ästhetisches Denken* (Stuttgart: Philipp Reclam, 2017), 13.

26 *Journal of Interdisciplinary Music Studies*, dostop 30. novembra 2022, https://musicstudies.org/interdisciplinarity/.

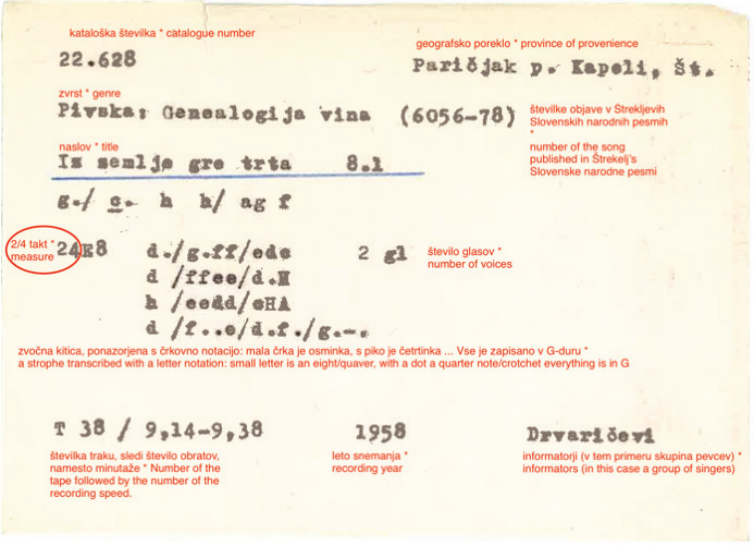
načrt klasifikacije tradicijske glasbe, ki je ohranjen v obliki šestih katalogov, leta 1962 pa je postavil obliko katalogizacije in klasifikacije besedil. Oba projekta sta prispevala k izredni odmevnosti in prepoznavnosti tako Voduška kot ustanove tudi zunaj jugoslovanskih meja. Njegova shema je pomenila prvi sistematični analitični koncept analize glasbene oblikovnosti, kar lahko štejemo za vzporednico računalniško podprtega pridobivanja glasbenih informacij (*music information retrieval*, MIR).



Shema 1: Vsak terenski posnetek so popisovali po določilih obrazca, ki ga je uvedel Valens Vodušek na Glasbenonarodopisnem inštitutu v Ljubljani v 1950-ih letih.

Analitični del sestoji iz treh glasbenih nivojev ali »tipov«: M = melodija, Rt = ritem in H = harmonija. »Strukturo« dela so opisovale naslednje spremenljivke: Met = metrika, Verz = verz, Rim = rima, Obl = oblika, Tdim = Tonska dimenzija, Harm = harmonija, Kad = kadenca, Grup = skupina, Tak = takt, Lin = [melodična] linija, Ton = začetni ton, Amb = ambitus, MM = Mälzlov metronom. Pristop je primerljiv s tistim, ki ga je bolj ambiciozno zasnoval Alan Lomax s kantometričnim sistemom in se je razširil pri računalniško podprti analizi oblikovnosti glasbe. Posamezne podrobnosti o glasbeni obliki vsakega dela so na GNI deloma shranjevali skupaj s transkripcijo in posnetkom skladbe, a le do 1980-ih. Kasneje so bile transkripcije izpuščene iz sistematično zasnovanih dejavnosti GNI-ja. Te so od tedaj v domeni individualnih raziskav in objavljenih projektov.

Glasbenonarodopisni inštitut je, poleg Narodne in univerzitetne knjižnice, utelešal vlogo vodilne institucije za katalogizacijo (tradicijske) glasbe. Njihov »listkovni katalog« je katalog, ki sestoji iz šestih enakih listkov, razporejenih v šest kategorij: 1. naslov, 2. številka kataloga, 3. struktura melodije, 4. struktura ritma in metrike, 5. zvrst in 6. kraj porekla.




1. Predal z naslovi


2. Predal s številkami kataloga


3. Predal z melodijami


4. Predal z metrikami in ritmi


5. Predal zvrsti


6. Predal izvora dela

Shema 2: Listek iz enega od katalogov Glasbenonarodopisnega inštituta.[27]

27 Fotografije: Urša Šivic.

Digitalizacija materialov se je na Glasbenonarodopisnem inštitutu začela izvajati leta 1992. Prikazani analitični obrazci, ki so bili del sistematičnega glasbenega raziskovanja, so primerljivi s sodobno prakso digitalizacije glasbe. Obrazci za analizo glasbenih posnetkov – razvijal jih je raziskovalec tega inštituta Drago Kunej[28] – so bili izdelani za arhiviranje v 1990-ih (glej Prilogi 1 in 2). Vzorec v Prilogi 1 vključuje tudi transkripcijo, a sistematično transkribiranje in sistematično analitično raziskovanje slovenskih tradicijskih korpusov od tedaj napreduje nekoliko počasneje.

Prav tako za ostalimi vedami humanistike metodološko in praktično zaostaja raziskovanje video vsebin, ki so z glasbo močno povezane v širšem smislu sicer že vsaj z nastankom opere, v ožjem smislu pa s filmom in zlasti glasbenim videom. Edini sistematični raziskovalec vizualne antropologije v Sloveniji je Naško Križnar in še pri tem le redko zasledimo vsebine, ki bi bile tako ali drugače vezane na glasbo.[29]

Metode in prakse, ki spremljajo glasbeno raziskovanje, so se z vse večjim zanimanjem strokovnjakov informacijskih tehnologij sčasoma spreminjale. Preden se posvetimo temu procesu, usmerimo pozornost na prispevek bibliotekarjev in knjižničarjev k slovenski e-etno/muzikologiji.

(Digitalne) knjižnice

Upravljanje in zbiranje glasbenega gradiva v Sloveniji je danes razdeljeno med nekaj različnih ustanov. Arhiv najvplivnejše (re-)produkcijske institucije, Radiotelevizije Slovenije (RTV Slovenija), je kljub temu, da sodi v *javno domeno*, raziskovalni pa tudi laični javnosti le deloma dostopen, zato lahko brez zadržkov sklenemo, da večji delež k razvoju e-etno/muzikologije prispeva raziskovalnost bibliotekarjev.

dLib

Narodna in univerzitetna knjižnica v Ljubljani (NUK) je leta 2005 s projektom dLib oblikovala slovensko verzijo Europeane.[30] Čeprav je osrednja misija projekta digitalizacija knjižničnega gradiva, strokovnjaki, kot je na primer eden izmed glavnih pobudnikov projekta Zoran Krstulović,[31] opominjajo na dve dodatni, a prav tako ključni prednosti: zasnovati boljšo dostopnost »klasičnega« knjižničnega gradiva oziroma omogočiti dostopnost do digitalnih vsebin, torej vzpostaviti portal digitalne knjižnice ter zagotoviti trajno ohranjanje digitalnih vsebin.

28 Prim. objave Draga Kuneja, navedene v seznamu literature, iz let 1999, 2000, 2001, 2005, 2009, 2013, 2017, 2020.

29 Prim. objave Franca Križnarja, navedene v seznamu literature, iz let 1991, 1994, 2001, 2002, 2006, 2009, 2012, 2013.

30 Digitalna knjižnica Slovenije, www.dlib.si; Europeana, https://www.europeana.eu/, dostop 30. novembra 2022.

31 V letu 2011 je Zoran Krstulović skupaj s Karmen Štular Sotošek prejel Kalanovo nagrado za teorijo in prakso digitalizacije knjižničnega gradiva.

Strukutra sistema je zasnovana v skladu s sledečim načelom: Trajno ohranjanje podatkov in sistemov za prenos informacij – Odprti arhivski informacijski sistem (OAIS) – Referenčni model (SIST ISO 14721:2013). V enem oziroma enotnem repozitoriju je poskrbljeno za vse podatke, zajem teh (digitalizacija) pa se tudi danes izvaja tam, kjer je fizično gradivo shranjeno. Digitalizacija teh gradiv zagotavlja širšo in boljšo dostopnost (do) kulturne dediščine, varstvo izvirnikov, pripomore k popularizaciji kulturne dediščine in omogoča preprostejše rokovanje z gradivom. Prav tako na izbor gradiva vplivajo zunanje okolje, pravni vidiki ter potreba po obnovi fizičnega gradiva in izdelavi nadomestnih oglednih kopij.

Pri izbiri notnih oziroma zvočnih gradiv za digitalizacijo (in, seveda, vseh ostalih) je s stališča zagotavljanja širše in boljše dostopnosti kulturne dediščine pomembno materiale dopolniti s primerno strukturiranimi metapodatki oz. je te potrebno zagotoviti z ustreznim (standardiziranim) metapodatkovnim modelom za opis digitalne različice gradiva.[32] Pri izbiri *notnega gradiva* za digitalizacijo so nujne tudi dodatne možnosti pri uporabi digitalne različice gradiva, ki jih omogoča računalniška tehnologija (npr. iskanje po vseh besedah besedila skladbe, povečave detajlov skladb v rokopisu itd.). Pri izbiri *zvočnega gradiva* je še posebno pomembno merilo možnost dostopa do gradiv, ki potrebujejo opuščeno strojno ali programsko opremo za prikaz ali predvajanje (npr. gramofon). Na izbiro gradiva vplivajo tudi razpoložljivi viri (infrastrukturni, človeški, finančni), zato pri oblikovanju izvedb projektov digitalizacije v praksi prihaja do sinergij, oblikovanja skupnih projektov digitalizacije med različnimi institucijami. Tak primer so projekti digitalizacije tiskanega notnega gradiva s podporo Slovenskega glasbenoinformacijskega centra (SIGIC), Narodne in unverzitetne knjižnice (NUK) in Društva slovenskih skladateljev, ki so zagotovili gradiva za digitalizacijo ter dostopnost uporabnikom do rezultatov digitalizacije. Na izbor obdelanih gradiv in možnosti ustvarjanja digitalnih zbirk vedno bolj vpliva zakonodaja s področja avtorskega prava, varovanja zasebnosti, varovanja osebnih podatkov itd.

Digitalizacija gradiv omogoča bolj učinkovito iskanje in poizvedovanje po zbirkah, povečuje stopnjo povezljivosti z drugimi digitalnimi zbirkami ter ponuja možnost kompletiranja nepopolne zaloge knjižničnega gradiva. Hkrati princip zagotavlja varstvo izvirnikov in s tem omogoča dostopnost redkega, občutljivega in poškodovanega gradiva ter zmanjša učinke pogoste uporabe gradiva oziroma povpraševanje po izvirnikih s strani uporabnikov. Koncept digitalizacije se je izkazal kot še posebej dragocen zlasti v zadnjih, »pandemijskih« letih, ko je bilo javno življenje in s tem dostop do določenih institucij še toliko bolj omejeno.

V tem trenutku je v Digitalni knjižnici Slovenije dostopnih nekaj več kot osem tisoč enot glasbenih rokopisov, tiskov in zvočnih posnetkov. Med najstarejšimi

32 »Podatki o podatkih.« Metapodatki so tudi bibliografski podatki, ki so bili včasih zapisani na kataložnih karticah knjižničnih katalogov, danes pa so to bibliografski zapisi v računalniških spletnih katalogih, kot je slovenski nacionalni vzajemni katalog COBISS.

gradivi so srednjeveške liturgičnoglasbene knjige, kot so graduali, antifonarji in psalterji, Hrenove korne knjige iz sedemnajstega stoletja ter *Himni ad Laudes* Jacopa Tomadinija iz osemnajstega stoletja. Slovenska glasba prve polovice devetnajstega stoletja je predstavljena s tiski in glasbenimi rokopisi. Digitalna knjižnica Slovenije ponuja zanimiv vpogled v ustvarjalnost za klavir na Slovenskem v devetnajstem in na začetku dvajsetega stoletja. Sistematično so digitalizirane skladbe za klavir devetnajstega stoletja ter zajeta zgodnja ustvarjalnost za ta inštrument. Objavljene zbirke za klavir iz druge polovice tega stoletja že kažejo težnjo tedanjih skladateljev po bolj poglobljenem oblikovanju glasbe za ta inštrument. Digitalna knjižnica Slovenije zagotavlja dostop tudi so vseh slovenskih glasbenih revij, ki so bile objavljene do leta 1945, in do večine teh, ki so izhajale po drugi svetovni vojni (*Slovenska glasbena revija*, *Muzikološki zbornik*, *De musica disserenda* itd.). Prav tako so v celoti dostopne vse edicije Glasbene matice oz. skoraj tristo publikacij, ki jih je izdala med letoma 1873 in 1945. Možnosti raziskovanja delovanja Glasbene matice dopolnjuje dostopnost drugih gradiv, kot so albumi Glasbene matice s fotografskim gradivom, posnetim ob prvem slovenskem festivalu, na turnejah pevskega zbora, na pogrebu Mateja Hubada in ob drugih priložnostih. Vpogled v dejavnost dodatno razširjajo *Poročila društva Glasbene matice v Ljubljani*, ki jim lahko sledimo vse od leta 1874 do leta 1945.

Preko Digitalne knjižnice Slovenije lahko dostopamo do cele vrste zbirk s skladbami za zbore. V digitalno obliko je že transformirano tudi veliko nabožne glasbe, ki je nastala v devetnajstem in na začetku dvajsetega stoletja. Od skladateljev, ki so delovali v prvi polovici dvajsetega stoletja, so na portalu dLib.si dostopna dela Viktorja Parme, Emila Adamiča in Slavka Osterca.

Digitalna knjižnica Slovenije zagotavlja dostop do učbenikov za petje in učenje inštrumenta, ki so na Slovenskem izšli v letih od 1867 do 1925. V skupini koncertnih sporedov je dosegljivih več kot 1.600 sporedov koncertov, ki so bili izvedeni v letih od 1867 do 1946. Največ je sporedov koncertov Glasbene matice in Filharmonične družbe, vendar zbirka zajema tudi sporede drugih solistov in ansamblov.

V fondih Glasbene zbirke Narodne in univerzitetne knjižnice je ohranjen tudi korpus historičnih zvočnih posnetkov, ki so redki v knjižničnih zbirkah. Gre za stare gramofonske plošče na 78 obratov, večinoma iz obdobja pred drugo svetovno vojno. Večinoma gre za priredbe ljudskih pesmi za vokalne, vokalno-inštrumentalne in popularne zasedbe. V zadnjem času je bilo digitaliziranih tudi približno 2.000 zvočnih kaset, ki so izšle med letoma 1970 in 2000.

Eden večjih portalov, preko katerega je možno dostopati do slovenskih vsebin, je portal Europeana. Poleg tega dLib izmenjuje metapodatke tudi z Nacionalnim portalom odprte znanosti. Metapodatki Digitalne knjižnice Slovenije so uvrščeni tudi v portal odprte znanosti OpenAIRE.[33]

Medinstitucionalno sodelovanje zagotavlja tudi ekonomsko učinkovitost in smotrnost uporabe razpoložljivih virov kot osnovo sistematičnega razvoja. V

33 Europeana, www.europeana.eu; OPENAire, http://www.openaire.eu.

petnajstih letih obstoja se je Digitalna knjižnica Slovenije razvila v sistem, ki zagotavlja podporo zajemu digitalnih vsebin, digitalnemu ohranjanju in spletni dostopnosti za vse partnerje, ki svoje digitalne publikacije dajejo na voljo javnosti prek dLiba. Zato je rezultat skupnega dela na prenosu fizičnih publikacij v digitalno obliko dober, omogoča natančno načrtovanje digitalizacije posameznih vrst gradiva ter je dobra osnova za dostopnost celovitega korpusa slovenike v okviru Digitalne knjižnice Slovenije.

Glasbeno-računalniško raziskovanje

Ko govorimo o prvih valovih digitalizacije, se zdi, da izhajajo iz dveh temeljnih idej: *ohranjanja* in *dostopnosti*. Prva – *ohranjanje* – je zasidrana v eni izmed nabolj razširjenih antropoloških prespektiv od poznega osemnajstega stoletja naprej: razsvetljenskega ideala *univerzalnega* znanja, nekakšne *philosophiae perennis et universalis* (večne in univerzalne filozofije). Njen enciklopedični cilj je zbrati vse »minule bodočnosti,« ki lahko odstopajo od posamezn/ikov/ih »preteklih prihodnosti,« če povzamemo misel Reinharta Kosellecka o odnosu med razumevanjem naše preteklosti, sedanjosti in predvidene prihodnosti.[34] Digitalizacija je glasbi potemtakem omogočila vseprisotnost glasbe brez časovne omejitve – odlično (lahko) ohranja glasbo.

Medtem ko je glasbo mogoče *ohranjati* v mnogih različnih oblikah, ima druga ključna ideja digitalizacije – *dostopnost* – nekakšne *postmoderne* zmogljivosti permutacije, fragmentacije in razvejevanja. Trenutno se zdi, da je dostopnost do posameznih plasti glasbene komunikacijske verige povsem prepuščena posameznim projektom. Odvisne so od prepričanj in politik o dostopnosti glasbenih podatkov v določenem kulturnem okolju. Znotraj IT skupnosti, na primer, Orio[35] piše o »dostopanju, filtriranju, klasifikaciji in pridobivanju.« Schedl, Gómez in Urbano[36] pišejo o naslavljanju *glasbene vsebine*, *glasbenega konteksta*, *uporabnikovega konteksta* in *uporabnikovih značilnosti* kot o medsebojno povezanih plasteh *zaznavanja glasbe*, ki tvorijo skupno problematiko MIR. Müller je po drugi stran pisal o »glasbenih reprezentacijah in Fourierjevem zaporedju« kot dveh vsebinskih sklopih, zaradi katerih je njegov pregled na področje MIR »v veliki meri samostojen.«[37] Jannach in drugi so se osredotočali na *glasbenoanalitične procese* in v podpoglavje »Music Data: Beyond the Signal Level« vključujejo obširna področja matematike kot tudi »muzikalnosti,« na primer pretresanje *čustev*, *organizacijo glasbenih zbirk*,

34 Reinhart Koselleck, *Vergangene Zukunft: Zur Semantik geschichtlicher Zeiten* (Frankfurt am Main: Suhrkamp, 1995).

35 Nicola Orio, »Music Retrieval: A Tutorial and Review,« *Foundations and Trends® in Information Retrieval* 41, št. 1 (2006): 1–90.

36 Markus Schedl, Emilia Gómez in Julián Urbano, »Music Information Retrieval: Recent Developments and Applications,« *Foundations and Trends® in Information Retrieval* 8, št. 2–3 (2014): 127–261.

37 Meinhard Müller, *Fundamentals of Music Processing: Audio, Analysis, Algorithms, Applications* (New York: Springer-Verlag New York, 2015), ix.

vzpostavljanje sistemov glasbenega prepoznavanja in celo *avtomatsko komponiranje*.[38] Na kratko povedano: tip informacij, na katere se posamezni raziskovalci osredotočajo, je večinoma odvisen od raziskovalčeve epistemološke usmeritve. Čeravno bi bilo v tem trenutku glasbenega raziskovanja to težko zagotovo trditi, se zdi, da sta glavni vodili računalniško podprtega raziskovanja glasbe pridobivanje informacij, na eni strani *iz* glasbe, in na drugi strani *o* glasbi. Lahko bi rekli, da je ravno razlikovanje podrobnega proučevanja podatkov *iz glasbe* na eni strani in na drugi *o glasbi* tisto, kar določa dve med seboj povezani skupini problematik, s katerimi se danes ukvarja MIR. To nazorno prikaže shema treh avtorjev: Schedla, Gómeza in Urbana,[39] saj vključuje zelo prepričljivo sistematizacijo obilice raziskovalnih usmeritev znotraj področja zaznavanja glasbe ne le računalniško-glasbenega raziskovalnega področja, temveč glasbenega raziskovanja nasploh:

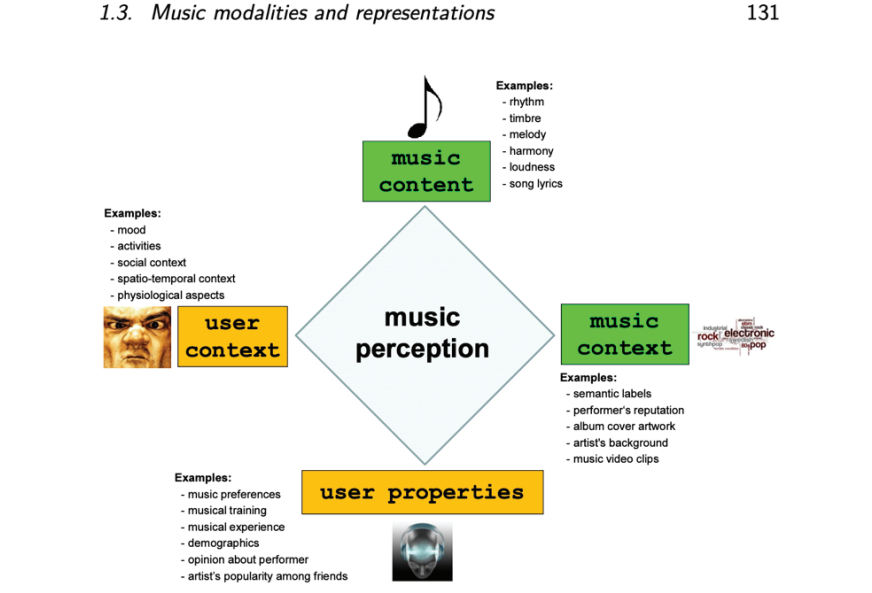


Figure 1.1: Categorization of perceptual music descriptors proposed in [230]

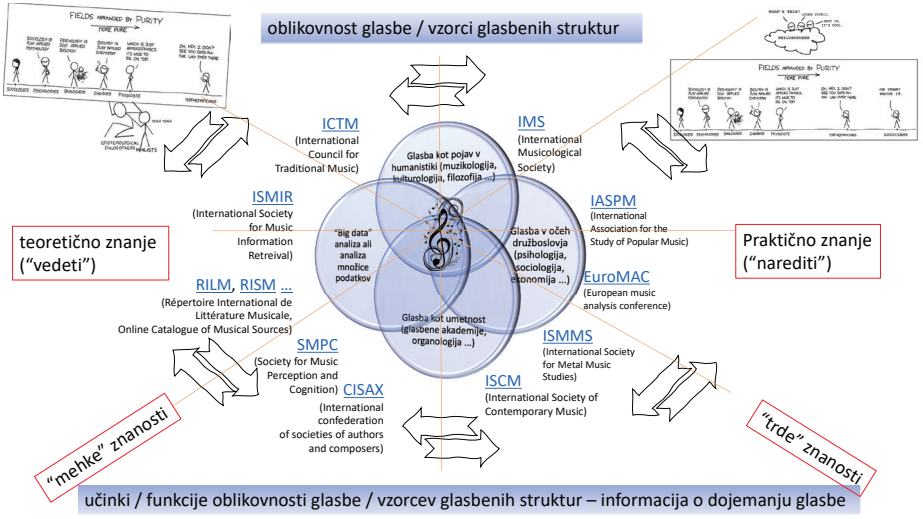
Shema 3: Shema zajema ključne vsebinske sklope komunikacijske verige: poslušalca in kontekst v katerem se nahaja, kakor tudi glasbo in okoliščine, ki so pomembne nanje; obenem pa medij, skozi katerega poslušalec pride do glasbe, postavlja bodisi v kontekst poslušalca bodisi v okoliščine, ki zadevajo glasbo. Glede na to, da so mediji danes posebna – pomembna – plat sodobnega bivanja.[40]

38 Claus Weihs, Dietmar Jannach, Igor Valotkin in Gunter Rudolph, *Music Data Analysis: Foundations and Applications* (London: Chapman and Hall/CRC, 2016).

39 Schedl, Gómez in Urbano, »Music Information Retrieval,« 127–261.

40 Prav tam, 131.

Iščoč celovitejšo povezovanje stremenj na področju raziskovanja glasbe predlagamo shemo z nekoliko drugačnimi poudarki (Shema 4), ki temeljijo na trenutnih institucionalnih interesnih skupinah znotraj glasbenoraziskovalne mreže:



Shema 4: Zanimanja za glasbeno analizo danes izhajajo iz različnih interesov največjih akademskih društev oz. ustanov na področju raziskovanja glasbe. Navedene epistemološke premise so po našem mnenju verjetno največkrat obravnavane vsebine v današnjih raziskavah glasbene analize.

Znotraj razmerij, prikazanih v Shemi 4, najdemo tudi nekatere projekte, povezane z Laboratorijem za računalniško grafiko in multimedije na Fakulteti za računalništvo in informatiko Univerze v Ljubljani.[41]

Dejavnosti Laboratorija[42] se večinoma osredotočajo na računalniške perspektive pridobivanja glasbenih informacij ter razumevanju glasbe. V zadnjih dvajsetih letih se je Laboratorij posvečal široki paleti tematik, od transkripcije tonskih višin glasbe za klavir[43] in pritrkavanja,[44] odkrivanja

41 »Laboratorij za grafiko in multimedijo,« Fakulteta za računalništvo in informatiko, dostop 30. novembra 2022, https://fri.uni-lj.si/sl/laboratorij/lgm.

42 Vse projektne aplikacije Laboratorija so dostopne na: »Research and Development Projects,« LGM: Laboratory for Computer Graphics and Multimedia, dostop 30. novembra 2022, http://lgm.fri.uni-lj.si/research/#category.

43 Matija Marolt, »A Connectionist Approach to Automatic Transcription of Polyphonic Piano Music,« *IEEE Transactions on Multimedia* (2004): 439–449.

44 Marieke Lefeber in dr., »Identificatie van repertoire van achtiende-eeuwse bellen- speelklokken op basis van automatische vergelijking, « *Tijdschrift van de Koninklijke Vereniging voor Nederlandse Muziekgeschiedenis* 61, št. 12 (2011): 147–161.

melodije[45] in srednjenivojske značilke za detekcijo priredb[46] do raziskovanja odnosa med razpoloženjem zaznavanjem barve v glasbi[47] in globoko kompozicionalno modeliranje harmonije, melodije in ritma.[48]

Sodelovanje Laboratorija z Glasbenonarodopisnim inštitutom se je pričelo v letu 2006. Skupaj so ustvarili nekaj zanimivih in uspešnih projetkov ter aplikacij, začenši z razvojem arhiva EthnoMuse kot digitalne poosebitve inštitutovih zbirk.[49] EthnoMuse je bil deloma vključen tudi v projekta Click to Homeland (ARRS projekt, 2010–2012), ki je upodobil spletno multimedijsko predstavitev kulture slovenskih emigrantov, in EtnoFletno (2014–2015), soroden obliki pretočne storitve (npr. Spotify) za doživljanje tradicijske glasbene dediščine na spletu in mobilnih napravah.

Projekta EtnoKatalog (ARRS projekt, 2008–2011) in Thinking Folklore (ARRS projekt, 2018–2021) sta se osredotočala na pristope iskanja in zbiranja glasbenih informacij, ki so bili posebej prilagojeni arhivom tradicijske glasbe. Računalniški pristopi, ki se jih običajno uprablja pri proučevanju popularne ali umetnostne glasbe, so se v tem primeru izkazali za omejene, saj sta bili vsebina in oblika podatkov specifični (terenski posnetki, posneti v »neidealnih« okoliščinah z amaterskimi izvajaci proti studijskim posnetkom s profesionalnimi glasbeniki). Iz projektov so nastali sistemi za segmentacijo terenskih posnetkov,[50] segmentacijo in transkripcijo petja[51] in transkripcijo posnetkov pritrkavanja.[52]

45 Matija Marolt, »Audio Melody Extraction Based on Timbral Similarity of Melodic Fragments,« Paper presented at *Proceedings: The International Conference on Computer as a Tool, Belgrade, Serbia and Montenegro, 21–24. November, 2005*, 1288–1291. DOI:10.1109/EURCON.2005.1630193.

46 Matija Marolt, »A Mid-Level Representation for Melody-Based Retrieval in Audio Collections,« *IEEE Transactions on Multimedia* 10, št. 8 (2008): 1617–1625.

47 Matevž Pesek, Aleš Leonardis in Matija Marolt »An Analysis of Rhythmic Patterns with Unsupervised Learning,« *Applied Sciences* 10, št. 1 (2020): 1–22.

48 Matevž Pesek in dr., »The Moodo Dataset: Integrating User Context with Emotional and Color Perception of Music for Affective Music Information Retrieval,« *Journal of New Music Research* 46, št. 3 (2011): 246–260; Matevž Pesek, Aleš Leonardis in Matija Marolt, »SymCHM– An Unsupervised Approach for Pattern Discovery in Symbolic Music with a Compositional Hierarchical Model,« *Applied Sciences* 7, št. 11 (2017): 1–21; Pesek, »An Analysis of Rhythmic Patterns.«

49 Gregor Strle in Matija Marolt, »The EthnoMuse Digital Library: Conceptual Representation and Annotation of Ethnomusicological Materials,« *International Journal on Digital Libraries* 12 (2012): 105–119.

50 Matija Marolt, »Probabilistic Segmentation and Labeling of Ethnomusicological Field Recordings,« paper presented at *ISMIR 2009: Proceedings of the 10th International Society for Music Information Retrieval Conference, 26.–30. October 2009, Kobe, Japan, 2009*, 75–80, https://zenodo.org/record/1415532; Matija Marolt in dr., »Automatic Segmentation of Ethnomusicological Field Recordings,« *Applied Sciences* 9, št. 3 (2019): 1–12.

51 Ciril Bohak in dr., »Transcription of Polyphonic Vocal Music with a Repetitive Melodic Structure,« *AES* 64, št. 9 (2016): 664–672.

52 Matija Marolt, »Automatic Transcription of Bell Chiming Recordings,« *IEEE Transactions on Audio, Speech, and Language Processing* 20, št. 3 (2012): 844–853.

Glasbeno-izobraževalne aplikacije

Poleg raziskovalno usmerjenih dosežkov, je e-etno/muzikologija prispevala tudi k pedagoškim procesom. Prvi poskus sistematičnega izrisa področja računalniških pripomočkov za glasbeno pedagogiko se je izvršil dokaj pozno[53] in zdi se, da je na tem mestu smotrno nadaljevati pot in skicirati še slovenske inovacije e-učenja.

Poleg *učbenikov in izročkov*, ki jih pedagogški delavci in učenci vedno bolj pogosto uporabljajo v e-obliki (večidel v formatu PDF), so strokovnjaki zunaj akademskih krogov do danes izoblikovali že kar nekaj e-učilnic. Velika večina spletnih vsebin je zasnovana za pouk glasbene teorije – nauka o glasbi. Zavod Republike Slovenije za šolstvo je postavil ambiciozen obseg »zbiranja gradiv po vertikali za pouk glasbe.«[54] V njem lahko poudarimo osem spletnih učilnic[55] in tri e-učbenike.[56] Akademska raziskovalna mreža Slovenije (Arnes) nudi e-učilnice za pedagoge od leta 2018, do začetka leta 2021 je bilo mogoče našteti 206 učilnic za glasbo.[57] V prvi vrsti so posvečene osnovnošolski glasbeni vzgoji, nato srednješolski glasbeni vzgoji in glasbeni teoriji na ravni nižje glasbene šole.

V zadnjih desetletjih so bila v sodelovanju Fakultete za računalništvo in informatiko z nekaterimi ostalimi članicami Univerze v Ljubljani in Konservatorijem za glasbo ustvarjena nekatera *izobraževalna spletišča in aplikacije*. Čeprav se glasbeni pedagogi velikokrat poslužujejo tujih glasbenih (spletnih) aplikacij, je slovenska stroka leta 2007 oblikovala svoj prvi prosto dostopen e-pripomoček Pojmovnik teorije glasbe, ki predstavlja spletišče, namenjeno teoriji glasbe. Kot je zapisano na spletišču, »[o]bjava v PTG predstavlja pomemben prispevek k razvoju koherentne in ugledne mreže znanja na področju raziskovanja teorije glasbe.«[58] Poleg spletne aplikacije Bojane Borota Glasbeni slikovni zapis: Ritem (2007; aplikacija od 8. septembra 2015 naprej ni več dostopna) je treba poudariti še projekt MySolfeggio (2017) kot brezplačno dostopen prototip za dopolnjevanje glasbenih učbenikov in učilnic in na drugi strani MaestroAmadeus (2017), ki služi kot profesonalna aplikacija za organiziranje in uporabo notnih zapisov. Najnovejši projekt, ki je rezultat primarnega sodelovanja Matije Marolta, Matevža Peska in Petra Šavlija, je mobilna

53 Leon Stefanija, *Računalniško podprto poučevanje glasbe / Computer-Assisted Music Learning* (Ljubljana: University of Ljubljana, Faculty of Arts, 2006), http://www2.arnes.si/~lstefa/hala/RPG_files/RPG.htm (SLO različica), http://www2.arnes.si/~lstefa/hala/CAML_datoteke/CAML.htm (ENG version).

54 Več na: https://skupnost.sio.si/course/view.php?id=999#section-1.

55 Več na: https://skupnost.sio.si/course/search.php?search=glasba.

56 Več na: https://eucbeniki.sio.si/.

57 *Arnes učilnice*, dostop 30. novembra 2022, https://ucilnice.arnes.si/course/search.php?q=glasba&areaids=core_course-course.

58 »Pravilnik delovanja,« *Pojmovnik teorije glasbe*, dostop 30. novembra 2022, http://pojmovnik.fri.uni-lj.si/pravilnik-delovanja/.

aplikacija Trubadur.[59] Glavni namen te platforme je pomagati pri urjenju glasbenega posluha novih generacij učencev, ki jih mobilne naprave spremljajo od rojstva. Osredotoča se na melodične, ritmične in harmonijske vaje in pripravljajo še vrsto novih e-pripomočkov. Trubadur je na Konservatoriju za glasbo v Ljubljani že dodobra zaživel.

Izven izobraževalnega in raziskovalnega sistema

Znotraj bolj turistično naravnanih projektov, povezanih z glasbo, je med drugim nastala aplikacija Guide2Music, ki uporabniku omogoča raziskovanje narodnih parkov, glasbenih zbirk, (glasbenih) dogodkov in rojstnih hiš glasbenikov.[60] Podobne ambicije je gojil tudi Slovenski glasbenoinformacijski center (SIGIC).[61] Oba projekta sta postavljena samostojno in – v sicer zelo interaktivnem okolju – v kratkem nimata predvidenega nadaljnjega razvoja.

V slovenskem prostoru sta nastali še dve aplikaciji – EDO in GEO. Prva »glasbenim izvajalcem in založbam v Sloveniji omogoča pregled nad spoštovanjem njihovih pravic med uporabniki glasbe (npr. v gostinskih lokalih, okrepčevalnicah, barih, slaščičarnah, trgovinah, frizerskih in kozmetičnih salonih ...).«[62] Po drugi strani pa je spletna aplikacija GEO oblikovana za opazovanje uporabe glasbe znotraj skupin »manjših uporabnikov« s pomočjo ineratkivnega zemljevida.[63] Obe sta v svoji uporabi omejeni na spekter »nadzorovanja«: pridobivanje podatkov o natančnem številu izvedb določene skladbe ali izvajalca še ni na voljo. Prav tako zaenkrat še ni znane metode o pridobivanju informacij o tem, kolikokrat je bila določena skladba predvajana na določenem viru (torej posameznikov telefon, radio, računalnik in ostali pripomočki).

Trenutno najnaprednejšo glasbeno platformo, ki je nastala v Sloveniji in je mednarodno razmeroma odmevna, je ponudilo slovensko podjetje Viberate, glasbeno omrežje in analitika, d. o. o. Le-to je leta 2017 v petih minutah zbralo 9.000.000 evrov zagonskega kapitala v kriptovalutah in je kmalu postalo eno vodilnih na področju analize glasbenega trga. Njihova platforma Viberate[64] sodi med najbolj dodelane posrednike med glasbeniki in glasbenimi ustanovami in festivali. Ambicioznost analize glasbenega tržišča trenutno privlači precej pozornosti tako med glasbeniki kot tudi med ustanovami, saj spremlja, na primer, predvajanje 2400 radijskih postaj v 150 državah po vsem svetu, glasbenim

59 Matevž Pesek in dr., »Motivating Students for Ear-Training with a Rhythmic Dictation Application,« *Applied sciences* 10, št. 19 (2020): 1–19, DOI:/10.3390/app10196781; »Vadnice,« *Pojmovnik teorije glasbe*, dostop 30. novembra 2022, http://pojmovnik.fri.uni-lj.si/vadnice/.

60 Frank Elda, *Guide2Music: Learn how to Play the Piano from Home*, dostop 30. novembra 2022, https://guidetwomusic.wordpress.com/.

61 Momus, https://www.momus.si/, dostop 30. novembra 2022.

62 »Aplikacije,« *IPF, k.o.*, dostop 30. novembra 2022, https://www.ipf.si/ipf-ko/aplikacije.

63 »GEO,« IPF, k.o., dostop 30. novembra 2022, http://geo.ipf.si/.

64 Viberate, dostop 30. novembra 2022, https://www.viberate.com/.

ustanovam in glasbenikom pomaga do boljšega razumevanja delovanja glasbenih dogodkov z informacijami o posameznih lokacijah, ki pripravljajo nastope, medtem ko festivalom pomaga z možnostjo vzporejanja glasbenikov na podlagi vrste z njimi povezanih značilnosti in njihovega dela.[65]

Akademski zadržki

Četudi bi danes le stežka preživeli brez računalnika ali pametnih naprav, glasbeno raziskovanje v Sloveniji vse prej kot z naglico nadgrajuje tehnično plat metodologij in nerado vzpostavlja komunikacijo med raznolikimi vejami medsebojno povezanih strok. Katera »nova področja muzikologije« so tista, ki odpirajo možnosti »dela z večjo gmoto podatkov,« kar je Cook (2006, 5) smatral za glavno premiso e-muzikologije?[66]

Slovenska »velikopodatkovna« muzikologija izgleda kot skupina manjših procesov, ki se sramežljivo spogledujejo, če sploh, z obstajajočimi e-pristopi, sicer že dodobra zasidranih v nekaterih drugih humanistikah in družboslovju. Za boljšo ilustracijo trenutnih razmer, izpostavimo tri probleme.

Prvi primer – *glasbena antropologija*. Glasbena antropologija v najširšem pomenu besede, vključujoč glasbeno psihologijo, sociologijo in estetiko, bi lahko izkoriščala sledenje in analizo glasbene konzumacije v različnih (geografskih) območjih s strani najrazličnejših uporabnikov. To do neke mere podpirata že prej omenjeni aplikaciji EDO in GEO, ki bi bili ob razširitvi svojega delovanja v raziskovalne namene odlični izhodišči, toda veliko bolj učinkovito se je stvari lotila platforma Viberate s celostno analizo glasbenokomunikacijske verige – za zdaj skoraj izključno popularnoglasbenih zvrsti. V njej je mogoče videti t. i. »kulturni preobrat,« ki opozarja o razdrobljenosti sveta: Alfred Schütz je problematiko oklical za drobljenje različnih bivanjskih praks za »so--svetove,«[67] Max Bense za »so-resničnost«[68] in IT strokovnjaki za »virtualne« oz. »razširjene« resničnosti – prav za to gre pri iskanjih sorazmerij med svetovi ustvarjalnosti, poustvarjalnosti, posredovanja in recepcije, česar Viberate sicer ne zajame v celoti, a vsekakor zajema precej obsežen del te celote. Škoda, da akademska sfera (še) ni pokazala znanstvenoraziskovalnega zanimanja, ki bi pri nas te resničnosti umeščal v etno/muzikološko raziskovanje v smeri Lomaxovega kantometričnega sistema, Music Genome Project ali pa Viberate platforme.

65 Medium, dostop 30. novembra 2022, https://medium.com/.

66 Zavedamo se, da bi lahko in bi morali na problem pogledovati še iz marsikaterega zornega kota, a menimo, da izbrani zadoščajo za ilustracijo bistva.

67 Alfred Schütz, *Gesammelte Aufsätze III: Studien zur phänomenologischen Philosophie*, ur. Ilse Schütz (Den Haag: Martinus Nijhoff, 1971), 115 in 203.

68 Max Bense, *Aesthetica (I): Metaphysische Beobachtungen am Schönen* (Stuttgart: Deutsche Verlags-Anst., 1954); Max Bense, *Aesthetica: Einführung in die neue Aesthetik* (Baden-Baden: Agis, 1965).

Drugič – *glasbeno zgodovinopisje in analiza oblikovnosti*. Velike podatkovne baze bi lahko pomagale glasbenemu zgodovinopisju iz dveh vidikov. Na eni strani bi bile v veliko pomoč analizi glasbenih vzorcev v izbranem glasbenem korpusu: poznavanje slogovnih značilnosti na vseh ravneh oblikovnosti ponuja veliko bolj temeljite možnosti primerjave med avtorji, zvrstmi in obdobji kot fenomenološki pristopi, osredotočeni na specifike enega glasbenega dela ali opusa. Na drugi strani zbiranje in analiziranje podatkov na način, kot to počne Viberate, prinaša veliko več podatkov o kroženju in sprejemanju glasbe v primerjavi s podatki, ki so dostopni v klasičnih pisnih virih – sistematični analizi teh podatkov se zlasti zgodovinopisje sodobne glasbe trdovratno upira. Trenutno v Sloveniji še ne moremo govoriti o konkretno pripravljenih korpusih, ki bi bili lahko uporabni za analizo oblikovnosti glasbe, analizo pretoka glasbenih del in dogodkov, ali analizo recepcije glasbe. Uporabnost tovrstnih zbirk bi verjetno zajela interese glasbenega raziskovanja glasbe v najširšem pomenu: od etno/muzikologov in praktičnih glasbenikov do kulturnega managementa, ekonomije in medijskih študij.

Tretjič – *teorija glasbe*. Pametni glasbeni pripomočki za urjenje o glasbeni teoriji so v današnji praksi zelo razširjeni, zaželeni in učinkoviti na vseh stopnjah glasbenoizobraževalnega procesa. Ne kaže pozabiti, da teorija glasbe po svoji (tudi etimološki) naravi vključuje *pregledovanje* in *razmislek* o glasbenih pojavih na širši način, kot se to počne v današnjih akademskih krogih: sega namreč od računalniško podprte analize produkcije glasbenih struktur in analize sloga (glasbena teorija) do analize glasbenih in recepcijskih konceptov (kot je npr. analiza terminologije ali estetskih konceptov v pisanju o glasbi). V širšem smislu ima glasbena teorija torej vrsto stičišč z lingvistiko, psihologijo, medijskimi in komunikacijskimi študijami ali pa s strojnim učenjem.

Zaključek

Današnje demokratično in liberalno raziskovanje glasbe vse bolj intenzivno tekmuje s hitro razraščajočim se svetom informacijskih tehnologij. Čeprav se na trenutke zdi, da je prispevek računalniške analize glasbe skoraj nepregleden, verjamemo, da cilj katerega koli analitičnega prizadevanja v proučevanju glasbe še vedno prevprašuje le dve med seboj prepleteni skupini vprašanj, ki jih je skrbno opisal že Carl Dahlhaus leta 1970. Trdil je, da vsaka glasbena analiza bodisi izhaja iz določene teorije bodisi se zaključuje z njo.[69] Soodvisnosti med »širšo sliko« in »manjšim delcem« – med *teorijo* kot izhodiščem analize in oblikovnimi ali estetskimi *podrobnostmi* kot temelji grajenja neke teorije – nedvomno odpirajo preširoko množico problematik, da bi jih lahko obravnavali v tem prispevku. Zato na kratko povzemamo bistvo prispevka. V okviru Adornovega analitičnega ideala, po katerem je treba »definirati vsako celotno obliko

69 Carl Dahlhaus. *Analyse und Werturteil* (Mainz: Schott, 1970), 17.

iz dinamičnega prepletanja njenih elementov,«[70] se gibljejo tudi danes aktualna prizadevanja računalniško podprte analize glasbe. Razmerja med glasbenimi strukturami in njihovimi »dinamičnimi interakcijami,« ki tvorijo »celoto,« so navsezadnje tisto, kar se skriva za Lomaxovo Kantometriko, žene Pandorin The Music Genome Project, Nielsenove Gracenote Sonic Style »stilne profile« in v določeni meri tudi Viberate platformo.

Čeprav postopki računalniško podprte analize niso novost za klasično izurjenega etno/muzikologa, se zdi, da potrebujejo akademski krogi še nekaj časa, da osmislijo in raziščejo prednosti in možnosti glasbene analize večjih podatkovnih baz. Dejstvo pa je, da je sodelovanje IT in etno/muzikološkega sveta ne le neizbežen, dobrodošel in obojestransko izredno koristen, temveč tudi nujen. Ostaja pa odprto vprašanje, kako konkretno izboljšati obstoječo komunikacijo in pretok znanja o »glasbenih strukturah« in »celoto« njihovega in, ne nazadnje, tudi tudi našega obstoja.

Literatura

Adorno, Theodor W. *Gesammelte Schriften in 20 Bänden*. Zvezek 15, *Komposition für den Film: Der getreue Korrepetitor*. Berlin: Suhrkamp Taschenbuch Wissenschaft, 2003.

Adorno, Theodor W. *Gesammelte Schriften in 20 Bänden*. Zvezka 20/1 in 20/2, *Vermischte Schriften*. Berlin: Suhrkamp Taschenbuch Wissenschaft, 2003.

Adorno, Theodor W. *Dissonanzen: Musik in der verwalteten Welt*. Göttingen: Vandenhoeck und Ruprecht, 1991.

Bense, Max. *Aesthetica (I): Metaphysische Beobachtungen am Schönen*. Stuttgart, 1954.

Bense, Max. *Aesthetica: Einführung in die neue Aesthetik*. Baden-Baden: Agis, 1965.

Bohak, Ciril, in Matija Marolt. »Transcription of Polyphonic Vocal Music with a Repetitive Melodic Structure.« *AES* 64, št. 9 (2016): 664–672.

Borota, Bogdana, in Andrej Brodnik. *Glasbeni slikovni zapis: Ritem*. Elektronska knjiga. Koper: Pedagoška fakulteta, 2007.

Christensen, Thomas. »Fétis's Racial Frame of Tonality (Part II).« V *History of Music Theory: SMT Interest Group & AMS Study Group*. 29. September 2020, https://historyofmusictheory.wordpress.com/2020/09/.

Cook, Nicholas. »Towards the Compleat Musicologist?« Paper presented at *Ismir 2005*. http://ismir2005.ismir.net/documents/Cook-CompleatMusicologist.pdf.

Dahlhaus, Carl. *Analyse und Werturteil*. Mainz: Schott, 1970.

70 Theodor W. Adorno, *Dissonanzen: Musik in der verwalteten Welt* (Göttingen: Vandenhoeck und Ruprecht, 1991). »[...] jede ganze Form aus dem dynamischen Zusammenspiel ihrer Elemente bestimmen«. Izpostavljena problematika je izredno bogato zastopana znotraj Adornovih analiz. Njegove analize tretjega in dvanajstega opusa Antona Weberna uspešno tematizirajo odnos med najmanjšo podrobnostjo in širšim teoretičnim okvirjem. Adorno razlikuje med »kompozicijsko analizo« (»Kompositionsanalyse«) in »izvajalsko oz. interpretacijsko analizo« (»Interpretationsanalyse«) kot »ne shematsko ločeni med sabo,« čeprav je bila kompozicijska analiza vedno smatrana pred interpretacijsko (»nicht schematisch voneinander abgegrenzt, obwohl in den Interpretationsanweisungen der Komposition durchweg der Vorrang zukam«). Theodor W. Adorno, *Gesammelte Schriften in 20 Bänden*, zvezek 15, *Komposition für den Film: Der getreue Korrepetitor* (Berlin: Suhrkamp Verlag, 2003).

Hörisch, Jochen. *Theorie-Apotheke: Eine Handreichung zu den humanwissenschaftlichen Theorien der letzten fünfzig Jahre, einschließlich ihrer Risiken und Nebenwirkungen*. Berlin: Suhrkamp Verlag, 2012.

ISO: International Organization for Standardization. »Space Data and Information Transfer Systems: Open Archival Information Systems: Reference Model.« Dostop 30. novembra 2022. https://www.iso.org/standard/24683.html.

Jeppesen, Knud. *The Style of Palestrina and the Dissonance*. New York: Dover Publications, 1971.

Koselleck, Reinhart. *Vergangene Zukunft: Zur Semantik geschichtlicher Zeiten*. Frankfurt am Main: Suhrkamp, 1995.

Kosseleck, Reinhart. *Futures Past: On the Semantics of Historical Time*. Prevod in spremna beseda Keith Tribe. New York, Chichester: Columbia University Press, 2004.

Križnar, Naško. »Avdiovizualni laboratorij in etnologija.« *Traditiones* 30 (2001): 85–118.

Križnar, Naško. »Creators, Researchers and Users of Intangible Cultural Heritage in the Light of the National List of Living Cultural Heritage.« *Traditiones* 41, št. 2 (2012): 183–191.

Križnar, Naško. »Etnologija in vizualna antropologija.« *Traditiones* 31, št. 2 (2002): 85–92.

Križnar, Naško. »Izhodišča vizualnih raziskav v etnologiji.« *Traditiones* 20 (1991): 143–162.

Križnar, Naško. »Prispevek vizualne produkcije k ohranjanju nesnovne kulturne dediščine.« *Glasnik Slovenskega etnološkega društva* 53, št. 3–4 (2013): 94–95.

Križnar, Naško. »Vizualije kot teksti.« *Traditiones* 23 (1994): 241–248.

Križnar, Naško. »Utemeljitev in osnutek aktivnosti delovne skupine za etnografski film pri SED.« *Glasnik Slovenskega etnološkega društva* 46, št. 1 (2006): 62.

Križnar, Naško. »Vizualna antropologija v tranzicijskih državah.« *Traditiones* 30, št. 2 (2001): 161–166.

Križnar, Naško. »Vizualna etnografija kot dejanje emancipacije.« *Glasnik Slovenskega etnološkega društva* 49, št. 1–2 (2009): 116–119.

Kunej, Drago. »Fonografski posnetki slovenskih ljudskih pesmi iz Bele krajine v SEM: Rezultat lastnih snemanj ali pridobljeno gradivo OSNP?« *Etnolog* 19 (2009): 225–235.

Kunej, Drago. »Kaj nam tudi pripovedujejo zgodnji zvočni zapisi v GNI?« *Glasnik Slovenskega etnološkega društva* 54, št. 3 (2013): 44–50.

Kunej, Drago. »Matija Murko – pionir terenskega zvočnega dokumentiranja.« V *Matija Murko – slovanski filolog v najširšem pomenu besede*, uredila Marko Jesenšek in Marija Stanonik, 236–252. Ljubljana: Slovenska akademija znanosti in umetnosti, 2020.

Kunej, Drago. »Možnosti in omejitve zvočnih zapisov ljudske glasbe.« *Traditiones* 29, št. 1 (2000): 197–208.

Kunej, Drago. »Nastajanje zvočnega arhiva Glasbenonarodopisnega inštituta.« *Traditiones* 27 (1998): 175–185.

Kunej, Drago. »Pesemsko izročilo Bele krajine na zgodnjih terenskih posnetkih.« *Traditiones* 46, št. 3 (2017): 125–140. DOI:/10.3986/Traditio2017460307.

Kunej, Drago. »Prva magnetofonska snemanja za zvočni arhiv Glasbenonarodopisnega inštituta.« *Traditiones* 28, št. 2 (1999): 217–232.

Kunej, Drago. »Vplivi terenskih zvočnih snemalnih naprav na etnomuzikološke raziskave.« *Traditiones* 30, št. 1 (2001): 303–312.

Kunej, Drago. »We Have Plenty of Words Written Down, We Need Melodies!: The Purchase of the First Recording Device for Ethnomusicological Research in Slovenia.« *Traditiones* 34. št. 1 (2005): 125–140. DOI:10.3986/Traditio2005340110.

Lefeber, Marieke, Peter van Kranenburg in Matija Marolt, »Identificatie van repertoire van achtiende-eeuwse bellen- speelklokken op basis van automatische vergelijking.« *Tijdschrift van de Koninklijke Vereniging voor Nederlandse Muziekgeschiedenis* 61, št. 12 (2011): 147–161.

Marolt, Matija. »A Connectionist Approach to Automatic Transcription of Polyphonic Piano Music.« *IEEE Transactions on Multimedia* 6, št. 3 (2004): 439–449.

Marolt, Matija. »A Mid-Level Representation for Melody-Based Retrieval in Audio Collections.« *IEEE transactions on Multimedia* 10, št. 8 (2008): 1617–1625.

Marolt, Matija. »Audio Melody Extraction Based on Timbral Similarity of Melodic Fragments.« Paper presented at *Proceedings: The International Conference on Computer as a Tool, Belgrade, Serbia and Montenegro, 21–24. November, 2005*, 1288–1291. DOI: 10.1109/EURCON.2005.1630193.

Marolt, Matija. »Automatic Transcription of Bell Chiming Recordings.« *IEEE Transactions on Audio, Speech, and Language Processing* 20, št. 3 (2012): 844–853.

Marolt, Matija. »Probabilistic Segmentation and Labeling of Ethnomusicological Field Recordings.« Paper presented at *ISMIR 2009: Proceedings of the 10th International Society for Music Information Retrieval Conference, 26.–30. October 2009, Kobe, Japan, 2009*, 75–80. https://zenodo.org/record/1415532.

Marolt, Matija, Ciril Bohak, Alenka Kavčič in Matevž Pesek. »Automatic Segmentation of Ethnomusicological Field Recordings.« *Applied Sciences* 9, št. 3 (2019): 1–12.

Müller, Meinard. *Fundamentals of Music Processing: Audio, Analysis, Algorithms, Applications*. Switzerland: Springer International Publishing, 2015.

Orio, Nicola. »Music Retrieval: A Tutorial and Review.« *Foundations and Trends in Information Retrieval* 1, št. 1 (2006): 1–90. DOI:10.1561/1500000002.

Pesek, Matevž, Aleš Leonardis in Matija Marolt. »An Analysis of Rhythmic Patterns with Unsupervised Learning.« *Applied sciences* 10, št. 1 (2020): 1–22. DOI:10.3390/app10010178.

Pesek, Matevž, Aleš Leonardis in Matija Marolt. »Robust Real-Time Music Transcription with a Compositional Hierarchical Model.« *PloS One* 12, št. 1 (2017): 1–21. DOI:/10.1371/journal.pone.0169411.

Pesek, Matevž, Aleš Leonardis in Matija Marolt. »SymCHM: An Unsupervised Approach for Pattern Discovery in Symbolic Music with a Compositional Hierarchical Model.« *Applied sciences* 7, št. 11 (2017): 1–21. DOI:10.3390/app7111135.

Pesek, Matevž, Gregor Strle, Alenka Kavčič in Matija Marolt. »The Moodo Dataset: Integrating User Context With Emotional and Color Perception of Music for Affective Music Information Retrieval.« *Journal of New Music Research* 46, št. 3 (2017): 246–260. DOI:/10.1080/09298215.2017.1333518.

Pesek, Matevž, Lovro Suhadolnik, Peter Šavli in Matija Marolt. »Motivating Students for Ear-Training with a Rhythmic Dictation Application.« *Applied sciences* 10, št. 19 (2020): 1–19. DOI:/10.3390/app10196781.

Schedl, Markus, Emilia Gómez in Julián Urbano. »Music Information Retrieval: Recent Developments and Applications.« *Foundations and Trends in Information Retrieval* 8, št. 2–3 (2014): 127–261. DOI:10.1561/1500000042.

Schüler, Nico. »Reflections on the History of Computer-Assisted Music Analysis I.« *Muzikološki zbornik* 41, št. 1 (2005): 31–43.

Schütz, Alfred. *Gesammelte Aufsätze III: Studien zur phänomenologischen Philosophie*, uredila Ilse Schütz. Den Haag: Martinus Nijhoff, 1971.

»*Smernice za zajem, dolgotrajno ohranjanje in dostop do kulturne dediščine v digitalni obliki: Digitalna agenda na področju kulture*.« Različica 1.0. Ljubljana: Ministrstvo za kulturo, 2013. Dostop 17. aprila 2016. http://www.mk.gov.si/fileadmin/mk.gov.si/pageuploads/Ministrstvo/Zakonodaja/2013/Smernice_za_zajem_dolgotrajno_ohranjanje_in_dostop_do_kulturne_dediscine_v_digitalni_obliki.pdf.

Stefanija, Leon. *Računalniško podprto poučevanje glasbe / Computer-Assisted Music Learning*. Ljubljana: Oddelek za muzikologijo Filozofske fakultete Univerze v Ljubljani, 2006. Dostop 30. novembra 2022. Različica v slovenščini: http://www2.arnes.si/~lstefa/hala/RPG_files/RPG.htm. Različica v angleščini: http://www2.arnes.si/~lstefa/hala/CAML_datoteke/CAML.htm.

Strle, Gregor, in Matija Marolt. »The EthnoMuse Digital Library: Conceptual Representation and Annotation of Ethnomusicological Materials.« *International Journal on Digital Libraries* 12 (2012): 105–119. DOI:/10.1007/s00799-012-0086-z.

Tomažič, Agata. »Pisateljska zapuščina na ključu usb.« *Pogledi* (21. aprila 2010): 15.

Weihs, Claus, Dietmar Jannach, Igor Vatolkin in Guenter Rudolph. *Music Data Analysis: Foundations and Applications*. London: Chapman and Hall/CRC, 2017.

Welsch, Wolfgang. *Ästhetisches Denken*. Stuttgart: Philipp Reclam, 2017.

Welsch, Wolfgang. *Unsere postmoderne Moderne*. Berlin: Akademie Verlag, 2008.

Welsch, Wolfgang. *Vernunft: Die zeitgenössische Vernunftkritik und das Konzept der transversalen Vernunft*. Berlin: Suhrkamp Verlag, 1996.

Spletni viri

10th European Music Analysis Conference, Moscow, September 2021. Dostop 30. novembra 2022. https://euromac.mosconsv.ru/.

Arnes učilnice. Dostop 30. novembra 2022. https://ucilnice.arnes.si/course/search.php?q=glasba&areaids=core_course-course.

Elda, Frank. Guide2Music: Learn how to Play the Piano from Home. Dostop 30. novembra 2022. https://www.guide2music.com/.

Empirical Musicology Review: Special Issue on Open Science in Musicology. Dostop 30. novembra 2022. https://emusicology.org/.

European Association for Digital Humanities – EADH. Dostop 30. novembra 2022. https://eadh.org/.

IPF, k.o. »Aplikacije.« Dostop 30. novembra 2022. https://www.ipf.si/ipf-ko/aplikacije.

IPF, k.o. »GEO.« Dostop 30. novembra 2022. http://geo.ipf.si/.

Journal of Interdisciplinary Music Studies. Dostop 30. novembra 2022. https://musicstudies.org/interdisciplinarity/.

LGM: Laboratory for Computer Graphics and Multimedia. »Research and Development Projects.« Dostop 30. novembra 2022. http://lgm.fri.uni-lj.si/research/#category.

Pandora: Music Genome Project. Dostop 30. novembra 2022. https://www.pandora.com/about/mgp.

Pojmovnik teorije glasbe. »Vadnice.« Dostop 30. novembra 2022. http://pojmovnik.fri.uni-lj.si/vadnice/.

Pojmovnik teorije glasbe. »Pravilnik delovanja.« Dostop 30. novembra 2022. http://pojmovnik.fri.uni-lj.si/pravilnik-delovanja/.

Priloga 1: Vzorec obrazca »Zapisnik«

osnova TZap

A ORIGINAL (OT):

1 Posnetek, št.:
2 Trak, št.:
3 Ter. zv., št.:

B ARHIVSKA KOPIJA (AT):

1 Zapisnik, št.:
2 Trak, št.:
3 DAT, št.:
4 Arhivirano:

C INFORMATOR:

1 Ime in priimek:
2 Rojstni podatki:
3 Prebivališče:
4 Poklic:
5 Izobrazba:
6 Opombe:

D POSNETEK:

1 Čas snemanja:
2 Kraj snemanja:
3 Država:
4 Snemalna skupina:

E VSEBINSKI PODATKI ZAPISNIKA:

1 Geslo:
2 Projekt:
3 Dodatno gradivo:
4 Viri in literatura:
5 Publikacije:.
6 Opis vsebine:
7 Opombe:
8 Dodatno besedilo iz ter. zv.:

F TEHNIČNI PODATKI:

1 Izvirnik:
Snemalna naprava:
Mikrofoni:
Trak:
Tehnika snemanja:

2 Kopija:
Reprodukcija:
Mešalna miza:
Snemalna naprava:
DAT
Tehnika snemanja:

G SPLOŠNI PODATKI:

1 Metoda:
2 Trajanje:
3 Omejitev:
4 Avtor zapisnika:
5 Preverjanje zapisnika:

Izpis: 11/11/2020 Vzorec terenskega zapisnika_1.DOC Stran: 1

osnova TZap

DAT	katal. št.	tip pesmi	začetek	trajanje	transk.	vrsta	opombe	nivo p.
							Originalni trak : **Terenski zvezek:**	

Izpis: 11/11/2020 Vzorec terenskega zapisnika_1.DOC Stran: 2

Priloga 2: Navodila za pripravo arhivskega zvočnega gradiva za digitalizacijo, dokumentiranje metapodatkov in popis posnete vsebine v obrazcu »Zapisnik«[71]

Analogno zvočno gradivo, ki je zapisano na zvočnih nosilcih, ima zaradi kompleksnosti zvočnega zapisa in potrebe po ustreznih predvajalnih napravah razmeroma kratko življenjsko dobo. Je zelo občutljivo na vplive okolja (temperatura, vlaga, čistoča) in zahteva primerno ravnanje, saj se drugače lahko poškoduje ali celo uniči. V nadaljevanju so navedena navodila, kako pripraviti analogno zvočno gradivo za predvajanje in digitalizacijo, saj je postopek razmeroma zapleten, dolgotrajen ter zahteva specifično opremo in nastavitve predvajalnih parametrov. S podobno metodologijo se lahko za digitalizacijo pripravi tudi drugo analogno gradivo (npr. fotografije in pisno gradivo).

Pred predvajanjem in digitalizacijo je arhivsko zvočno gradivo potrebno strokovno pregledati, oceniti stanje, značilnosti in posebnosti nosilca ter formata zapisa, hkrati pa zagotoviti ustrezne vsebinske in tehnične metapodatke, ki vplivajo na postopek digitalizacije ter poskrbeti za ustrezno dokumentiranje tovrstnih podatkov. Za dokumentiranje metapodatkov in popis posnete vsebine je v nadaljevanju pripravljen poseben obrazec »Zapisnik«, navodila za pripravo zapisnika pa so sestavni del Navodil za pripravo arhivskega gradiva za digitalizacijo.

1. Metapodatki

Zvočni arhivski dokumenti vsebujejo podatke v različnih oblikah. Posneta zvočna vsebina predstavlja primarne informacije, druge oblike informacij, ki se nanašajo na posneto vsebino, pa so sekundarne informacije (metapodatki), ki zvočno vsebino dopolnjujejo in postavljajo v ustrezen kontekst. Sekundarne informacije so pogosto v pisni obliki (npr. zapisi vsebinskih podatkov na zvočnih nosilcih ali v terenskih zapiskih), lahko pa jih ugotovimo tudi iz podatkov o samem zvočnem nosilcu ali uporabljeni snemalni opremi.

Primarne in sekundarne informacije skupaj tvorijo zvočni dokument in so oboje pomembne za razumevanje in interpretacijo posnete vsebine. Sekundarne informacije (metapodatki) so še posebej pomembni za avtentizacijo posnetka pri postopku digitalizacije ter pri analizi in raziskovanju zvočne vsebine. Zato jih je potrebno dokumentirati, digitalizirati in skupaj s posneto vsebino ohraniti, saj le tako lahko zagotovimo dolgoročno uporabnost zvočnega zapisa.

71 Priloga 2 je povzeta po navodilih, ki so v celoti dostopna na spletu, in sicer na: https://fmh.zrc-sazu.si/publikacije/ oz. https://fmh.zrc-sazu.si/wp-content/uploads/2020/12/Protokol_SLO-1.pdf.

1.a Vsebinski metapodatki

Vsebinski metapodatki so v pomoč pri predvajanju, digitaliziranju in dokumentiranju zvočnega gradiva, saj opisujejo, dopolnjujejo in pojasnjuje posneto zvočno gradivo in so ključnega pomena pri avtentizaciji zvočnega zapisa. Pogosto so zapisani na zvočnih nosilcih, njihovih škatlicah, vloženih lističih ali v posebnih zvezkih in beležkah.

Za pomoč pri dokumentiranju vsebinskih metapodatkov so v obrazcu »Zapisnik« pripravljeni različni sklopi metapodatkov (npr. C: INFORMATOR, D: POSNETEK, E: VSEBINSKI PODATKI ZAPISNIKA), kjer se v polja vpisujejo ustrezni podatki, ki jih pridobimo iz različnih virov.

1.b Tehnični metapodatki

Raziskovalci in zbiralci ljudske glasbe, ki so zapisovali gradivo s pomočjo zvočnih posnetkov, so pri svojem delu uporabljali zelo različno, pogosto preprosto oz. amatersko, snemalno opremo. Uporabljeno opremo in tehnične parametre nastavitve opreme so praviloma slabo dokumentirali, zato teh podatkov ni preprosto ugotoviti. Je pa v veliko pomoč, če lahko pred digitalizacijo iz različnih virov ugotovimo uporabljeno snemalno opremo (snemalna naprava, mikrofoni idr.) ali celo pregledamo morebitno ohranjeno opremo, saj s tem zanesljiveje izberemo ustrezne predvajalne naprave, nastavimo njihove parametre in izberemo najprimernejši postopek digitalizacije.

Ob zvočnih zapisih pogosto obstajajo tudi spremljajoči pisni podatki o posnetkih (npr. terenske beležke, zvezki, zapisi na škatlicah ali vloženi listi v škatlicah zvočnih nosilcev idr.), ki lahko vsebujejo tudi tehnične metapodatke (npr. hitrost predvajanja, število posnetih stez, način snemanja: stereo/mono) in pojasnila o postopku snemanja. Pred digitalizacijo je potrebno tovrstno gradivo zbrati, pregledati in ustrezno dokumentirati.

Za pomoč pri dokumentiranju tehničnih metapodatkov je v obrazcu »Zapisnik« pripravljen sklop F: TEHNIČNI PODATKI, kjer se v polja o izvirniku vpišejo metapodatki o uporabljeni snemalni opremi, zvočnem nosilcu in postopku snemanja, v polja o digitalni kopiji pa tehnični metapodatki o postopku digitalizacije in pri tem uporabljeni opremi.

2. Strokovni pregled zvočnega gradiva pred digitalizacijo

Pregled opravi strokovnjak, ki oceni fizično stanje in stopnja ogroženosti nosilca. Pri tem je posebej pozoren na vrsto in stanje nosilca (vključno z morebitnimi poškodbami in nepravilnostmi) ter značilnosti in posebnosti posameznega nosilca. Na podlagi pregleda se določi ustrezna oprema za digitalizacijo in postopek digitalizacije.

S pomočjo testnega predvajanja nosilca na ustrezni predvajalni opremi se ugotovi format zapisa (npr. stereo/mono, število posnetih stez, hitrost

predvajanja) in določijo nastavitve predvajalne opreme za digitalizacijo (npr. izbor ustrezne predvajalne glave, hitrost predvajanja).

Izvede se sondažni pregled zvočnih posnetkov na nosilcu, s katerim se ugotovi trajanje in vrsta posnete vsebine ter preveri pravilnost pripadajočih metapodatkov. Pri tem se podrobneje ugotovijo tudi morebitne poškodbe in anomalije zvočnega nosilca, ki bi lahko povzročile težave pri predvajanju in digitalizaciji ter celo dodatne poškodbe nosilca in zvočnega zapisa. Pred predvajanjem je potrebno ugotovljene nepravilnosti odpraviti in nosilec ustrezno restavrirati.

3. Napotki za pripravo »zapisnika«

Za dokumentiranje in popis posnetega analognega zvočnega gradiva in dokumentiranje postopka digitalizacije je pripravljen poseben obrazec »Zapisnik.« Sestavljen je iz dveh vsebinskih delov: prvi del zajema različne vsebinske in tehnične metapodatke, ki se nanašajo na posneto gradivo, drugi del predstavlja kronološki popis posnete vsebine oz. posnetih enot na zvočnem nosilcu.

3.a Metapodatki o posnetem gradivu

Metapodatki o posnetem gradivu so razdeljeni na več vsebinskih sklopov (označeni so z A, B, C, D, E, F in G), ki zajemajo različne vrste metapodatkov.

A: ORIGINAL

Sklop A vsebuje tri polja, ki se nanašajo na oznake ali arhivske signature, ki jih imajo izvirni zvočni nosilci in spremni pisni viri:

1. **Posnetek, številka:** arhivske signature ali oznake posameznih posnetih enot na zvočnem nosilcu (če obstajajo, npr. GNI M 33.112–33.125)
2. **Zvočni nosilec, številka:** arhivska signatura ali oznaka zvočnega nosilca (npr. T 31 ali K 12)
3. **Terenski zvezek, številka:** arhivske signature ali oznake spremnih pisnih virov (npr. terenskih zvezkov, beležk, arhivskih popisov itn.), ki se nanašajo na posneto vsebino (npr. TZ 15)

B: DIGITALNA KOPIJA

Sklop B vsebuje tri polja za osnovni popis dokumentov, ki bodo nastali pri digitalizaciji izvirnika:

1. **Zapisnik, številka:** signatura ali oznaka zapisnika (obrazca). Vsak zapisnik mora imeti svojo signaturo, ki je enoznačna. Zapisnik zajema gradivo ene snemalne seanse (terenskega snemalnega dogodka), npr. snemanje nekega informatorja na določen dan, snemanje prireditve, snemanje več informatorjev v okviru enega dogodka oz. na istem mestu idr. (npr. Zap 25)

2. **Ime datoteke:** ime oz. oznaka datoteke, ki vsebuje digitalizirano zvočno gradivo (digitalizirano kopijo)
3. **Digitalizirano:** datum, ko je bila izvedena digitalizacija

C: INFORMATOR
Sklop C vsebuje štiri polja z osnovnimi podatki o izvajalcih (informatorjih, sogovornikih idr.):

1. **Ime in priimek:** ime in priimek izvajalcev (lahko je dodano tudi domače ime ali rojstni priimek) in vloga posameznega izvajalca pri izvajanju (npr. kateri glas poje, katero glasbilo igra)
2. **Rojstni podatki:** datum in kraj rojstva in drugi tovrstni podatki
3. **Prebivališče:** prebivališče v času snemanja (naslov, kraj, pokrajina)
4. **Opombe:** Različne opombe, ki se nananšajo na izvajalce ter pojasnjujejo in dopolnjujejo njihove zgoraj navedene podatke (npr. sorodstvena razmerja, morebitne spremembe kraja bivanja, služenje vojaštva in daljša potovanja, ki je morebiti vplivalo na izvajani repertoar, vloga v skupnosti, vloga posameznega izvajalca pri skupinskem izvajanju, morebitne posebnosti izvajanja itn.)

D: POSNETEK
Sklop D vsebuje štiri polja z osnovnimi podatki o posnetku:

1. **Datum snemanja:** datum (in čas, če je znan) nastanka izvirnega posnetka
2. **Kraj snemanja:** naslov, kraj in pokrajina nastanka izvirnega posnetka ter prostor snemanja (npr. kuhinja, dvorana kulturnega doma itn.)
3. **Država:** država nastanka izvirnega posnetka
4. **Snemalna skupina:** vsi sodelavci, ki so na terenu neposredno sodelovali pri nastanku posnetka (raziskovalci, snemalci, organizatorji snemanja ...)

E: VSEBINSKI PODATKI ZAPISNIKA
Sklop E vsebuje osem polj s podatki o posneti vsebini:

1. **Geslo:** kratko enoznačno ime (opis), ki opiše terensko snemanje oz. v zapisniku zajeto gradivo: praviloma je sestavljeno iz kraja in datuma nastanka posnetka ter kratice pokrajine; če je potrebno, lahko vsebuje tudi dodatno oznako (npr. Beltinci, 28. 1. 1988, Prkm)
2. **Projekt:** morebitni projekt ali posebej poimenovan sklop raziskovanja, v okviru katerega so nastali izvirni zvočni posnetki (npr. Raziskovalni tabor ERICO 2003)
3. **Dodatno gradivo:** morebitno dodatno gradivo, ki neposredno dopolnjuje in/ali pojasnjuje posneto zvočno gradivo (npr. fotografije izvajalcev,

fotografije prireditve, video posnetki, koncertni listi, seznami nastopajočih na prireditvi, pisne predloge (pesmarice), po katerih izvajalci pojejo na posnetkih, pisma in dopisi glede priprave na snemanje idr.)

4. **Viri in literatura:** morebitni dodatni viri in literatura, ki se neposredno nanašajo na posneto zvočno gradivo tega zapisnika (npr. tiskani, rokopisni, zvočni ali drugi viri) ali izvajalce (npr. kronike kulturnih društev)
5. **Publikacije:** morebitne publikacije, kjer je že bilo objavljeno zvočno gradivo (ali posamezne posnete enote gradiva) iz tega zapisnika (npr. pesmarice, gramofonske plošče, CD-ji, radijske oddaje idr.)
6. **Opis vsebine:** s kraticami označene vrste posnetih enot (npr. 1m – enoglasno moško petje, 2ž – dvoglasno žensko petje, vmž – večglasno moško in žensko petje, i – inštrumentalni posnetek itn.)
7. **Opombe:** različne opombe, ki se nanašajo na posneto vsebino in/ali zvočno snemanje ter to na kratko opisujejo, pojasnjujejo in dopolnjujejo, npr. kje so se naučili posnetega repertoarja, kakšne so značilnosti izvajanja (suvereno, glasno, morebitne težave z izvajanjem melodije ali besedila idr.), več morebitnih podatkov o tem, kje in kako je potekalo snemanje (npr. v sobi ali kuhinji na domu informatorja, prireditev na odru, mikrofoni nameščeni na mizi idr.), morebitne tehnične in akustične značilnosti posnetkov (prisotnost šuma, popačenja, nizek nivo glasnosti idr.), prisotnost drugih ljudi, ki se jih morda občasno sliši na posnetkih, vendar niso navedeni med informatorji itn.
8. **Dodatno besedilo iz terenskega zvezka:** morebitno dodatno gradivo, ki na snemanju ni bilo zvočno dokumentirano, ampak je zapisano v terenskih zvezkih (beležkah, lističih idr.) in se nanaša na posneto vsebino ali izvajalce

F: TEHNIČNI PODATKI

Sklop F vsebuje podatke o snemalnih napravah in tehnični opremi, ki je bila uporabljena pri snemanju in digitalizaciji zvočnega gradiva. Razdeljen je na dve skupini polj: podatki, ki se nanašajo na izvirnik, in podatki, ki se nanašajo na digitalno kopijo.

1 Izvirnik:

Vsebuje tiste tehnične podatke, ki se nanašajo na snemalno opremo in postopek snemanja ob nastanku posnetkov na izvirnem zvočnem nosilcu.

- **Snemalna naprava:** vrsta, tip, serijska številka in morebitni drugi podatki o napravi (ali napravah), ki je bila uporabljena na snemanju
- **Mikrofoni:** vrsta, tip, serijska številka in morebitni drugi podatki o mikrofonu (ali mikrofonih), ki je bil uporabljen na snemanju
- **Zvočni nosilec:** vrsta, tip, serijska številka ali tovarniška oznaka zvočnega nosilca, na katerega se je snemalo

- **Tehnika snemanja:** opis načina in postopka snemanja (npr. mono, dvosledno, hitrost traku 9,5 cm/s, posneta le sled A)

2 Digitalna kopija:

Vsebuje tiste tehnične podatke, ki se nanašajo na opremo in postopek predvajanja izvirnega zvočnega nosilca ter digitalizacijo. Ti podatki se pripravijo in vnesejo ob digitalizaciji zvočnega gradiva.

- **Reprodukcija:** vrsta, tip, serijska številka in morebitni drugi podatki o napravi, ki je bila uporabljena za predvajanje
- **Mešalna miza:** vrsta, tip, serijska številka in morebitni drugi podatki o mešalni mizi, ki je bila uporabljena za predvajanje
- **Snemalna naprava:** vrsta, tip, serijska številka in morebitni drugi podatki o napravi (ali napravah), ki je bila uporabljena za digitalizacijo
- **Digitalni format:** opis digitalnega formata datoteke, v katerem je zapisana digitalna zvočna datoteka (digitalna kopija)
- **Način predvajanja in digitalizacije:** opis načina predvajanja izvirnega analognega nosilca in postopka digitalizacije

G: SPLOŠNI PODATKI

Sklop G vsebuje pet polj s splošnimi podatki o posneti vsebini in pripravi zapisnika.

1. **Metoda dokumentiranja:** uporabljena raziskovalna metoda na terenskem snemanju (možnosti: eksplorativna metoda z dogovorjenim snemanjem ali dokumentarna metoda, kjer snemanje ni vplivalo na posneto vsebino)
2. **Trajanje:** skupno trajanje vseh posnetih enot tega zapisnika
3. **Omejitev objave:** se izpolni takrat, kadar obstajajo morebitne omejitve ali »prepovedi« uporabe ali objave posnetega gradiva (npr. na željo izvajalca, snemalne skupine ali lastnika posnetkov)
4. **Avtor zapisnika:** ime in priimek tistega, ki je izpolnil zapisnik (obrazec)
5. **Preverjanje zapisnika:** ime in priimek tistega (lahko tudi več), ki so zapisnik (obrazec) pregledali in potrdili

3.b Kronološki popis posnete vsebine (enot)

Popis posnete vsebine (zvočnih enot) je narejen v obliki tabele, kjer vsaka vrstica predstavlja posamezno posneto enoto (vsebinsko zaokroženi posnetek), ki si kronološko sledijo. Posamezne kolone opisujejo vsak posnetek oz. enoto. Kolone tabele pomenijo (od leve proti desni):

- **Zaporedna številka:** zaporedna številka posnetka
- **Kataloška številka:** arhivska signatura ali (kataloška) oznaka posnete enote

- **Tip pesmi:** vrsta (žanr) pesmi, npr. pripovedna, ljubezenska, kolednica …
- **Začetek:** minutaža, kjer se posneta enota začne
- **Trajanje:** trajanje posnete enote (razlika med časom začetka in konca posnete enote)
- **Transkripcija:** kdo je naredil transkripcijo posnetka (če obstaja)
- **Vrsta posnetka:** s kratico označena vrsta posnete enote (npr. 1m – enoglasno moško petje, 2ž – dvoglasno žensko petje, vmž – večglasno moško in žensko petje, i – inštrumentalni posnetek itn.)
- **Opombe:** različne opombe, ki vsebinsko opišejo posnetek in izvedbo: najprej naslov posnete enote (pri pesmih prvi verz in nato naslov pesmi v oklepaju, če obstaja, naslov inštrumentalne viže), nato druge opombe, ki so podobne opombam v sklopu E (Vsebinski podatki zapisnika), le da se nanašajo samo na posamezno posneto enoto in ne na celotno posneto gradivo zapisnika (npr. kje so se naučili posnete pesmi, značilnosti izvajanja, tehnične in akustične značilnosti posnetka itn.)
- **Nivo p.:** raven presnetka (morebitno povečanje ali slabljenje jakosti signala) – tehnični parameter, ki se vpiše ob predvajanju in digitalizaciji

SUMMARY

History and Challenges of Digital Ethno/Musicology in Slovenia

We sketch the processes of understanding music as a set of phenomena intricately involved with the IT practices of music retrieval within the Slovenian research community from the three basic perspectives: ethno-/musicological, librarian (essential when approaching music computationally), and IT. The article assesses what these perspectives have brought to the understanding of music and suggests indicates that the three addressed perspectives are not arbitrary. Thus in the first part (ethno/musicological perspective) the main concepts of computer-assisted music analysis are discussed starting with Knud Jeppesen's analysis of Palestrina's style, Alan Lomax's Cantometric project and Music Genome Project as the most ambitious music-analytical endeavour; afterwards, the Slovenian circumstances are described mainly from the ethnomusicological and, closely associated to them and described within the second perspective, the librarian ongoings are given. As the third perspective, the IT projects are described leading to the last part of the article that offers some thoughts on current academic challenges and reflects on possible solutions for how computer-assisted music analysis may be implemented more fully into ethno/musicological research bearing in mind the possibilities of today's interdisciplinary community of music research.

O AVTORJIH

LEON STEFANIJA (leon.stefanija@ff.uni-lj.si) je profesor muzikologije na Filozofski fakulteti v Ljubljani. Bil je predstojnik sistematske muzikologije, med letoma 2008 in 2012 tudi predstojnik Oddelka za muzikologijo. Njegova glavna raziskovalna področja in področja poučevanja so epistemologija raziskovanja glasbe, sociologija glasbe in zgodovina sodobne, predvsem slovenske glasbe od leta 1918. Redno sodeluje z Glasbeno akademijo v Zagrebu, Fakulteto za glasbo Beograd, Univerzo v Gradcu, Glasbeno akademijo v Sarajevu in baletno šolo v Ljubljani.

VANESSA NINA BORSAN (vanessanina.borsan@univ-lille.fr) je trenutno doktorska kandidatka na Univerzi v Lillu pod mentorstvom dr. Mathieuja Girauda in dr. Thierryja Lecroqa. Trenutno se osredotoča na algoritemsko muzikologijo, natančneje na indeksiranje melodičnih in harmonskih vzorcev. Magistrirala je iz zvočnega in glasbenega računalništva (Univerza Pompeu Fabra, Barcelona) ter diplomirala in magistrirala iz muzikologije (Univerza v Ljubljani). Njeni splošni raziskovalni interesi so bili osredotočeni na slovenske ljudske pesmi, zahodno glasbo 20. stoletja ter različne teme digitalne in aplikativne muzikologije.

MATEVŽ PESEK (matevz.pesek@fri.uni-lj.si) je docent in raziskovalec na Fakulteti za računalništvo in informatiko Univerze v Ljubljani, kjer je leta 2012 diplomiral in leta 2018 doktoriral. Od leta 2009 je član Laboratorija za računalniško grafiko in multimedije. Njegovi raziskovalni interesi so iskanje glasbenih informacij, glasbeno e-učenje, biološko navdahnjeni modeli in globoke arhitekture. Raziskoval je tudi kompozicijsko hierarhično modeliranje kot alternativne globoke transparentne arhitekture in večmodalno zaznavanje glasbe, vključno z interakcijo človek-računalnik ter vizualizacijo za analizo zvoka in ustvarjanje glasbe.

MATIJA MAROLT (matija.marolt@fri.uni-lj.si) je izredni profesor na Fakulteti za računalništvo in informatiko Univerze v Ljubljani, kjer je vodja Laboratorija za računalniško grafiko in multimedije. Med njegove raziskovalne interese sodijo pridobivanje informacij iz glasbe, računalniška grafika in vizualizacija. Osredotoča se na probleme, kot so ocenjevanje melodije in ritma, segmentacija in organizacija zvoka ter iskanje in vizualizacija glasbenih zbirk.

DRAGO KUNEJ (drago.kunej@zrc-sazu.si) je višji znanstveni sodelavec in vodja Zvočnega arhiva na Glasbenonarodopisnem inštitutu ZRC SAZU ter docent na Akademiji za glasbo in Filozofski fakulteti Univerze v Ljubljani. Raziskuje zgodovino zvočnih zapisov in zgodnjih etnomuzikoloških zvočnih posnetkov na Slovenskem, posnetke kot vir za etnomuzikološke raziskave, tradicionalna glasbila, folklorne ansamble in glasbo migrantov. Aktivno se ukvarja s tehničnimi in metodološkimi vidiki zvočnih dokumentov ter problematiko zvočnega ohranjanja, restavriranja, presnemavanja, digitalizacije in arhiviranja.

ZORAN KRSTULOVIĆ (zoran.krstulovic@nuk.uni-lj.si) je vodja Oddelka za digitalne vsebine v Narodni in univerzitetni knjižnici Ljubljana, kjer je zaposlen od leta 1988. Do leta 1999 je bil bibliotekar v Glasbeni zbirki knjižnice, med letoma 1999 in 2002 pa je deloval kot vodja bibliografske obdelave. Med letoma 2002 in 2019 je bil pomočnik ravnatelja. Vodil je tudi projekt zasnove in izvedbe Digitalne knjižnice Slovenije (www.dlib.si) in je avtor več člankov in prispevkov s področja razvoja digitalnih knjižnic in glasbenih bibliografij.

ABOUT THE AUTHORS

LEON STEFANIJA (leon.stefanija@ff.uni-lj.si) is a professor of musicology at the Faculty of Arts in Ljubljana. He served as the chair of systematic musicology, between 2008 and 2012 also as the chair of the Department of Musicology. His main research interests and teaching areas are epistemology of music research, sociology of music, and the history of contemporary, primarily Slovenian, music since 1918. He cooperates regularly with the Music Academy in Zagreb, the Faculty of Music Belgrade, the University of Graz, the Music Academy in Sarajevo, and the Ballet College in Ljubljana.

VANESSA NINA BORSAN (vanessanina.borsan@univ-lille.fr) is currently a PhD candidate at the University in Lille under the supervision of Mathieu Giraud and Thierry Lecroq. Her primary focus at the moment is algorithmic musicology, more specifically melodic and harmonic pattern indexing. She holds a master's degree in Sound and Music Computing (Pompeu Fabra University, Barcelona) and a bachelor's and master's degree in musicology (University of Ljubljana). Her general research interests have been centralized around Slovenian folk songs, Western music of the 20th century, and various topics in digital and applied musicology.

MATEVŽ PESEK (matevz.pesek@fri.uni-lj.si) is an assistant professor and a researcher at the Faculty of Computer and Information Science, University of Ljubljana, where he received his BSc in computer science in 2012 and his PhD in 2018. He has been a member of the Laboratory of Computer Graphics and Multimedia since 2009. His research interests are music information retrieval, music e-learning, biologically inspired models, and deep architectures. He has also researched compositional hierarchical modelling as alternative deep transparent architectures, and music multi-modal perception, including human-computer interaction, and visualisation for audio analysis and music generation.

MATIJA MAROLT (matija.marolt@fri.uni-lj.si) is an Associate Professor and the head of the Laboratory for Computer Graphics and Multimedia at the Faculty of Computer and Information Science, University of Ljubljana. His research interests include music /audio information retrieval, computer graphics, and visualisation. He focuses on problems such as melody and rhythm estimation, audio segmentation and organisation, and search and visualisation of music collections.

DRAGO KUNEJ (drago.kunej@zrc-sazu.si) is a Senior Research Associate and the head of the Sound Archives at the Institute of Ethnomusicology ZRC SAZU as well as an assistant professor at the Academy of Music and at the Faculty of Arts, University of Ljubljana. His research includes the history of sound recordings and early ethnomusicological sound documents in Slovenia, recordings as a source for ethnomusicological research, traditional musical instruments, folk dance ensembles and migrant music. He is actively involved in the technical and methodological aspects of sound documents and the problems of sound preservation, restoration, re-recording, digitization, and archiving.

ZORAN KRSTULOVIĆ (zoran.krstulovic@nuk.uni-lj.si) is the head of the Digital Resources Department at the National and University Library, Ljubljana. He has been working at the National and University Library since 1988: up to 1999 as a librarian at the Music Collection of the Library, 1999–2002 as a head of bibliographic processing of the Library, from 2002 to 2019, Library's deputy director. He led the Digital Library of Slovenia (www.dlib.si) design and implementation project. He is an author of several articles and contributions in the field of the digital library development and music bibliographies.

DOI: 10.4312/mz.58.2.51-79
UDK 78:37.091.3:004.738.5

Razvoj platforme Trubadur in novi izzivi v prihajajočih letih

Matevž Pesek,[a] Peter Šavli,[b] Matija Marolt[a]

[a]*Univerza v Ljubljani*
[b]*Konservatorij za glasbo in balet Ljubljana*

IZVLEČEK

Trubadur je odprtokodna platforma za urjenje glasbenega posluha z avtomatiziranimi vajami ritmičnega in intervalnega nareka. Platformo smo ovrednotili z dijaki Konservatorija za glasbo in balet Ljubljana v šolskih letih 2018/19–2020/21. Rezultati evalvacije so pokazali, da lahko uporaba platforme poveča uspešnost pri testih in predstavlja dopolnitev učenja na daljavo.

Ključne besede: e-izobraževanje, urjenje glasbenega spomina, ritmični in intervalni narek, evalvacija IKT pripomočkov pri pouku

ABSTRACT

Trubadur (Troubadour) is an open source platform for training of the musical ear with automated rhythmic and interval dictation exercises. We evaluated the platform together with students of the Ljubljana Music and Ballet Conservatory in the school years 2018/19 – 2020/21. The results of the evaluation showed that using the platform can increase test performance and complement studying from home.

Keywords: e-learning, musical memory training, rhythmic and interval dictation, evaluation of ICT materials in the learning process

Uvod

Učenje glasbe v Sloveniji poteka v okviru različnih formalnih in neformalnih izobraževalnih procesov v osnovnih in srednjih šolah ter na Akademiji za glasbo ter v specializiranih glasbenih šolah in različnih tečajih. Čeprav glasba prinaša veselje tako izvajalcem kot poslušalcem, sta učenje glasbene teorije in posluha pogosto manj zaželena med otroki in mladostniki, ki obiskujejo glasbene programe. Vaje iz glasbene teorije in urjenja posluha so tudi v sami obliki učnega procesa precej monotone. Običajno jih mladostnik izvaja s pomočjo svinčnika oz. pisala in papirja, ob izvajanju vaje s strani učitelja ali s pomočjo posnetka. Ne glede na razvoj pripomočkov informacijsko-komunikacijskih tehnologij (IKT) se računalniki in mobilne naprave le redko uporabljajo kot orodje za vajo v formalnih študijskih procesih in programih. Z modernimi IKT orodji lahko povečamo zavzetost dijakov in jim omogočimo vaje doma brez fizične prisotnosti v učilnici. Z orodji lahko tudi zagotovimo takojšnjo povratno informacijo o pravilnosti izpolnjene naloge. Hkrati ni potrebno, da sta dijak in učitelj fizično prisotna v istem prostoru ali časovno sinhronizirana pri izvedbi in pregledu vaj.

V članku poročamo o razvojnem procesu in evalvaciji platforme Trubadur v šolskih letih 2018/19–2020/21. Platforma je bila razvita v sodelovanju s Konservatorijem za glasbo in balet v Ljubljani. Konservatorij je ena od dveh srednješolskih glasbenih ustanov, ki ju obiskujejo dijaki, ki se večinoma odločajo za poklice, povezane s poučevanjem in izvajanjem glasbe. Čeprav smo se osredotočili na dijake, ki že imajo nekaj glasbenega znanja, se dijaki ob vpisu na konservatorij – še posebej dijaki prvega letnika – pomembno razlikujejo po stopnji znanja glasbene teorije. Obravnava morebitnega vključevanja teh dijakov v spletno platformo za učenje glasbene teorije zato predstavlja izziv.

Vpliv platforme smo ocenili v dveh ocenjevalnih obdobjih v letih 2018/19 in 2019/20, pri čemer smo analizirali uspešnost dijakov pri vajah intervalnega in ritmičnega nareka. Analiza uspešnosti dijakov je pokazala, da se je uspešnost dijakov, ki so uporabljali platformo Trubadur, povečala. Dijaki so v obeh študijah dali tudi pozitivne povratne informacije o platformi. V obeh eksperimentih so bile na platformi uvedene nove oblike glasbenega usposabljanja, sprva intervalni narek, nato ritmični narek. V tretjem letu razvoja platforme smo uvedli dodatne pristope interakcije med dijaki in učitelji: domače naloge, izzive in poglobljeno statistiko posameznega dijaka ter razreda kot celote. Da bi učiteljem zagotovili vpogled, smo razširili modul za upravljanje, ki zdaj zagotavlja individualne in zbirne statistične podatke o uspešnosti dijakov. V tem eksperimentu smo analizirali vključenost, interakcijo in neposredne povratne informacije dijakov s platformo Trubadur v trimesečnem ocenjevalnem obdobju. Cilj te raziskave je bil oceniti prednosti in preostale izzive platforme, pri čemer smo zbirali povratne informacije uporabnikov v trimesečni študiji. Zaradi omejitev javnega življenja zaradi Covid-19 so dijaki v tem časovnem obdobju obiskovali konservatorij preko

spleta (marca in aprila 2021) in v razredu (maja in junija 2021). Zato smo pridobili dragocen vpogled v motiviranost dijakov v obeh načinih učenja (na spletu in v razredu). V tem delu poročamo o rezultatih prvih treh let razvoja platforme in se nato osredotočimo na analizo trenutnega stanja in razvoj v prihodnjih letih glede na trenutne in prihodnje izzive in priložnosti za podporo izobraževalnemu procesu v slovenskem jeziku in na slovenskem prostoru.

Sorodna dela

Orodja za učenje

Sistemi za upravljanje učenja (angl. *learning management systems* – LMS) učiteljem omogočajo, da učno gradivo na preprostejši način preko spleta delijo z dijaki. Kakovost gradiv se lahko razlikuje glede na količino razpoložljivega časa in znanja posameznega učitelja, ki uporablja LMS.[1] Za glasbeno teorijo je bilo za uporabo v LMS izdelanih več tematsko specifičnih paketov. Carney[2] je na primer zgradil sistem za učenje glasbene teorije v klavirski učilnici s paketi SCORM za LMS Moodle, ki je eden najpogosteje uporabljenih sistemov[3] in se tudi najpogosteje uporablja v slovenskih šolah. Paketi so vključevali uporabniški vmesnik, zgrajen s tehnologijo Adobe Flash, in čeprav so podprti gradniki, specifični za glasbeno teorijo (klavirska tipkovnica), je integracija z osnovnim sistemom LMS omejena, uporabljena tehnologija pa je v zadnjih letih zastarela glede na novodobne trende. S strani učitelja pa je nemogoče pričakovati nadaljnji razvoj, posodobitve in vzdrževanje paketov, za kar je potrebno strokovno znanje in dostop do izvorne kode.

Ustvarjanje in vzdrževanje digitalnih gradiv zahteva čas in znanje IKT. Da bi zmanjšali delovno obremenitev učiteljev, je mogoče del vsebine (npr. naključne vaje) ustvariti samodejno.[4] Čeprav obstajajo vtičniki, ki omogoča-

1 Debbi Weaver, Christine Spratt in Chenicheri Sid Nair, »Academic and Student Use of a Learning Management System: Implications for Quality,« *Australasian Journal of Educational Technology* 24, št. 1 (2008), http://ajet.org.au/index.php/ AJET/article/view/1228, DOI:10.14742/ajet.1228.

2 Robert Carney, »Using Web-Based Instruction to Teach Music Theory in the Piano Studio: Defining, Designing, and Implementing an Integrative Approach« (doktorska disertacija, University of North Texas, 2010), 175, https://digital.library.unt.edu/ark:/67531/metadc28404/.

3 Yahaya Abd. Rahim in dr., »A Study On The Effects Of Learning Material Handling Procedures Towards Information Integrity in Moodle Learning Management System (LMS),« paper presented at *2nd International Conference on Electrical Engineering and Informatics (ICon EEI)*, 81–85, https ://ieeexplore.ieee.org/document/8784322/, DOI:10.1109/ICon-EEI.2018.8784322; Hsien-Tang Lin in dr., »Annotating Learning Materials on Moodle LMS,« paper presented at *2009 International Conference on Computer Technology and Development*, 455–459, http://ieeexplore.ieee.org/document/5360189/, DOI:10.1109/ICCTD.2009.131.

4 Prim. Rubén Jesús García Hernández in dr., »E-Cecilia: Implementation of a Music Game,« *CEUR Workshop Proceedings*, št. 1196 (2014): 66–77, https://gaia.fdi.ucm.es/sites/cosecivi14/es/papers/12.pdf; Lorenzo J. Tardón in dr., »Music Learning: Automatic Music Composition and Singing Voice Assessment,« *Springer Handbooks*, ur. R. Bader (Heidelberg: Springer Berlin, 2018), 873–883, https://link.springer.com/chapter/10.1007/978-3-662-55004-5_42, DOI:10.1007/978- 3- 662- 55004- 5_42.

jo samodejno generiranje vaj v obstoječih sistemih LMS (npr. vtičniki Music Theory, Music Scale in Music Key Signature za Moodle),[5] ti vtičniki zahtevajo precejšen učiteljev prispevek za pripravo vaj. Več projektov se osredotoča na razvoj LMS s samodejnim ocenjevanjem, večinoma za teme, povezane s tehnologijo.[6] Cilj teh orodij je zmanjšati delovno obremenitev učiteljev in povečati zahtevnost dijakov. Vendar so prejšnje raziskave[7] pokazale, da bi pomanjkanje tehnične podpore in računalniškega znanja lahko preprečilo, da bi učitelji in tudi dijaki v celoti sprejeli sistem LMS.[8] Tako je v razredih, ki niso povezani s tehnologijo, potencial in hkrati izziv za razvoj poigrenih učnih orodij večji kot v razredih, povezanih s tehnologijo. S samodejnim generiranjem poigrenih vaj bi lahko zmanjšali tehnološko in vsebinsko obremenitev učiteljev.

V zadnjih desetletjih je zanimanje za izobraževanje, podprto z IKT, naraslo.[9] Na področju glasbenega usposabljanja in izobraževanja so bili v teoretični ali prototipni obliki predstavljeni različni pristopi,[10] ki segajo od računalniško podprtega učenja, kot je učenje instrumenta in glasbene teorije, do

5 »Moodle Plugins Directory,« *Moodle*, https://moodle.org/plugins/index.php?q=music.

6 Prim. Janine G. Moura, Leônidas O. Brandão in Anarosa A. F. Brandão, »A Web-Based Learning Management System with Automatic Assessment Resources,"« paper presented at *2007 37th Annual Frontiers In Education Conference – Global Engineering: Knowledge Without Borders, Opportunities Without Passports*, F2D–1–F2D–6, http://ieeexplore.ieee.org/document/4418100/, DOI:10.1109/FIE.2007.4418100; Christopher Douce, David Livingstone in James Orwell, »Automatic Test-Based Assessment of Programming,« *Journal on Educational Resources in Computing* 5, št. 3 (2005): 4–es, http://portal.acm.org/citation.cfm?doid=1163405.1163409, DOI:10.1145/1163405.1163409; Stephan Krusche in Andreas Seitz, »ArTEMiS: An Automatic Assessment Management System for Interactive Learning,« paper presented at *SIGCSE'18: Proceedings of the 49th ACM Technical Symposium on Computer Science Education* (New York: ACM Press, 2018), 284–289, http://dl.acm.org/citation.cfm?doid=3159450.3159602, DOI:10.1145/3159450.3159602; Abderrahmane Adda Benattia, Abdelhalim Benachenhou in Mohammed Moussa, »Development of an Automatic Assessment in Remote Experimentation Over Remote Laboratory,« v *Lecture Notes in Networks and Systems 47: Smart Industry & Smart Education,* ur. Michael E. Auer in Reinhard Langmann (Cham: Springer, 2019), 136–143, https://link.springer.com/chapter/10.1007/978-3-319-95678-7_15, DOI:10.1007/978-3-319-95678-7_15.

7 Mohammed Asiri in dr., »Factors Influencing the Use of Learning Management System in Saudi Arabian Higher Education: A Theoretical Framework,« *Higher Education Studies* 2, št. 2 (2012): 125, http://www.ccsenet.org/journal/, DOI:10.5539/hes.v2n2p125; Sultan Hammad Alshammari in dr., »The Influences of Technical Support, Self Efficacy and Instructional Design on the Usage and Acceptance of LMS: A Comprehensive Review,« *Turkish Online Journal of Educational Technology* 15, št. 2 (2016): 116–125, https://eric.ed.gov/?id=EJ1096463.

8 Samar Ghazal, Hosam Al-Samarraie in Hanan Aldowah, »'I am Still Learning': Modeling LMS Critical Success Factors for Promoting Students' Experience and Satisfaction in a Blended Learning Environment,« *IEEE Access* 6 (2018): 77179–77201, https://ieeexplore.ieee.org/document/8523678, DOI:10.1109/ACCESS.2018.2879677.

9 Mihai Andronie in Maria Andronie, »Information and Communication Technologies (Ict) Used for Education and Training,« *Contemporary Readings in Law and Social Justice* 6, št. 1 (2014): 378–386.

10 Nico Schüler, »Modern Approaches to Teaching Sight Singing and Ear Training,« *Facta Universitatis, Series: Visual Arts and Music* 6, št. 2 (2021): 83, DOI:10.22190/fuvam2002083s.

pomožnih orodij za usposabljanje in izvajanje, povezano z glasbo, kot je sledenje partituram.[11]

Zanetti in Loh[12] sta predlagala spletno rešitev za urjenje posluha za razločevanje tonskih višin. Z uporabo predlagane rešitve sta zbirala podatke o uspešnosti udeležencev in njihove povratne informacije. Avtorja sta poročala o pozitivnem vplivu predlaganega pristopa na dosežke udeležencev. Ugotovila sta tudi, da bi bila za celovito raziskavo učinkov glasbene inteligence in glasbenih sposobnosti na glasbene dosežke potrebna obsežna longitudinalna študija. Kiraly in drugi[13] so predlagali alternativni računalniško podprt pristop k vajam. Poročali so, da je avdio-vizualna okrepitev pozitivno vpliva na motivacijo dijakov, in poudarili prihodnjo uporabo učitelja-računalnika za usposabljanje v prostorsko-časovno neodvisnem okolju v nasprotju s tradicionalnim, prostorsko-časovno fiksnim pristopom v razredu. Seddon in drugi[14] so poročali o izkušnjah udeležencev pri prehodu iz razreda v spletno okolje in opazili pozitivne izkušnje pri glasbenem usposabljanju desetletje pred tem, ko je takšen pristop postal nujen zaradi pandemije Covid-19. V zadnjih dveh letih so zaradi pandemije Covid-19 poročali o prehodu s tradicionalnega na učenje na daljavo.[15] Čeprav je več vidikov učenja, ki jih je mogoče ponoviti na daljavo, je usposabljanje, povezano z glasbo, brez ustreznih orodij težje prenesti v oddaljeno okolje.

Poigritev

Trenutne raziskave kažejo, da igre na splošno ne veljajo več za nekaj negativnega ali nejasnega v učnem procesu, temveč za pomembno spodbudo k učenju.[16]

---

11 Prim. Matthias Dorfer, Andreas Arzt in Gerhard Widmer, »Towards Score Following in Sheet Music Images,« paper presented at *Proceedings of the 17th International Society for Music Information Retrieval Conference New York City, USA, 7–11 August 2016*, 789–795, DOI:10.5281/zenodo.1415548.

12 David Zanetti in dr., »Mona Listen: A Web-Based Ear Training Module for Musical Pitch Discrimination,« paper presented at *Proceedings of E-Learn 2004*: *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education,* eds. J. Nall & R. Robson, 2026–2032 (2004), https://www.learntechlib.org/noaccess/11620/.

13 Zsuzsanna Kiraly, »Solfeggio 1: A Vertical Ear Training Instruction Assisted by the Computer,« *International Journal of Music Education* 40, št. 1 (2003): 41–58, https://journals.sagepub.com/doi/abs/10.1177/025576140304000105, DOI:10.1177/025576140304000105.

14 Frederick Seddon in Michele Biasutti, »Evaluating a Music E-Learning Resource: The Participants' Perspective,« *Computers and Education* 53, št. 3 (2009): 541–549, DOI:10.1016/j.compedu.2008.12.011.

15 Alanna Gillis in Laura M. Krull, »COVID-19 Remote Learning Transition in Spring 2020: Class Structures, Student Perceptions, and Inequality in College Courses,« *Teaching Sociology* 48, št. 4 (2020): 283–299, https://journals.sagepub.com/doi/10.1177/0092055X20954263, DOI:10.1177/0092055X20954263.

16 Cristina Muntean, »Raising Engagement in E-Learning through Gamification,« v *The 6th International Conference on Virtual Learning ICVL 2012* (Bucharest University Press, 2012), 323–329; Richard Van Eck, »Digital Game-Based Learning: It's not Just the Digital Natives Who are Restless,« *EDUCAUSE Review* 41, št. 2 (2006): 16; Eric Sanchez, Shawn Young in Caroline Jouneau-Sion, »Classcraft: From Gamification to Ludicization of Classroom Management,« *Education and Information Technologies* 22, št. 2 (2017): 497–513.

Številni pristopi poigritve se tako uporabljajo pri e-učenju.[17] V raziskavah je bilo vrednotenju poigritve[18] in vključevanju dijakov[19] posvečeno veliko pozornosti, razvoj specializiranih platform in aplikacij za e-učenje pa je doživel razcvet.[20]

Al-Othman in drugi poročajo o več primerih, v katerih so bila specializirana učna orodja, kot so učne platforme, resne igre in okolja, podprta z igrami, uporabljena za izboljšanje učnih rezultatov in povečanje zavzetosti dijakov.[21] Cheng in drugi so opravili pregled sorodnega dela, ki opisuje uporabo resnih iger v naravoslovnem izobraževanju od leta 2002 do 2013, in predlagali metodologijo, v kateri so analizirane igre, pedagogika in raziskovalne metode.[22] Zaradi motivacije uporabnikov so resne igre na splošno dojete kot učinkovito in močno orodje za učenje naravoslovja. Connolly in drugi so v raziskavi pregledali širši spekter iger, kot so jezikovne in zgodovinske igre, igre za samopomoč in družbeno usmerjene igre (brezdomstvo, vožnja, urbanizem in druge), da bi ugotovili morebitne pozitivne učinke in rezultate običajnih in resnih iger na učenje in sodelovanje.[23] Poudarili so tudi pomen prihodnjega razvoja resnih

17 Thomas Connolly, Mark Stansfield in Thomas Hainey, »An Application of Games-Based Learning within Software Engineering,« *British Journal of Educational Technology* 38 (2007): 416–428, https://bera-journals.onlinelibrary.wiley.com/doi/10.1111/j.1467-8535.2007.00706.x, DOI:/10.1111/j.1467-8535.2007.00706.x; S. C. Ng, Andrew K. Lui in W. S. Lo, »An Interactive Mobile Application for Learning Music Effectively,« paper presented at *Knowledge Sharing through Technology: 8th International Conference on Information and Communication Technology in Teaching and Learning, ICT 2013, Hong Kong, China, July 10–11, 2013*, ur. Jeanne Lam, Kam Cheong Li, Simon K. S. Cheung in Fu Lee Wang (Heidelberg: Springer Berlin, 2013), 148–157, https://link.springer.com/chapter/10.1007/978-3-642-45272-7_14, DOI:/10.1007/978-3-642-45272-7_14.

18 Bradley E. Wiggins in Bradley E, »An Overview and Study on the Use of Games, Simulations, and Gamification in Higher Education,« *International Journal of Game-Based Learning* 6, št. 1 (2016): 18–29, http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/IJGBL.2016010102, DOI:10.4018/IJGBL.2016010102; Simone de Sousa Borges in dr., »A Systematic Mapping on Gamification Applied to Education,« paper presented at *Proceedings of the 29th Annual ACM Symposium on Applied Computing – SAC '14* (New York: ACM Press, 2014), 216–222, http://dl.acm.org/citation.cfm?doid=2554850.2554956, DOI:10.1145/2554850.2554956.

19 Caroline E. Morton in dr., »Blended Learning: How Can We Optimise Undergraduate Student Engagement?« *BMC Medical Education* 16, št. 1 (2016): 195, http://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-016-0716-z, DOI:10.1186/s12909- 016-0716-z.

20 Carolyn Wagner, »Digital Gamification in Private Music Education,« *Antistasis* 7, št. 1 (2017), https://journals.lib.unb.ca/index.php/antistasis/article/view/24904.

21 Maryam A. Al-Othman in dr., »An Adaptive Educational Web Application for Engineering Students,« *IEEE Access* 5 (2017): 359–365, http://ieeexplore.ieee.org/document/7865892/, DOI:10.1109/ACCESS.2016.

22 Meng-Tzu Cheng in dr., »The Use of Serious Games in Science Education: A Review of Selected Empirical Research from 2002 to 2013,« *Journal of Computers in Education* 2, št. 3 (2015): 353–375, https://link.springer.com/article/10.1007/s40692-015-0039-9, DOI:/10.1007/s40692-015-0039-9.

23 Thomas M. Connolly in dr., »A Systematic Literature Review of Empirical Evidence on Computer Games and Serious Games,« *Computers & Education* 59, št. 2 (2012): 661–686, https://www.sciencedirect.com/science/article/abs/pii/S0360131512000619, DOI:/10.1016/j.compedu.2012.03.004.

iger, ki bi presegal preproste ugankarske igre, in vključevanja resnih iger v učni proces dijakov. Chou je predlagal celoten okvir poigritve. Okvir zajema vse vidike poigritve s strukturo v obliki osmerokotnika, pri čemer vsako stran predstavlja osem osnovnih gonilnih sil. Avtor je kot alternativni izraz za poigritev predlagal na človeka osredotočeno načrtovanje, ki v nasprotju z osredotočanjem na funkcionalnosti optimizira motivacijo človeka v sistemu.[24]

Pridobivanje informacij iz glasbe

Na področju pridobivanja informacij iz glasbe (angl. *music information retrieval* – MIR) so raziskovalci razvili poigrene aplikacije kot medij za skupno zbiranje podatkov.[25] Uporabljenih je bilo več pristopov za poigritev glasbenih anotacij in zbiranja metapodatkov. Uyar in drugi so predlagali orodje za urjenje ritma, osredotočeno na posebno glasbeno zvrst usul v turški glasbi makam (maqam).[26] Kim et al. so predlagali igro Moodswings za označevanje razpoloženja, kjer so morali uporabniki narisati razpoloženje na graf prijetnosti in aktivnosti.[27] Zbrali so več kot 50.000 točkovnih oznak (angl. *valence-arousal points*) za več kot 1.000 pesmi. Avtorji so opredelili poigritev kot ključno sestavino vključevanja uporabnikov. Na podoben način sta Mandel in Ellis predlagala spletno igro za zbiranje metapodatkov o pesmih, kot sta žanr in instrumentarij.[28] Law in drugi so ustvarili igro TagATune za anotacijo glasbe in zvoka.[29] Igra zbira primerjalne podatke o zvokih in glasbi, pri čemer uporabniki igrajo igro v parih. Avtorji so zbrali odgovore 54 testnih uporabnikov. Osredotočili so se tudi na vključenost uporabnikov s tremi vidiki: občutek kompetentnosti za

24 Yu-kai Chou, »Octalysis: Complete Gamification Framework,« *Yu-kai Chou:Gamification & Behavioral Design*, dostop 27. aprila 2020, https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/.

25 Richard A. Bartle, »Information Reconstruction: Unpicking the GamifIR call for Papers,« paper presented at *Proceedings of the First International Workshop on Gamification for Information Retrieval: GamifIR@ECIR '14, Amsterdam, The Netherlands, April 13* (New York, NY: Association for Computing Machinery, 2014), DOI:/10.1145/2594776.2597423.

26 Burak Uyar in Barıs Bozkurt, »An Interactive Rhythm Training Tool for Usuls of Turkish Makam Music, « paper presented at *5th Int. Workshop on Folk Music Analysis (FMA), Paris, France, 10–12 June 2015* (Paris: University Pierre et Marie Curie, 2015), 126–129, https://zenodo.org/record/1211661, DOI:10.5281/ZENODO.1211661.

27 Youngmoo E. Kim, Erik M. Schmidt in Lloyd Emelle, »MoodSwings: A Collaborative Game for Music Mood Label Collection,« paper presented at *ISMIR 2008: 9th International Conference on Music Information Retrieval, Drexel University, Philadelphia, PA, USA, September 14–18, 2008*, ur. Juan Pablo Bello, Elaine Chew in Douglas Turnbull, 231–236, https://archives.ismir.net/ismir2008/paper/000257.pdf.

28 Michael I. Mandel in Daniel P. W. Ellis, »A Web-Based Game for Collecting Music Metadata,« *Journal of New Music Research* 37, št. 2 (2008): 151–165, DOI:10.1080/09298210802479300.

29 Edith Law in dr., »TagATune: A Game for Music and Sound Annotation,« paper presented at *Proceedings of the International Conference on Music Information Retrieval, ISMIR 2007, Vienna, September 23–27, 2007*, https://www.semanticscholar.org/paper/TagATune%3A-A-Game-for-Music-and-Sound-Annotation-Law-Ahn/50bae0a30cf26601cb14574a53c990bda744e7fa.

uporabnika, prijetnost in čutna uporabniška izkušnja ter možnost povezovanja s partnerjem. Burgoyne in drugi so predstavili igro z imenom Hooked za raziskovanje »udarnosti« pesmi na podlagi odgovorov 26 uporabnikov.[30] Nabor podatkov je bil sestavljen iz 32 pesmi. Aljanaki in drugi so razvili »igro z namenom« za zbiranje čustvenih odzivov na glasbo. Zbrali so več kot 15.000 odzivov od 1.595 udeležencev.[31]

Na splošno so v skupnosti MIR razvite aplikacije služile predvsem kot medij za zbiranje podatkov. Glede na sorodno delo na to temo v MIR predlagane igre, ki so bile narejene za zbiranje podatkov manjših skupin uporabnikov, običajno niso poudarjale vključenih elementov poigritve, medtem ko so avtorji tistih iger, ki so bile razvite za večje število uporabnikov, prav tako poročali, da sta poigritev in vključevanje uporabnikov pomembna vidika za uspeh njihovih aplikacij. Predlaganih je bilo tudi več nekomercialnih aplikacij za učenje glasbe, ki so vključevale poigritev, da bi dosegle zavzetost in izboljšale uspešnost dijakov. Na primer, Gomes in drugi so za učenje glasbe predlagali aplikacijo Flappy Crab, klon znane igre Flappy Bird.[32] Rizqyawan et al. so predlagali pustolovsko igro za učenje glasbene teorije in posluha.[33] Poročali so o znatnem izboljšanju rezultatov pri preizkusih dojemanja relativnih intervalov pri štiridesetih osnovnošolcih.

Komercialne rešitve

Za samostojno učenje glasbe je bilo predlaganih več pristopov. V zadnjem desetletju je bilo razvitih veliko različnih aplikacij za učenje instrumentov v obliki aplikacij za mobilne naprave, ki so na voljo v trgovinah Google Play in Apple App. Več aplikacij vključuje tudi elemente poigritve. Med različnimi instrumenti je najbolj zastopano učenje klavirja. Ena izmed najbolj priljubljenih poigrenih platform za učenje instrumentov je Yousician.[34] Podobno

30 Mandel in Ellis, »A Web-Based Game for Collecting Music Metadata.«

31 Anna Aljanaki, Frans Wiering in Remco Veltkamp, »Collecting Annotations for Induced Musical Emotion via Online Game with a Purpose Emotify,« *Technical Report Series 2014.UU- CS-2014-015* (2014), https://www.semanticscholar.org/paper/Collecting-annotations-for-induced-musical-emotion-Aljanaki-Wiering/7159b180c729795b998c53ef735bb91bb1a70d81.

32 Cristina Maria Cardoso Gomes in dr., »Project Flappy Crab: An Edugame for Music Learning,« *Competencies in Teaching, Learning and Educational Leadership in the Digital Age*, ur. J. Michael Spector, Dirk Ifenthaler, Demetrios G. Sampson, Pedro Isaias (Cham: Springer, 2016), 287–301, https://link.springer.com/chapter/10.1007/978-3-319-30295-9_18, DOI:10.1007/978-3-319-30295-9_18.

33 Muhammad Ilham Rizqyawan in Galih Hermawan, »Adventure Game as Learning Media for Introducing Music Interval and Ear Training to Kids,« paper presented at *2015 International Conference on Automation, Cognitive Science, Optics, Micro Electro-Mechanical System, and Information Technology (ICACOMIT)*, 172–175, http://ieeexplore.ieee.org/document/7440200/, DOI:10.1109/ICACOMIT.2015.7440200.

34 https://yousician.com/ – na voljo tudi v trgovinah App in Play; Anamaria Claudia Eli. »Platforma de educație muzicală 'Yousician',« *Tehnologii informatice și de comunicații in domeniul muzical* 8, št. 1 (2017): 37–41, https://www.ceeol.com/search/article-detail?id=596853.

priljubljena je aplikacija Simply piano.[35] Synthesia[36] vizualno predstavlja klavirski trak (angl. *piano roll*) in tako olajša prve korake pri vadbi klavirja, ne da bi uporabnik potreboval znanje o notnem zapisu. Projekt z imenom ForteRight je med drugimi podobnimi pristopi za podoben namen predlagal tudi klavirski trak. Druga priljubljena možnost za učenje klavirja je My Piano Assistant.[37] Od drugih instrumentov so dobro zastopani tudi kitara in pihala. Poleg programa Yousician, ki podpira tudi učenje kitare, ponuja zelo poigrena aplikacija za učenje kitare Rocksmith[38] izkušnjo, podobno igri Guitar Hero, in je na voljo tudi za uporabnike osebnih računalnikov in konzol (Microsoft XBOX 360 in Sony Play Station 3). Za pihala aplikacija Tonestro[39] ponuja podobno izkušnjo za dijake flavte. Aplikacija Finger Charts ponuja flavtistom, saksofonistom, oboistom in klarinetistom orodje za vadbo položajev prstov. Tudi za glasbeno teorijo in učenje posluha je na voljo več aplikacij. Aplikacija Tenuto[40] ponuja 24 vrst vaj za glasbeno teorijo v obliki kviza. Podobno aplikacija ABRSM Theory Works[41] ponuja kvizu podobno okolje za vadbo glasbene teorije. Nekatere aplikacije v svoje platforme običajno vključujejo uporabniške profile in deljenje dosežkov. Na primer, aplikacija MusicTheoryPro vključuje elemente uporabniških profilov in deljenja dosežkov med uporabniki aplikacije.[42] Vendar je večina razpoložljivih komercialnih aplikacij osredotočena na mladostnike ali odrasle uporabnike. Serdaroglu je opravil pregled približno 60 aplikacij v trgovini Apple App Store, ki so bile na voljo leta 2018, in raziskoval njihovo morebitno uporabo v predšolskem in osnovnošolskem izobraževanju.[43] Odkril je, da je le majhna podskupina razpoložljivih aplikacij za urjenje glasbenega sluha, ki jih najdemo v trgovini Apple App Store, namenjena mlajšim otrokom.

35 https://www.joytunes.com/ – prav tako na voljo v trgovinah App in Play.

36 »A Fun Way to Learn How to Play the Piano,« Synthesiagame, dostop 24. oktobra 2022, https://synthesiagame.com/; Thomas E. Brow in Nico Benitez, »Method and System for Interactive Musical Game,« *Google Patents* (2010), https://patents.google.com/patent/US8445767B2/en.

37 Na voljo v trgovinah Play in App Store

38 https://www.ubisoft.com/en-us/game/rocksmith.

39 »Learn to Play a Brass or Woodwind Instrument,« *Tonestro*, dostop 24. oktobra 2022, https://www.tonestro.com/.

40 https://www.musictheory.net/products/tenuto – na voljo tudi v App store.

41 Na voljo v trgovini App store.

42 http://musictheorypro.net – prav tako na voljo v App store.

43 Emine Serdaroglu, »Ear Training Made Easy: Using IOS Based Applications to Assist Ear Training in Children,« *European Journal of Social Science Education and Research* 5, št. 3 (2018): 202–209, http://archive.sciendo.com/EJSER/ejser.2018.5.issue-3/ejser-2018-0071/ejser-2018-0071.pdf, DOI:10.2478/ejser-2018-0071.

Platforma Trubadur

Trubadur je odprtokodna spletna platforma za urjenje glasbenega posluha. Cilj platforme je postati dopolnilno orodje za individualno vadbo in opravljanje domačih nalog, ki dijakom in učiteljem zagotavlja takojšnje povratne informacije in predstavlja IKT pripomoček za vodeno učenje, ki je komplementaren obstoječim procesom in orodjem. Platforma vsebuje več elementov poigritve, vključno s takojšnjimi povratnimi informacijami, ravnmi, lestvicami in avatarji.

Platforma vključuje aplikacije za ritmični in intervalni narek, z željo po razbremenitvi učiteljev pri pripravi in avtomatiziranem ocenjevanju učenčevih domačih nalog. Aplikacija ustvarja, pregleduje in popravlja vaje ter učitelju omogoča vpogled v uspešnost dijakov, dijakom pa daje takojšnjo povratno informacijo in možnost izboljšanja razumevanja trenutne vaje. Poleg tega platforma zmanjšuje učiteljevo obremenjenost z generiranjem vaj, saj učitelju ni potrebno ročno generirati in popravljati vaj.

Tehnične specifikacije

Platforma je bila razvita kot odzivna spletna aplikacija, ki se dobro prilagaja mobilnim napravam. Na ta način sta razvoj in vzdrževanje platforme poenostavljena, saj je platforma dostopna prek brskalnika na vseh glavnih platformah – Windows, Linux, MacOS X za namizna okolja ter Android in iOS za mobilne naprave. Platforma omogoča intuitivno nadgradljivost aplikacij in razrešitev z novimi vrstami aplikacij. Aplikacije vključujejo več možnosti poigritve. Možno je tudi prilagajanje vaj glede na uporabnikove osebne preference ter prilagajanje težavnosti vaj glede na (pred)znanje.

Aplikaciji za intervalni in ritmični narek

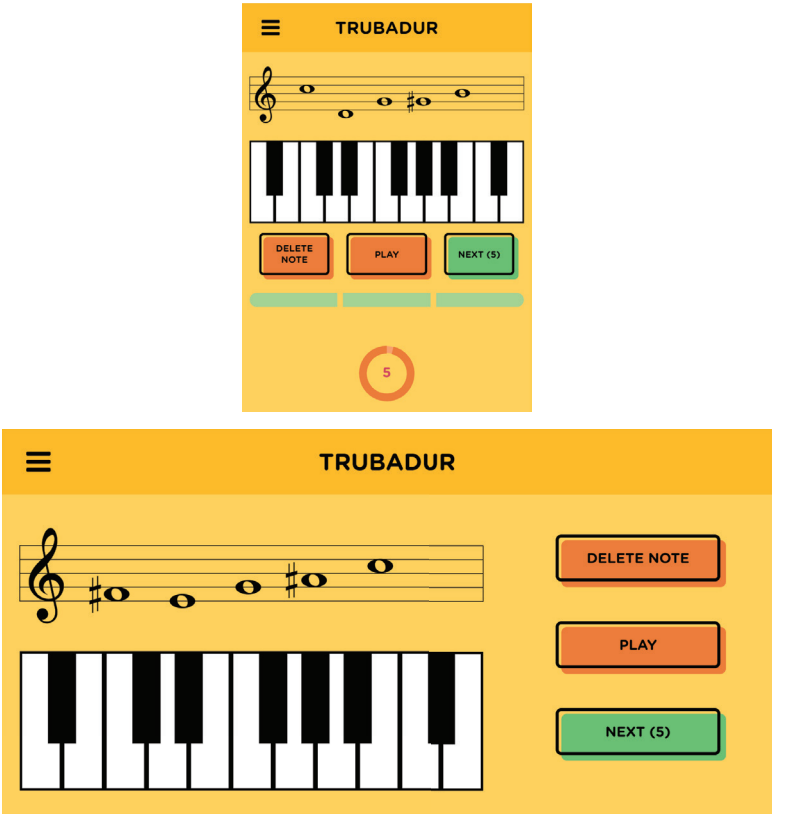
Intervalni narek

Sprva smo razvili dve aplikaciji s samodejnim generiranjem vaj za intervalni in ritmični narek. Prva razvita aplikacija na platformi Trubadur je bila intervalni narek. Zaslon aplikacije je prikazan na Sliki 1: zaslonski posnetek aplikacije za vadbo intervalnega nareka. Zaslon se prilagaja orientaciji mobilne naprave: a) pokončna postavitev in b) ležeča postavitev. Vaja je sestavljena iz petih intervalnih zaporedij. Vsako intervalno zaporedje je sprva zaigrano, prva nota zaporedja pa se samodejno prikaže v notnem zapisu. Učenčeva naloga je, da prepozna slišane tone in jih vnese v prikazani notni zapis. Dijak lahko svoj odgovor vnese s klikom na klavirsko tipkovnico, ki je prikazana pod notnim zapisom.

Samodejno zgenerirane vaje so razdeljene na štiri ravni. Težavnost posamezne ravni je ustrezala posameznemu konferenčnemu obdobju, vsaka pa je bila razdeljena na dodatne štiri težavnostne (pod)ravni. Vaje so podpirale tudi več elementov poigritve, kot so značke in pogledi na lestvico. Z napredovanjem se

v igrah povečuje število not, generirana zaporedja vključujejo več specifičnih intervalov (tritonski, kromatični pristopi) v izmeničnih smereh, več nepopolnih konsonanc kot popolnih konsonanc in več disonanc kot konsonanc. Ker je Peter Šavli didaktično povezal algoritemske rešitve s pevskim obsegom, lahko učenci intervale med zapisovanjem s klaviaturo pevsko preverjajo, jih ponotranjijo in bolje napredujejo. Vaje se lahko zapisujejo sproti (noto vpišemo takoj, ko jo algoritem predvaja) ali pa po končanem predvajanju v celoti.

Ustvarjanje smiselnih psevdonaključnih intervalnih zaporedij je netrivialen proces. Razvili smo algoritem za generiranje zaporedij, ki upošteva več vidikov kompleksnosti zaporedja: dolžino zaporedja, velikost intervalov in pogostost pojavljanja intervalov. S pomočjo učiteljev smo analizirali njihova obstoječa gradiva in oblikovali začetne porazdelitve pojavljanja intervalov za različne težavnostne stopnje. Poznavanje porazdelitev intervalov je potrebno za generiranje psevdonaključnih vaj, da bi dosegli njihovo različno težavnost, pa tudi, da bi bile vaje smiselne.



Slika 1: Zaslonski posnetek aplikacije za vadbo intervalnega nareka. Zaslon se prilagaja orientaciji mobilne naprave.

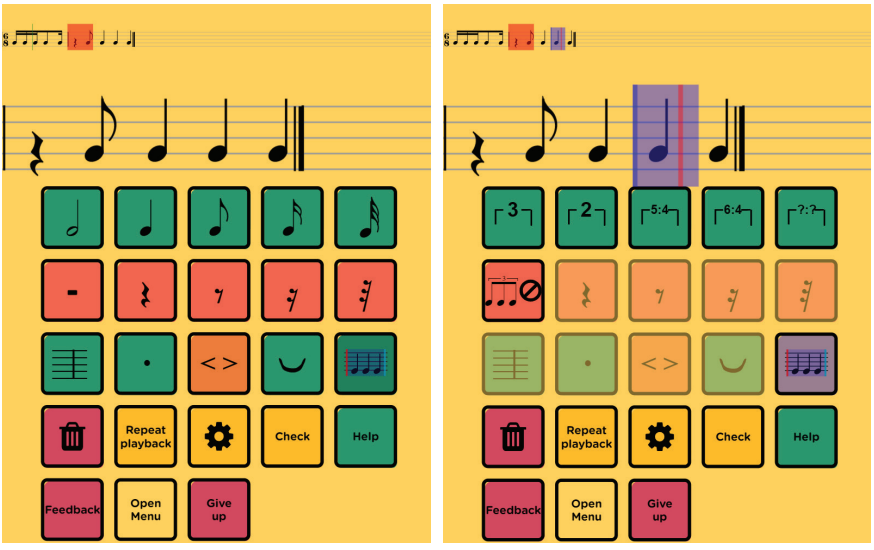
Uporaba zgolj naključnih zaporedij glasbeno ne bi bila »smiselna«: če bi bil na primer interval prime v izhodnem zaporedju prisoten z enako pogostostjo kakor drugi intervali (npr. mala terca), bi bilo izhodno zaporedje naključno, ne pa smiselno, saj se takšne kombinacije v glasbi redko pojavljajo. Zbrane porazdelitve intervalov so bile vključene kot privzete vrednosti algoritma za ustvarjanje intervalnega zaporedja. Da bi ohranili prilagodljivost platforme, smo implementirali vmesnik za spreminjanje teh vrednosti, da bi ustrezale potrebam posameznega učitelja. Rezultat algoritma za generiranje zaporedja je intervalno zaporedje, ki ga določajo omejitve glede dolžine zaporedja, velikosti intervala in intervalnih porazdelitev. Peter Šavli je ritmične vaje didaktično zasnoval kot dvotaktne fraze, kjer je en takt relativno prelahek, dva takta pa sta relativno tako zahtevna, da ju je težko zapisati v prvem poskusu.

Ritmični narek

Druga razvita aplikacija je bila ritmični narek. Uporabniški vmesnik ritmične aplikacije sledi običajnim korakom v praksi: dijaki poslušajo ritmično zaporedje, ki ga morajo zapisati v notnem zapisu. Glavni del uporabniškega vmesnika aplikacije za ritmični narek (Slika 2a – glavni zaslon aplikacije za ritmični narek na mobilni napravi, glavni pogled aplikacije) zato vključuje dve vrsti notnega črtovja, ki prikazujeta vhodno ritmično zaporedje, in vmesnik za vnos ritma. Zgornje (manjše) notno črtovje prikazuje celotno zaporedje z rdečim pravokotnikom, ki označuje območje, prikazano na spodnjem notnem črtovju, kamor uporabnik vnese svoj odgovor na narek. Vajo je mogoče večkrat predvajati in jo med predvajanjem ustaviti.

Vsaka vaja se prične z metronomom, ki označuje taktovski način, temu pa sledi predvajanje ritmičnega nareka. Dijak lahko prilagodi hitrost in glasnost predvajanja. Narek se predvaja z zvokom orgel. Zvok je bil izbran v pogovoru z učitelji glasbene teorije zaradi hitrega začetka, enakomernega trajanja in jasnega konca (angl. *offset*) zvočne predloge. Čeprav se zvok klavirja pogosto uporablja za intervalni narek, vendar zvok po udarcu na klavirsko tipko dlje časa izzveneva oz. sam »udarec« na tipko ne traja dlje časa, kar lahko povzroči nejasnosti pri določanju dolžine dogodka (npr. pavze).

Čeprav obstaja več uveljavljenih smernic za razvoj uporabniškega vmesnika, je specifičnost ritmičnih vaj razkrila zanimiv izziv uporabniške izkušnje. Tipkovnica za vnos ritma podpira različne ritmične vnose: dolžine not in pavz, delitve in sinkopiranje. Da bi se prilagodili majhnim zaslonom mobilnih naprav, so vhodi razdeljeni na dve postavitvi: na osnovni postavitvi so prikazane najpogostejše dolžine not in pavz. S tipkami za delitev in sinkopiranje se postavitev spremeni in prikaže niz dodatnih možnosti vnosa, kot je prikazano na Sliki 2b (sekundarna postavitev vnosne tipkovnice z možnostmi za dodajanje in spreminjanje podrazdelkov je prikazana na desni). Ob upoštevanju obeh usmeritev zaslona se vnos dodatno prilagodi v ležeči postavitvi naprave, kot je prikazano

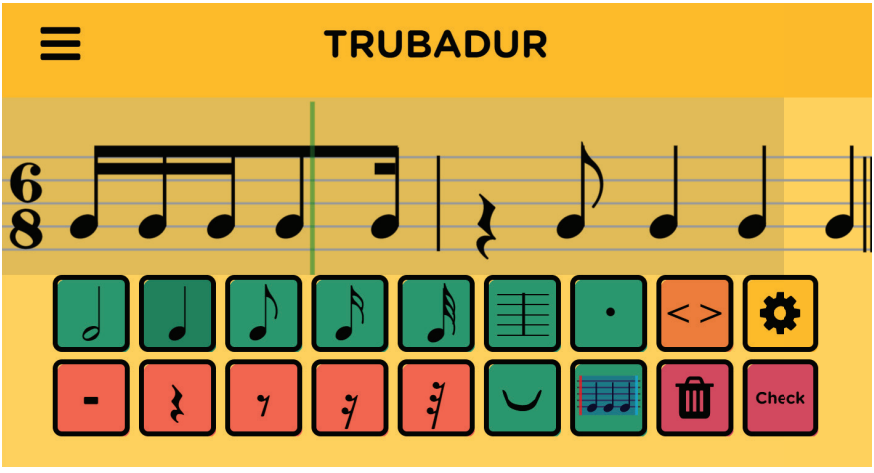


Slika 2: Glavni zaslon aplikacije za ritmični narek na mobilni napravi (levo). Primarni vmesnik za vnos ritma je prikazan pod notnim črtovjem. Sekundarna postavitev tipkovnice z možnostmi za dodajanje in spreminjanje podrazdelkov je prikazana na desni.

na Sliki 3 (postavitev aplikacije za ritmični narek na mobilni napravi v ležeči postavitvi zaslona). Zgornja (manjša) vrstica je odstranjena, spodnja vrstica pa je povečana čez zgornjo polovico zaslona.

Aplikacija za ritmični narek vključuje generator vaj, ki lahko ustvari vaje različnih težavnostnih stopenj. Težavnost ritmične vaje je odvisna od več parametrov, glede na vključenost tonskih trajanj in istoimenskih pavz (od celink do dvaintridesetink), ritmičnih posebnosti (duole, triole, sinkope), kombinacije omenjenih tonskih trajanj in njihovega števila v posameznem nareku. Za ustvarjanje smiselnih naključnih zaporedij je treba uravnavati porazdelitve teh parametrov, sicer lahko pri generiranju nastanejo glasbena nesmiselna in (glasbeno gledano) nerealna zaporedja. Tudi težavnost takšnih zaporedij bi bila zelo različna, kar bi vplivalo na motivacijo dijakov.

Za začetne vrednosti porazdelitve parametrov smo analizirali obstoječa učna gradiva, ki so jih izdelali in zagotovili učitelji. Z njihovo pomočjo smo gradiva razdelili na šestnajst različnih težavnostih stopenj, ki so temeljile na učnem načrtu. Rezultat tega pristopa so naključno generirana zaporedja, ki so primerno težka in glasbeno smiselna, zato dijaka individualno pritegnejo z zadostno težavnostjo, hkrati pa ga ne preobremenijo s pretežkimi, prelahkimi ali nesmiselnimi zaporedji. Šestnajst težavnostnih stopenj vključuje težavnostne standarde v razponu osnovne glasbene šole, konservatorija in akademske sfere. Ravni so razdeljene na štiri glavne ravni, vsaka glavna raven pa je razdeljena na dodatne štiri

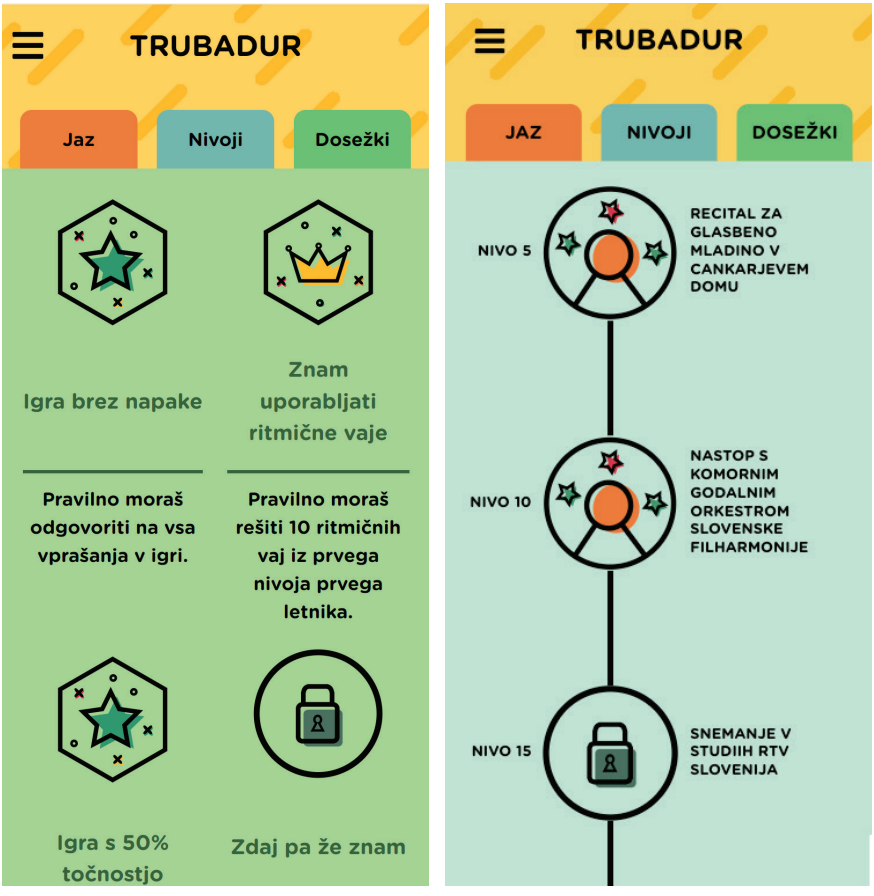


Slika 3: Postavitev aplikacije za ritmični narek na mobilni napravi v ležeči postavitvi zaslona. Vnosna tipkovnica je preurejena, da bi uporabniku olajšala izkušnjo v tem položaju.

manjše ravni. Ravni so označene s številkami (11–14, 21–24, 31–34 in 41–44), pri čemer prva številka ustreza glavni oz. najvišji težavnostni stopnji, druga številka pa nižji težavnosti stopnji. Porazdelitve parametrov za vsako raven so bile določene kot privzete vrednosti za ustvarjanje vaj v aplikaciji za ritmični narek. Vendar lahko posamezni učitelji dodatno spremenijo porazdelitve v skladu s svojim specifičnim učnim načrtom.

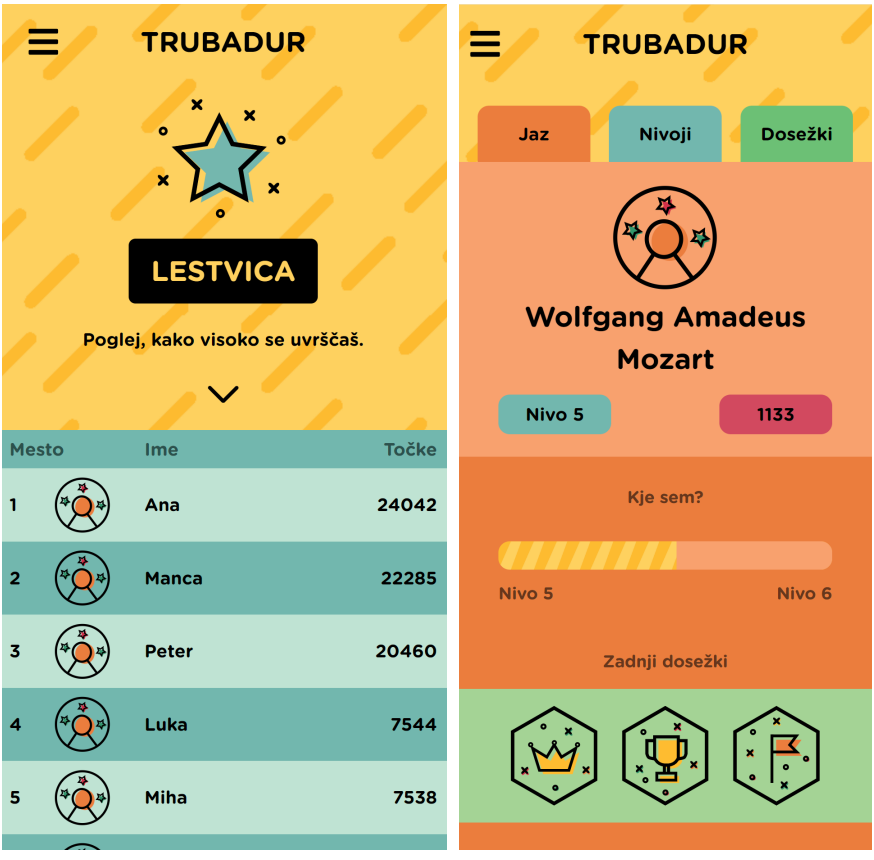
Poigritve na platformi Trubadur

Da bi povečali motivacijo dijakov za uporabo aplikacije, smo jo obogatili z elementi poigritve. Uporabljamo tri elemente poigritve, ki se nanašajo na uspešnost dijakov: ustvarjanje uporabniškega profila in avatarja, značke za dosežke, stopnje napredovanja in vodilno tablo. Stopnje napredovanja (Slika 4a prikazuje pot skozi različne nivoje) in značke za dosežke (Slika 4b prikazuje značke, pridobljene med učenjem) so vidne na začetnem zaslonu dijaka. Z reševanjem več vaj in napredovanjem po težavnostnih stopnjah dijaki zvišujejo svojo raven znanja. Ravni, ki so jih predlagali učitelji, predstavljajo dosežke dijaka skozi popotovanje po različnih oblikah vključenosti v glasbeno skupnost – od lokalnega orkestra do različnih tekmovanj in mednarodnih institucij. Značke, prikazane na Sliki 4b, odražajo tri različne vidike napredka dijakov. Prvi vidik je natančnost, ki se nanaša na dokončanje vaje brez določenega števila napak (od 50 % do 100 % pravilnih odgovorov). Drugi vidik je kontinuiteta učenčeve uporabe platforme in se nanaša na igranje vaje določeno število dni zapored – tri dni, pet dni, teden, dva tedna, mesec. Tretji vidik je učenčeva hitrost čas, potreben za dokončanje vaje v petminutnih intervalih, od 25 minut do 5 minut.



Slika 4: Elementi poigritev v platformi. Levi zaslon prikazuje pot skozi različne nivoje, desni zaslon pa značke, pridobljene med učenjem.

V svojem profilu lahko dijaki nastavijo ali spremenijo tudi svojo profilno sliko, uporabniško ime, institucijo in šolsko leto (Slika 5a – zaslona uporabniškega profila in lestvice najboljših), z grafičnim prikazom zbranih točk in doseženih ravni, ter opazujejo lestvico (Slika 5b – uporabnik lahko opazuje zbrane točke drugih igralcev na zaslonu lestvice najboljših). Na lestvici so prikazane kumulativne točke, ki so jih posamezni igralci zbrali med uporabo platforme. Več točk lahko dijak doseže tako z več rešenimi vajami kot s povečanjem težavnosti vaj. Dijaki lahko opazujejo svojo uspešnost in jo primerjajo z drugimi igralci. S klikom na enega od uporabnikov platforme se prikaže profilna stran izbranega uporabnika z njegovimi doseženimi ravnmi in značkami.



Slika 5: Zaslona uporabniškega profila in lestvice najboljših. Uporabnik lahko nastavi svoj avatar in spremeni podatke o svojem profilu (levo). Uporabnik lahko opazuje zbrane točke drugih igralcev na zaslonu lestvice najboljših (desno).

Eksperimenti

Evalvacija intervalnega nareka

Pri raziskavi v šolskem letu 2018/19 so nam pomagali dijaki prvega in drugega letnika Konservatorija za glasbo in balet Ljubljana ter njihovi učitelji. Po izkušnjah učiteljev imata ta dva letnika običajno največ težav pri prilagajanju na povečano obremenitev in zahtevnost ob vpisu na konservatorij, saj se nižje glasbene šole razlikujejo po zahtevnosti. V pričakovanju učinkovitosti platforme bi lahko aplikacija za intervalni glasbeni narek ponudila zanimivo okolje za prilagajanje povečani zahtevnosti na ravni konservatorija z izboljšanjem njihove izvedbe na nevsiljiv način vadenja.

Dijaki so platformo aktivno uporabljali en mesec med poukom in doma, nato pa je sledil izpit, ki je ocenil njihovo uspešnost pri prepoznavanju intervalov. Da bi ocenili učinek platforme na uspešnost dijakov, smo jih razdelili v testno in kontrolno skupino. Analizirali smo rezultate izpita in primerjali uspešnost obeh skupin.

V testni skupini je bilo šest dijakov prvega letnika in pet v kontrolni skupini. V drugem letniku je bilo trinajst dijakov v testni skupini in devet v kontrolni skupini. Če povzamemo, je bilo v kombinirani testni skupini devetnajst dijakov in štirinajst dijakov v kombinirani kontrolni skupini.

Konec naše študije je sovpadal s koncem šolskega leta, ko so dijaki opravljali zaključni izpit. Izpit je potekal na običajen način, tako da je učitelj na klavirju igral intervalna zaporedja, dijaki pa so svoje odgovore pisali na papir. Dijaki prvega letnika, ki so uporabljali platformo (testna skupina), so v povprečju dosegli 69,8 %, kar je bilo za 9,2 % bolje od dijakov, ki niso uporabljali platforme (kontrolna skupina), ki so v povprečji dosegli 60,6 %. Pri dijakih drugega letnika je bila ta razlika bistveno manjša (približno 1 %), saj so dijaki testne skupine v povprečju dosegli 73,4 %, dijaki kontrolne skupine pa 72,2 %.

Da bi ocenili pomembnost razlik med rezultati izpitov, smo v obeh letnikih izvedli Mann-Whitneyjev U-test med skupinami. Pri dijakih prvega letnika je bila verjetnost različne porazdelitve 0,17 ($p=0,1$, $U=8$) in s tem statistično značilna, medtem ko je verjetnost različne porazdelitve v skupinah drugega letnika ostala visoka pri 0,90, torej nepomembna ($U=52$, $p=0,34$). Povprečja porazdelitev pomenijo bistveno večji (pozitiven) vpliv na rezultate izpitov pri dijakih prvega letnika kot pri dijakih drugega letnika. Vendar so bile skupine zaradi relativne majhnosti konservatorija majhne, kar prav tako omejuje statistični vpogled v njihovo uspešnost. Da bi dodatno ocenili učinek na uspešnost dijakov, smo izvedli test naključne izbire na dveh neodvisnih vzorcih s 5.000 ponovitvami in opazili, da je bil odstotek povprečne razlike enak ali večji od dobljene vrednosti ter je dosegel 0,15 za skupine dijakov prvega letnika in 0,76 za skupine dijakov drugega letnika. V primeri uspešnosti testne skupine dijakov prvega letnika vrednost kaže na razmeroma majhno možnost (15 %) za statistično značilno izboljšanje rezultatov dijakov testne skupine napram kontrolni skupini.

Glede na razliko med dijaki obeh letnikov ta rezultat lahko pripišimo dodatnim izkušnjam in znanju, ki so jih dijaki drugega letnika pridobili med konvencionalno prakso, opravljeno v prvem letu obiskovanja konservatorija. Kljub temu se platforma izkaže kot koristna za pospešitev učnega procesa med dijaki prvega letnika, kar so kot koristno izpostavili tudi učitelji konservatorija. Zato je bila predlagana longitudinalna študija, s katero bi temeljito opazovali vpliv uporabe platforme v višjih letnikih in jo optimizirali za dijake z več znanja.

Evalvacija ritmičnega nareka

V šolskem letu 2019/20 smo dijakom predstavili aplikacijo za ritmični narek. Zopet smo izvedli eksperiment s prvima dvema letnikoma na konservatoriju in analizirali tudi rezultate kontrolne in testne skupine dijakov z opazovanjem njihove uspešnosti pri običajnem testu v razredu. Analizirali smo rezultate izpita in primerjali ocene znotraj skupin in med njimi. Rezultati izpita so bili ocenjeni z ocenami od 1 (najslabša ocena) do 5 (najboljša ocena). Dijaki prvega letnika kontrolne skupine so dosegli povprečno oceno 4,3, dijaki testne skupine pa povprečno oceno 4,5 (4 % povprečje). Rezultati so bili statistično preverjeni z Mann-Whitneyjevim U-testom in razlika ni bila statistično značilna (U=16, p=0,05). Večja razlika je bila opažena pri dijakih drugega letnika, kjer je kontrolna skupina dosegla povprečno oceno 3,58, testna skupina pa 4,44 (19 % boljša ocena, kar je pomembna razlika, U=24, p=0,001). Ker so boljši rezultat dosegli dijaki, ki so uporabljali aplikacijo za ritmični narek, lahko potrdimo, da je uporaba aplikacije pozitivno vplivala na njihovo uspešnost pri izpitu. Ker sta bili obe skupini razmeroma majhni, smo za primerjavo skupinskih povprečij uporabili tudi metodo ponovnega vzorčenja. Pri 1.000 ponovitvah je metoda ocenila 69,2-odstotno verjetnost, da je bil povprečni rezultat testne skupine večji od povprečnega rezultata kontrolne skupine za skupini dijakov prvega letnika. Za rezultate drugega letnika je algoritem pri 1.000 ponovitvah ocenil, da je ta verjetnost 99,6 %. Te ocene so potrdile Mann-Whitneyjev U-test, zato so pokazale, da so se dijaki, ki so uporabljali aplikacijo, pri izpitu bolje odrezali.

Evalvacija daljšega obdobja uporabe v času zaprtja šol med epidemijo Covid-19

V primerjavi s prejšnjimi raziskavami je bil eksperiment v šolskem letu 2020/21 izveden v trimesečnem obdobju, da bi se izognili potencialni pristranskosti novitete (angl. *novelty bias*) iz preteklih raziskav in vplivom na motivacijo dijakov. Ker platforma ni vključevala funkcionalnosti, ki bi omogočale dolgotrajno in izvenrazredno interakcijo z učitelji, smo dodali module domačih nalog in izzivov, ki so tedensko dodajali nove izzive. Dijaki so se hitro seznanili s platformo in jo sprejeli kot glasbeno-izobraževalno orodje. Glede na eksperimentalno postavitev, ki je bila posebej zasnovana tako, da je čim manj posegala v ustaljeno učenje v razredu in zunaj njega, se je število novih registracij uporabnikov znotraj platforme povečalo za večje število od predvidenega. Na koncu je bilo število dijakov, ki so uporabljali platformo v prvem mesecu eksperimenta, večje od števila dijakov, ki jim je bila sama platforma v prvem tednu predstavljena. Za število prijav in igranih iger rezultati kažejo, da so dijaki po treh mesecih uporabe platformo še vedno uporabljali tedensko. Rezultati tega poskusa so presegli tudi pričakovanja avtorjev. Na splošno sklepamo, da se je vključenost dijakov v platformo ohranila tudi po

trimesečnem obdobju in domnevamo, da se bo ohranila tudi po zaključku eksperimenta.

Tudi smernice Covid-19, ki so vplivale na prisotnost dijakov v šoli, niso bistveno vplivale na vključenost dijakov v platformo. Čeprav je bilo pričakovano, da se bo njihova zavzetost nekoliko zmanjšala, so dijaki platformo še naprej uporabljali za urjenje posluha. To pripisujemo dejstvu, da je učenje slušnih vaj v domačem okolju težko brez orodij, podprtih z IKT, in dejstvu, da je učitelj prek platforme lahko ustvarjal neobvezne domače naloge, medtem ko so dijaki, ki so bili platforme že vajeni, platformo še naprej uporabljali doma.

Iz izbranih podatkov tekom eksperimenta smo ugotovili, da dijaki niso pretirano marali dizajna platforme, ki je bil po njihovem mnenju preveč otroški. Ko si bile platformi dodane nove aplikacije in funkcije, je platforma ohranila obliko, ki je potencialno uporabna za mlajše občinstvo (osnovnošolce). Zato bi bilo treba s temeljitejšo analizo uporabniške izkušnje za ciljno skupino na ravni konservatorija preoblikovati zasnovo platforme s sodobnejšim videzom. S tega vidika bo naše prihodnje delo obsegalo preoblikovanje sodobnejše platforme v slogu mobilne aplikacije, kot je prikazano na Sliki 6.

Slika 6: Okvirni osnutek sodobnejše postavitve za platformo Trubadur.

Ostajajoči izzivi

Glede na rezultate obstaja več vidikov te študije, ki jih je še potrebno nasloviti. Medtem ko je bil vpliv na uspešnost dijakov že predhodno ovrednoten in se je izkazal za pozitivnega pri izpitih iz ritmičnega in intervalnega nareka, je potrebno vpliv uporabe orodja IKT namesto običajnega pisala in papirja na druge kompetence dijakov še raziskati na podoben način kot problem pisanja proti tipkanju.[44]

Glede na fizično lokacijo dijakov smo opazili, da je bila platforma uporabljena med učenjem na daljavo, pa tudi med učenjem v razredu. Domača naloga, ki so jo dobili dijaki, ni bila vključena v oceno njihove uspešnosti na tradicionalen način (tj. ocene domače naloge). Vendar je bila domača naloga močno povezana z delom v razredu, zato so učitelji lahko delno vplivali na motivacijo dijakov. Čeprav ta vpliv ne zmanjšuje rezultatov te študije, rezultatov tudi ne bi smeli posploševati na uporabo platforme za individualno ali od učnega načrta neodvisno usposabljanje.

V zvezi s povratnimi informacijami dijakov o njihovi izkušnji s platformo je bilo podanih več pripomb o vizualnem izgledu platforme. Obstaja možnost, da bi drugačna zasnova platforme pozitivneje vplivala na sodelovanje dijakov med eksperimentom. Ker so bili ti komentarji zbrani po eksperimentu, je potrebno to hipotezo še ovrednotiti.

Zaradi majhnega števila dijakov, ki obiskujejo konservatorij, je število udeležencev v tej študiji manjše od želenega. Poleg tega sta bila zaradi razmer v epidemiji Covid-19 dostop in zanesljivost komunikacije z dijaki otežena v primerjavi s prejšnjimi študijami izvedenimi v tem okolju. Po drugi strani pa so te razmere avtorjem omogočile tudi opazovanje morebitnih razlik v sodelovanju dijakov v dveh različnih učnih okoljih (na daljavo in v razredu), ki sta bili uporabljeni zaradi pandemije Covid-19. Takšno opazovanje bi bilo precej težko ponoviti v razmerah brez pandemije, saj bi to zahtevalo precejšnjo prekinitev učnega procesa, poleg tega pa bi ga bilo nemogoče izvesti brez izrecne odobritve pristojnega državnega organa. Glede na izzive zbiranje podatkov med zaprtjem šol menimo, da zbiranje podatkov v tej študiji zaradi navedenih omejitev ni bilo na predvidenem nivoju. Ne glede na to pa nam je ravno sprememba okolja zaradi zunanjih dejavnikov omogočila vpogled v učenčev učni proces in v dijakovo samostojno učenje, saj je zaprtje šol redek pojav, ki ga v realnem okolju predvidoma ne bomo več doživeli.

44 Prim. Marieke Longcamp in dr., »Remembering the Orientation of Newly Learned Characters Depends on the Associated Writing Knowledge: A Comparison between Handwriting and Typing,« *Human Movement Science* 25, št. 4–5 (2006): 646–656, DOI:10.1016/j.humov.2006.07.007; Marieke Longcamp, Marie Thérèse Zerbato-Poudou in Jean Luc Velay, »The Influence of Writing Practice on Letter Recognition in Preschool Children: A Comparison between Handwriting and Typing,« *Acta Psychologica* 119, št. 1 (2005): 67–79, DOI:10.1016/j.actpsy.2004.10.019; Sabine Wollscheid, Jørgen Sjaastad in Cathrine Tømte, »The Impact of Digital Devices vs. Pen(cil) and Paper on Primary School Students' Writing Skills: A Research Review,« *Computers and Education* 95 (2016): 19–35, DOI:10.1016/j.compedu.2015.12.001.

Diskusija in prihodnji razvoj

Platforma Trubadur je bila razvita za urjenje glasbenega posluha in vključuje aplikacije za vadenje intervalnih in ritmičnih narekov. Pri razvoju smo se sprva osredotočali na razvoj aplikacij, kasneje pa na podporne module, saj platforma ni vključevala funkcionalnosti, ki bi omogočale dolgoročno interakcijo med učenci in učitelji. Tako smo dodali domače naloge in module izzivov, ki so vključevali nove izzive na tedenski ravni. Administrativni modul učiteljem omogoča opazovanje in ustrezno ukrepanje pri učnem procesu na podlagi statistike na nivoju posameznikov in razredov. Moduli domačih nalog in izzivov so bili dobro sprejeti in so pozitivno vplivali na vsakotedensko motivacijo dijakov.

Kratkotrajni eksperimenti v prvih dveh šolskih letih so pokazali odličen potencial platforme za izboljšanje rezultatov. V zadnjem šolskem letu eksperimenta je situacija z zapiranjem šol v pandemiji Covid-19 vplivala tudi na našo zmožnost izvedbe takšnih eksperimentov, hkrati pa nam je ponudila odlično priložnost za dolgoročno spremljanje dijakov in njihove interakcije s platformo v različnih oblikah učnega procesa – tako v razredu kot tudi na daljavo. Da bi ocenili sodelovanje dijakov s platformo in zbrali vpogled v dolgoročno uporabo platforme, smo v treh mesecih zbrali njihove podatke. Dijaki so imeli vaje neodvisno od razreda, tedensko. Za sodelovanje ni bilo nobene spodbude, količina domačih nalog, ki jih je opravil dijak, pa ni vplivala na njegovo oceno v razredu ali dajala bonusov. Zbrani podatki so pokazali visoko angažiranost dijakov v celotnem obdobju. Na obdobje ocenjevanja so vplivali tudi zunanji dejavniki, ki so bili posledice pandemije Covid-19. Dijaki so imeli prva dva meseca pouk na daljavo (marec–april), nato pa v razredu (maj–junij). Zanimivo je, da so dijaki uporabljali platformo za urjenje glasbenega posluha v prvem delu – medtem ko je redni pouk potekali na daljavo – kot tudi v drugem delu evalvacijskega obdobja, ko se je učni proces preselil nazaj v učilnico. Platforma se je izkazala kot uporabno orodje za domače vaje glasbenega posluha, saj je učitelju olajšala pripravo vaj, dijaku pa omogočila takojšnje povratne informacije o uspešnosti reševanja in neskončen vir samodejno generiranih vaj.

Novo razviti moduli za upravljanje z razredi, domače naloge in izzivi so se izkazali za pomembno pomoč učiteljem pri uporabi platforme. Kljub temu je treba še implementirati številne funkcije. Naslednji razvojni cikel bo vključeval vaje harmonskega nareka in bo dopolnil zbirko aplikacij v obliki treh temeljnih vidikov urjenja ritmičnega, melodičnega in harmonskega znanja ter glasbenega posluha. Poleg tega bomo obstoječe aplikacije razširili z različnimi stili usposabljanja. Na primer, aplikacija za ritmični narek bo vključevala odziv s tapkanjem po mobilni napravi glede na prikazano ritmično zaporedje. Podobno bo imela aplikacija za intervali narek tudi inverzno različico vaje, kjer uporabnik opazije intervalno zaporedje in zapoje ali zamrmra odgovor. S tem načrtujemo izdelavo aplikacije, ki bo tekla neposredno na mobilni napravi. Vmesnik API,

ki bo omogočal komunikacijo med mobilno napravo in zalednim delom, je že na voljo in lahko podpira integracije mobilnih aplikacij, pa tudi druge oblike ali uporabe v različnih izobraževalnih orodij, vključno z obstoječimi LMS in slušalkami za virtualno resničnost.

Kot eden izmed ključnih izzivov, ki se jih je treba lotiti, se je pojavil izziv uporabniške zasnove platforme. Zbrali smo povratne informacije dijakov in ugotovili, da je treba slog oblikovanja izboljšati, saj je bil trenutni dizajn sprva osredotočen na najstnike, a so ga srednješolci zavrnili kot preveč otroškega. Začetni osnutki, predstavljeni v tem delu, temeljijo na povratnih informacijah učiteljev in dijakov. Izdajo nove različice platforme Trubadur skupaj z novo aplikacijo za vaje harmonije načrtujemo do konca leta 2022.

Čeprav platforma trenutno vključuje samo aplikacije za urjenje glasbenega posluha, je mogoče njeno podporo razširiti na teorijo glasbe in usposabljanje za instrumente. Prej omenjene nove tipe vaj, ki kot uporabniški odziv namesto natipkanega vnosa sprejemajo mrmranje, petje ali tapkanje uporabnika, je mogoče prilagoditi za podporo vadenja petja ali glasbil. Odločitev za prehod s spletne platforme na spletno in mobilno implementacijo v bližnji prihodnosti temelji tudi na zmožnosti učinkovite obdelave zvočnega vhoda za tovrstne prilagoditve.

Literatura

Al-Othman, Maryam A., John H. Cole, Carla B. Zoltowski in Dimitrios Peroulis. »An Adaptive Educational Web Application for Engineering Students.« *IEEE Access* 5 (2017): 359–365. http://ieeexplore.ieee.org/document/7865892/. DOI:10.1109/ACCESS.2016.2643164.

Aljanaki, Anna, Frans Wiering in Remco Veltkamp. »Collecting Annotations for Induced Musical Emotion via Online Game with a Purpose Emotify.« *Technical Report Series, 2014 UU-CS-2014-015* (2014). https://www.semanticscholar.org/paper/Collecting--annotations-for-induced-musical-emotion-Aljanaki-Wiering/7159b180c729795b998c53ef735bb91bb1a70d81.

Alshammari, Sultan Hammad, Mohamed Bilal Ali in Mohd Shafie Rosli. »The Influences of Technical Support, Self Efficacy and Instructional Design on the Usage and Acceptance of LMS: A Comprehensive Review.« *Turkish Online Journal of Educational Technology* 15, št. 2 (2016): 116–125. https://eric.ed.gov/?id=EJ1096463.

Andronie, Miahi, in Maria Andronie. »Information and Communication Technologies (Ict) Used for Education and Training.« *Contemporary Readings in Law and Social Justice* 6, št. 1 (2014): 378–386.

Asiri, Mohammed, Rosnaini Mahmud, Kamariah Abu Bakar in Ahmad Fauzi Mohd Ayub. »Factors Influencing the Use of Learning Management System in Saudi Arabian Higher Education: A Theoretical Framework.« *Higher Education Studies* 2, št. 2 (2012): 125–137. http://www.ccsenet.org/journal/. DOI:10.5539/hes.v2n2p125.

Bartle, Richard A. »Information Reconstruction: Unpicking the GamifIR Call for Papers.« Paper presented at *Proceedings of the First International Workshop on Gamification for Information Retrieval: GamifIR@ECIR '14, Amsterdam, The Netherlands, April 13, 2014*. New York, NY: Association for Computing Machinery, 2014. DOI:/10.1145/2594776.2597423.

Benattia, Abderrahmane Adda, Abdelhalim Benachenhou in Mohammed Moussa. »Development of an Automatic Assessment in Remote Experimentation Over Remote Laboratory.« V *Lecture Notes in Networks and Systems* 47: *Smart Industry & Smart Education*, uredila Michael E. Auer in Reinhard Langmann, 136–143. Cham: Springer, 2019. https://link.springer.com/chapter/10.1007/978-3-319-95678-7_15. DOI:10.1007/978-3-319-95678-7_15.

Borges, Simone de Sousa, Vinicius H. S. Durelli, Helena Macedo Reis in Seiji Isotani. »A Systematic Mapping on Gamification Applied to Education.« Paper presented at *Proceedings of the 29th Annual ACM Symposium on Applied Computing – SAC '14*. New York, NY: Association for Computing Machinery, 2014. http://dl.acm.org/citation.cfm?doid=2554850.2554956. DOI:10.1145/2554850.2554956.

Carney, Robert. »Using Web-Based Instruction to Teach Music Theory in the Piano Studio: Defining, Designing, and Implementing an Integrative Approach.« Doktorska disertacija, University of North Texas, 2010. https://digital.library.unt.edu/ark:/67531/metadc28404/.

Cheng, Meng-Tzu, Jhih-Hao Chen, Sheng-Ju Chu in Shin-Yen Chen. »The Use of Serious Games in Science Education: A Review of Selected Empirical Research from 2002 to 2013.« *Journal of Computers in Education* 2, št. 3 (2015): 353–375, https://link.springer.com/article/10.1007/s40692-015-0039-9, DOI:/10.1007/s40692-015-0039-9

Chou, Yu-kai. »Octalysis: Complete Gamification Framework.« *Gamification & Behavioral Design* (Blog), *Yu-kai Chou*. Dostop 27. aprila 2020. https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/.

Connolly, Thomas M., Mark Stansfield in Thomas Hainey. »An Application of Games-Based Learning within Software Engineering.« *British Journal of Educational Technology* 38 (2007): 416–428. https://bera-journals.onlinelibrary.wiley.com/doi/10.1111/j.1467-8535.2007.00706.x. DOI:/10.1111/j.1467-8535.2007.00706.x.

Connolly, Thomas M., Elizabeth A. Boyle, Ewan MacArthur, Thomas Hainey in James M. Boyle. »A Systematic Literature Review of Empirical Evidence on Computer Games and Serious Games.« *Computers & Education* 59, št. 2 (2012): 661–686. https://www.sciencedirect.com/science/article/abs/pii/S0360131512000619?via%3Dihub. DOI:/10.1016/j.compedu.2012.03.004.

Dorfer, Matthias, Andreas Arzt in Gerhard Widmer. »Towards Score Following in Sheet Music Images.« Paper presented at *Proceedings of the 17th ISMIR Conference, New York City, USA, 7–11 August 2016*, 789–795. DOI:10.5281/zenodo.1415548.

Douce, Christopher, David Livingstone in James Orwell. »Automatic Test-Based Assessment of Programming.« *Journal on Educational Resources in Computing* 5, št. 3 (2005): 1–13. http://portal.acm.org/citation.cfm?doid=1163405.1163409. DOI:10.1145/1163405.1163409.

Eck, Richard van. »Digital Game-Based Learning: It's not Just the Digital Natives Who are Restless.« *EDUCAUSE Review* 41, št. 2 (2006): 16–30.

Eli, Anamaria Claudia. »Platforma de educație muzicală Yousician.« *Tehnologii informatice și de comunicații in domeniul muzical* 8, št. 1 (2017): 37–41. https://www.ceeol.com/search/article-detail?id=596853.

Ghazal, Samar, Hosam Al-Samarraie in Hanan Aldowah. »'I am Still Learning': Modeling LMS Critical Success Factors for Promoting Students' Experience and Satisfaction in a Blended Learning Environment.« *IEEE Access* 6 (2018): 77179–77201. https://ieeexplore.ieee.org/document/8523678. DOI:10.1109/ACCESS.2018.2879677.

Gillis, Alanna, in Laura M. Krull. »COVID-19 Remote Learning Transition in Spring 2020: Class Structures, Student Perceptions, and Inequality in College Courses.« *Teaching Sociology* 48, št. 4 (2020): 283–299. https://journals.sagepub.com/doi/10.1177/0092055X20954263. DOI:10.1177/0092055X20954263.

Gomes, Cardoso Cristina Maria, Mauro Jorge Guerreiro Figueiredo, José Bidarra in José Duarte Cardoso Gomes. »Project Flappy Crab: An Edugame for Music Learning.« V *Competencies in Teaching, Learning and Educational Leadership in the Digital Age*, uredili J. Michael Spector, Dirk Ifenthaler, Demetrios G. Sampson, Pedro Isaias, 287–301. Cham: Springer, 2016. https://link.springer.com/chapter/10.1007/978-3-319-30295-9_18. DOI:10.1007/978-3-319-30295-9_18.

Hernández, Rubén Jesús García, Isabel Barbancho Pérez, Lorenzo José Tardón García, Jon Arambarri, Milán Magdics in Mateu Sbert. »E-Cecilia: Implementation of a Music Game.« *CEUR Workshop Proceedings*, št. 1196 (2014): 66–77. https://gaia.fdi.ucm.es/sites/cosecivi14/es/papers/12.pdf.

Krusche, Stephan, in Andreas Seitz. »ArTEMiS: An Automatic Assessment Management System for Interactive Learning.« Paper presented at *SIGCSE'18: Proceedings of the 49th ACM Technical Symposium on Computer Science Education*. New York: Association for Computing Machinery Press, 2018, 284–289. http://dl.acm.org/citation.cfm?doid=3159450.3159602. DOI:10.1145/3159450.3159602.

Law, Edith, Louis von Ahn, Roger B. Dannenberg in Mike Crawford. »TagATune: A Game for Music and Sound Annotation.« Paper presented at *Proceedings of the International Conference on Music Information Retrieval, ISMIR 2007, Vienna, September 23–27, 2007*. https://www.semanticscholar.org/paper/TagATune%3A-A-Game-for-Music-and-Sound-Annotation-Law-Ahn/50bae0a30cf26601cb14574a53c990bda744e7fa.

Lin, Hsien-Tang, Chih-Hua Wang, Chia-Feng Lin in Shyan-Ming Yuan. »Annotating Learning Materials on Moodle LMS.« Paper presented at *2009 International Conference on Computer Technology and Development*, 455–459. https://ieeexplore.ieee.org/document/5360189. DOI:10.1109/ICCTD.2009.131.

Longcamp, Marieke, Céline Boucard, Jean-Claude Gilhodes in Jean-Luc Velay. »Remembering the Orientation of Newly Learned Characters Depends on the Associated Writing Knowledge: A Comparison between Handwriting and Typing.« *Human Movement Science* 25, št. 4–5 (2006): 646–656. DOI:10.1016/j.humov.2006.07.007.

Longcamp, Marieke, Marie Thérèse Zerbato-Poudou in Jean Luc Velay. »The Influence of Writing Practice on Letter Recognition in Preschool Children: A Comparison between Handwriting and Typing.« *Acta Psychologica* 119, št. 1 (2005): 67–79. DOI:10.1016/j.actpsy.2004.10.019.

Mandel, Michael I., in Daniel P. W. Ellis. »A Web-Based Game for Collecting Music Metadata.« *Journal of New Music Research* 37, št. 2 (2008): 151–165. DOI:10.1080/09298210802479300.

Morton, Caroline E., Sohag N. Saleh, Susan F. Smith, Ashish Hemani, Akram Ameen, Taylor D. Bennie in Maria Toro-Troconis. »Blended Learning: How Can We Optimise Undergraduate Student Engagement?« *BMC Medical Education* 16, št. 1 (2016). http://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-016-0716-z. DOI:10.1186/s12909-016-0716-z.

Moura, Janine G., Leônidas O. Brandão in Anarosa A. F. Brandão. »A Web-Based Learning Management System with Automatic Assessment Resources.« Paper presented at *2007 37th Annual Frontiers in Education Conference – Global Engineering: Knowledge Without Borders, Opportunities Without Passports,* F2D-1–F2D-6. http://ieeexplore.ieee.org/document/4418100/. DOI:10.1109/FIE.2007.4418100.

Muntean, Cristina. »Raising Engagement in E-Learning through Gamification.« V *The 6th International Conference on Virtual Learning ICVL 2011*. Bucharest University Press, 2012, 323–329.

Ng, S. C., Andrew K. Lui in W. S. Lo. »An Interactive Mobile Application for Learning Music Effectively.« V *Knowledge Sharing through Technology: 8th International Conference on Information and Communication Technology in Teaching and Learning, ICT 2013*, *Hong Kong, China, July 10–11, 2013*, uredili Jeanne Lam, Kam Cheong Li, Simon K. S. Cheung in Fu Lee Wang, 148–157. Heidelberg: Springer Berlin, 2013. https://link.springer.com/chapter/10.1007/978-3-642-45272-7_14. DOI:/10.1007/978-3-642-45272-7_14.

Rahim, Yahaya Abd., Othman Mohd, Muhammad Amin Sahari, Nurhizam Safie in Zulkiflee Bin Abd Rahim. »A Study on The Effects of Learning Material Handling Procedures towards Information Integrity in Moodle Learning Management System (LMS).« Paper presented at *2nd International Conference on Electrical Engineering and Informatics (ICon EEI)*, 81–85. https://ieeexplore.ieee.org/document/8784322/. DOI:10.1109/ICon-EEI.2018.8784322.

Rizqyawan, Muhammad Ilham, in Galih Hermawan. »Adventure Game as Learning Media for Introducing Music Interval and Ear Training to Kids.« Paper presented at *2015 International Conference on Automation, Cognitive Science, Optics, Micro Electro-Mechanical System, and Information Technology (ICACOMIT)*, 172–175. http://ieeexplore.ieee.org/document/7440200/. DOI:10.1109/ICACOMIT.2015.7440200.

Sanchez, Eric, Shawn Young in Caroline Jouneau-Sion. »Classcraft: From Gamification to Ludicization of Classroom Management.« *Education and Information Technologies* 22, št. 2 (2017): 497–513.

Schüler, Nico. »Modern Approaches to Teaching Sight Singing and Ear Training.« *Facta Universitatis, Series Visual Arts and Music* 6, št. 2 (2020): 83–92. DOI:10.22190/fuvam2002083s.

Seddon, Frederick, in Michele Biasutti. »Evaluating a Music E-Learning Resource: The Participants' Perspective.« *Computers and Education* 53, št. 3 (2009): 541–549. DOI:10.1016/j.compedu.2008.12.011.

Serdaroglu, Emine. »Ear Training Made Easy: Using IOS Based Applications to Assist Ear Training in Children.« *European Journal of Social Science Education and Research* 5, št. 3 (2018): 202–209. http://archive.sciendo.com/EJSER/ejser.2018.5.issue-3/ejser-2018-0071/ejser-2018-0071.pdf. DOI:10.2478/ejser-2018-0071.

Tardón, Lorenzo, Isabel Barbancho, Carles Roig, Emilio Molina in Ana M. Barbancho. »Music Learning: Automatic Music Composition and Singing Voice Assessment.« *Springer Handbook of Systematic Musicology*, uredil R. Bader, 873–883. Heidelberg: Springer Berlin, 2018. https://link.springer.com/chapter/10.1007/978-3-662-55004-5_42. DOI:10.1007/978-3-662-55004-5_42.

Uyar, Burak, in Barış Bozkurt. »An Interactive Rhythm Training Tool for Usuls of Turkish Makam Music.« Paper presented at *5th Int. Workshop on Folk Music Analysis (FMA), Paris, France, 10–12 June 2015*. Paris: University Pierre et Marie Curie, 2015, 126–129. https://zenodo.org/record/1211661. DOI:10.5281/ZENODO.1211661.

Wagner, Carolyn. »Digital Gamification in Private Music Education.« *Antistasis* 7, št. 1 (2017). https://journals.lib.unb.ca/index.php/antistasis/article/view/24904.

Weaver, Debbi, Christine Spratt in Chenicheri Sid Nair. »Academic and Student Use of a Learning Management System: Implications for Quality.« *Australasian Journal of Educational Technology* 24, št. 1 (2008). http://ajet.org.au/index.php/AJET/article/view/1228. DOI:10.14742/ajet.1228.

Wiggins, Bradley E. »An Overview and Study on the Use of Games, Simulations, and Gamification in Higher Education.« *International Journal of Game-Based Learning* 6, št. 1 (2016): 18–29. http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/IJGBL.2016010102. DOI:10.4018/IJGBL.2016010102.

Wollscheid, Sabine, Jørgen Sjaastad in Cathrine Tømte. »The Impact of Digital Devices vs. Pen(cil) and Paper on Primary School Students' Writing Skills: A Research Review.« *Computers and Education* 95 (2016): 19–35. DOI: 10.1016/j.compedu.2015.12.001.

Youngmoo, Kim, Erik Schmidt in Lloyd Emelle. »MoodSwings: A Collaborative Game for Music Mood Label Collection.« Paper presented at *ISMIR 2008: 9th International Conference on Music Information Retrieval, Drexel University, Philadelphia, PA, USA, September 14–18, 2008*, uredili Juan Pablo Bello, Elaine Chew in Douglas Turnbull, 231–236. https://archives.ismir.net/ismir2008/paper/000257.pdf.

Zanetti, David, D. Krejci, K. Oliveira in A. R. Rocha. »Mona Listen: A Web-Based Ear Training Module for Musical Pitch Discrimination.« Paper presented at *Proceedings of E-Learn 2004*: *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, uredila* J. Nall in R. Robson, 2026–2032. https://www.learntechlib.org/noaccess/11620/.

SUMMARY

Development of the Trubadur (Troubadour) Platform and the Review of New Challenges in the Coming Years

Troubadour is an open source and flexible online platform for training of the musical ear. The platform was developed to support music theory lessons with automated rhythmic and interval dictation exercises. In the course of development, we analyzed the needs and feedback of teachers and students. Based on the collected information, we provided the platform with elements of play, exercise management, and learning tools for the periodical testing of knowledge in accordance with the curricula. We developed and evaluated the platform together with the students of the Ljubljana Music and Ballet Conservatory in the school years 2018/19–2020/21. The didactic musical content was designed by Assoc. prof. Peter Šavli, who teaches solfeggio and composition at the Conservatory. In the first two years, we evaluated the use with A/B testing, and in the third academic year, we monitored and analyzed the long-term use of the platform through learning from home as well as in the classroom during the period of covid school closures. The results of the evaluation showed that the use of the platform can increase performance in testing and that it represents a good addition to studying from home. The article thus summarizes the implementation and results of the evaluations and outlines the path for further development.

O AVTORJIH

MATEVŽ PESEK (matevz.pesek@fri.uni-lj.si) je docent in raziskovalec na Fakulteti za računalništvo in informatiko Univerze v Ljubljani, kjer je leta 2012 diplomiral in leta 2018 doktoriral. Od leta 2009 je član Laboratorija za računalniško grafiko in multimedije. Njegovi raziskovalni interesi so iskanje glasbenih informacij, glasbeno e-učenje, biološko navdahnjeni modeli in globoke arhitekture. Raziskoval je tudi kompozicijsko hierarhično modeliranje kot alternativne globoke transparentne arhitekture in večmodalno zaznavanje glasbe, vključno z interakcijo človek-računalnik ter vizualizacijo za analizo zvoka in ustvarjanje glasbe.

PETER ŠAVLI (peter.savli@kgbl.si) je na Akademiji za glasbo v Ljubljani diplomiral iz glasbene pedagogike in kompozicije ter leta 1995 na univerzi Yale prejel umetniško diplomo. Doktoriral je na Univerzi Cornell, kjer je leta 1999 obranil disertacijo z naslovom »Harmonska gostota pri Messiaenu.« Simfoniki RTV Slovenija in orkester SF so izvedli in posneli njegova orkestrska dela. Uveljavil se je predvsem kot skladatelj z obširnim komornim, zborovskim in mladinskim opusom in bil večkrat nominiran za nagrado Prešernovega sklada. Med njegova pomembnejša dela sodijo predvsem instrumentalni koncerti (za saksofon, klavir, violino, tolkala, kitaro in marimbo) ter kvarteti za najrazličnejše zasedbe. Veliko ustvarja tudi za mlajše občinstvo. Pomembno vlogo pri vzgoji le-tega ima njegova mladinska pravljična opera *Pastir* (2011), za katero je sam napisal libreto po predlogi tolminske ljudske pravljice, na besedila Maje Vidmar pa je napisal kantato *Prisotnost*. Od leta 2004 je profesor na Konservatoriju za glasbo in balet v Ljubljani, kjer spodbuja mlade talente pri njihovih prvih skladateljskih dosežkih. Kot docent za teoretične predmete na Akademiji za glasbo občasno predava solfeggio, oblikoslovje in specialno glasbeno didaktiko.

MATIJA MAROLT (matija.marolt@fri.uni-lj.si) je izredni profesor na Fakulteti za računalništvo in informatiko Univerze v Ljubljani, kjer je vodja Laboratorija za računalniško grafiko in multimedije. Med njegove raziskovalne interese sodijo pridobivanje informacij iz glasbe, računalniška grafika in vizualizacija. Osredotoča se na probleme, kot so ocenjevanje melodije in ritma, segmentacija in organizacija zvoka ter iskanje in vizualizacija glasbenih zbirk.

ABOUT THE AUTHORS

MATEVŽ PESEK (matevz.pesek@fri.uni-lj.si) is an Assistant Professor and researcher at the Faculty of Computer and Information Science at the University of Ljubljana, where he graduated in 2012 and received his doctorate in 2018. Since 2009, he has been a member of the Laboratory for Computer Graphics and Multimedia. His research interests are information retrieval from music, including e-learning, biologically inspired models and deep architectures. He has also researched compositional hierarchical models as alternative deep transparent architectures and multimodal music perception, including human-computer interaction, and visualization for sound analysis and music creation.

PETER ŠAVLI (peter.savli@kgbl.si) graduated from the Academy of Music in Ljubljana with a degree in music pedagogy and composition. In 1995, he received an Artist Diploma from Yale University in the USA. He received his doctorate in 1999 at Cornell University, for his dissertation entitled "Harmonic Density in Messiaen." Both the RTV Slovenia Symphony Orchestra and the Slovenian Philharmonic Orchestra performed and recorded

his orchestral works. He created concertos for saxophone, piano, violin, percussion, guitar, and marimba. Šavli's chamber and choral oeuvre is extensive, including his music output dedicated to younger generations. He wrote quartets for saxophones, guitars, strings, flutes, percussion, and clarinets. His youth fairy tale opera *Pastir* (*Goatherd*) plays an important role in the education of young opera audiences. Written in 2011, the libretto, also written by Peter Šavli, is based on a fairy tale from Tolmin. He also composed the cantata *Prisotnost* (*Presence*) based on Maja Vidmar's lyrics. As a composer, he was nominated for the Prešeren Fund Award several times. In 2004, he started work at the Ljubljana Music and Ballet Conservatory, where he encourages young talents in their first compositional achievements. As an assistant professor for theoretical subjects at the Academy of Music, he occasionally teaches solfeggio, design, and special musical didactics.

MATIJA MAROLT (matija.marolt@fri.uni-lj.si) is an Associate Professor at the Faculty of Computer and Information Science, where he is the head of the Computer Graphics and Multimedia Laboratory. His research interests are information retrieval from music, computer graphics, and visualization. It focuses on problems such as melody and rhythm estimation, segmentation and organization of sound, search and visualization of music collections.

DOI: 10.4312/mz.58.2.81-105
UDK 78 (497.11):070.447"1878/1941":004

Computational Research of Music Criticism between 1878 and 1941 in Serbian: What Can We Learn from the Digital Archive of the Historical Newspapers in the Svetozar Marković University Library?

Ivana Perković,[a] Anđelka Zečević[b]

[a]*University of Arts, Belgrade*
[b]*Serbian Academy of Sciences and Arts, Belgrade*

ABSTRACT

The article deals with the critical writing on music in the digitized newspapers in the Svetozar Marković University Library in Belgrade. The multidisciplinary research aims to connect the quantitative and qualitative analysis of the musical critics in Serbian in the period between 1878 and 1941, and to explore how to combine both the computational and traditional musicological approaches.

Keywords: music criticism, natural language processing, text analysis, musicological canon

IZVLEČEK

Članek se ukvarja s kritiškimi zapisi o glasbi v digitaliziranih časopisih v univerzitetni knjižnici Svetozarja Markovića v Beogradu. Cilj multidisciplinarne raziskave je povezati kvantitativno ter kvalitativno analizo glasbenih kritik v srbščini v obdobju med letoma 1878 in 1941 ter raziskati, kako združiti računalniške in tradicionalne muzikološke pristope.

Ključne besede: glasbena kritika, procesiranje naravnega jezika, analiza besedila, muzikološki kanon

Introduction

The process of digitization has affected many fields of musicological research, including the area of music criticism. However, computational research on the reception of musicians, musical pieces and performers, written in Serbian language, has not been done so far for a number of reasons, the most important of which include: (1) the limited availability of digital resources and (2) the requirements of the Natural Language Processing (NLP) systems regarding the language on music in historical sources. Furthermore, musicologists in Serbia often lack the computational and technical knowhow to conduct this type of research, since these fields of knowledge are not part of the regular academic curriculum.

The multidisciplinary research carried out for the purpose of this paper – to our knowledge, the first investigation of this kind related to Serbian resources – began with the definition of the repository, which consists primarily of writings related to music criticism in a digital format.

The repository of writing includes newspapers published across 63 years – between 1878 (the date of the independence of Serbia) and the start of the Second World War in Yugoslavia (1941). This time span is usually divided into two historical periods: the "long nineteenth century"[1] and the interwar period. A brief presentation of the historical and cultural background in these two periods follows, for a better understanding of the context.

The second half of the long nineteenth century was marked by frequent and complex political changes in the states inhabited by Serbs, including independence from Turkish domination (1878), the establishment of the Kingdom of Serbia (1882–1918), the change of the Obrenović and Karađorđević dynasties (1903), the Balkan Wars (1912–1913), and World War I. This is the time when important cultural and scientific institutions were founded, among which we find the Serbian Literary Guild (Srpska književna zadruga, 1892), and the *Serbian Literary Magazine* (*Srpski književni glasnik*, 1901–1914, 1920–1941). Significant impulses for the development of science came particularly from the Academy of Sciences and the Higher School (Velika Škola) that was transformed into the University of Belgrade (1905). Culture was also subjected to many changes, while national idealism and Romanticism were of special importance for cultural and artistic life in general.

The interwar period brought numerous transformations, within the Kingdom of Serbs, Croats and Slovenes (1918–1929) and later the Kingdom of Yugoslavia (1929–1941) resulting in aspirations towards unification, changes of various social structures, the economy, education and other fields. This was

1 The concept of the long nineteenth century in Western history, denoting the period between the French Revolution and the beginning of the First World War (1789–1914), relies on the historical-theoretical model of Eric Hobsbawm. For more information, cf. Phyllis Weliver and Katharine Ellis, eds., *Words and Notes in the Long Nineteenth Century* (Woodbridge, UK; Rochester, NY: Boydell & Brewer, 2013).

a time of high achievements of cultural history, and the key words here are certainly Europeanization and modernization. The renewal and establishment of institutions, whether cultural, scientific or educational, affected the overall level of prosperity, so that new tendencies in art, culture and science were synchronized with similar phenomena occurring in other European countries. The progressive and liberal journal *Nova Evropa* (*New Europe*) was founded in Zagreb in 1920, and a year later (1921) the *avant-garde* journal *Zenit* (*Zenith*, Zagreb and Belgrade) appeared, while in 1922 Cvijeta Zuzorić Society of Friends of Art was founded, promoting interest in the arts, to name just a few examples. The latest stylistic challenges were present in art (which does not mean that tradition was forgotten), and artists and scientists who had completed their education abroad successfully transferred their latest achievements to the Yugoslav environment. The increasingly developed bourgeoisie provided a good social framework for the establishment of numerous artistic associations, the development of amateurism and the provision of an educated audience.

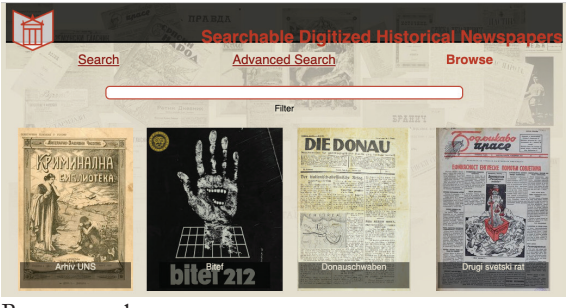
The main aim of the study is to explore how to combine the opportunities offered by computational quantitative analysis with traditional musicological qualitative research methods, and to indicate what this collaboration can bring to music research methods, particularly in terms of potential future research fields. Qualitative observations are combined with quantitative data in order to explore some of the selected topics relevant to the study of music criticism. For the purpose of this paper, three main topics were selected, as the most relevant in traditional musicological research of music criticism in Serbian: (1) the changes in the discourse in the selected historical period, (2) the language related to the emotional impact of certain performance or a new musical composition and (3) the enrichment of factual knowledge about music history. Possible further research does not exclude other themes and topics that might emerge from the huge amount of gathered material, rather, it is opened to – at the same time – broader and more refined insights, depending on the selected research discourse moving forward.

The Creation of the Corpus

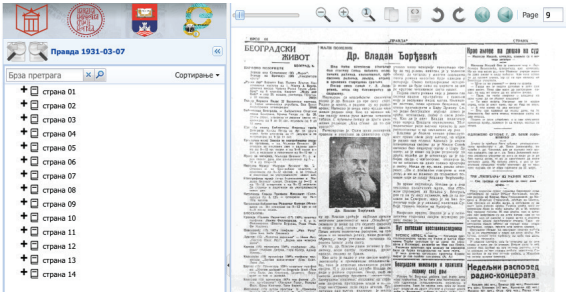
Within the Europeana,[2] one of the largest projects intended to preserve the rich cultural heritage of Europe, the Svetozar Marković University Library contributed with digitized newspapers that uncover the social, political, and cultural life of the people of those states inhabited by Serbs. This effort included the digitalization of more than 500,000 pages in Serbian, dating from the beginning of the nineteenth century to the present through the lenses of dozens of periodicals. As such, the collection represents a valuable source of knowledge and stories embroidered around important historical events.

2 Europeana, https://www.europeana.eu/en.

All the digitized newspaper pages can be accessed via the official web application,[3] where users can browse content and visually explore the pages using a number of functionalities.[4] When it comes to the textual content, the web application allows users to search through the digitized collection by entering query terms and selecting the options for narrowing the specific newspaper source and/or its period. If a user enters more than one query term, by default newspaper pages containing all the terms are searched. In addition, the application supports an exact match search by enclosing the query terms in quotation marks (for instance, "koncertna muzika"), a search by a disjunction of terms by using the/or *OR* delimiter (for instance, "svirati"/"pevati"), as well as search for pages that do not contain the given query term by using a prefix - (for instance, "-muzika"). Although very helpful, these search mechanisms do not cover all the relevant retrieval scenarios, for example, search by all morphological word forms. The option "Search for similar words and expressions" allows an extended search based on the edit distance between given query terms and search terms, but offers no means of configuration or additional control.



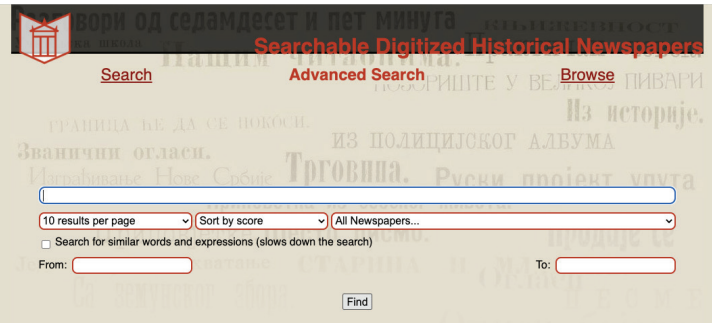
Browse panel



Preview panel (available in Serbian only)

3 Pretraživa digitalna biblioteka, https://pretraziva.rs/search.

4 As stated, these functionalities are partially based on the open source BnLViewer developed by National Library of Luxemburg available at "BnlViewer," Sourceforge, https://sourceforge.net/projects/bnlviewer/.



Search panel

Figure 1: Application provided by the Svetozar Marković University Library.

Upon retrieval, the application generates a list of relevant newspaper pages followed by the number of results. Each newspaper page is described with the appropriate metadata and a link to the page image that can be visually explored by using functionalities such as page zooming, page rotation, or page scrolling. In order to collect and analyze the text content of the pages, we needed to develop an application programming interface (API) on top of the results list. As far as we know, no official API provided by the Svetozar Marković University Library supports this kind of content aggregation. Therefore, for the seed query terms, the selection of which will be described later, a pool of HTTP requests is sent to the web application: the HTTP requests are generated recursively following the links present in the result list in the spirit of the best crawling practices. The textual content of the newspaper pages is extracted from the HTTP response jointly with the metadata prepared for the interaction between the user and the application via a web browser.

The initial corpus encompassed the content of newspaper pages obtained using the query term "muzika" (music) with the default option for similar words and expressions search as Serbian follows an inflection paradigm with nouns characterized by cases, gender, and number. In total, the corpus contained a text content of 16,843 newspaper pages. As expected, some of the pages in the corpus referred to relevant morphological forms of the word "muzika" such as "muzike" or "muzikom." However, there were a large number of pages containing word forms similar to the word "muzika" in respect to the edit distance, such as "fizika" (physics) or "jezika" (language) but with no overlapping semantics. Separate requests for each morphological form of the word "muzika" would generate a significantly larger number of results, in total 42,052 pages. As this corpus was intended for familiarization with writing on music, we decided to keep the smaller of the two but to perform separate searches for future retrievals.

By manual analysis of the pages in the corpus, we discovered plenty of resources related to musical education, theatre performances, ceremonies, and other similar activities not directly relevant to the study of music criticism. However, the analysis pointed us to the language of music critics – the past forms of the complete verbs such as "otpevao" ([he/she] sang), "odsvirao" ([he/she] played), "izveo" ([he/she] performed) as well as the expressions "izvedba je bila/izvođenje je bilo" (the performance was […]), "nastupio je" (he performed) that were very frequent. This motivated us to use these verbs, their morphological forms, and both their Ekavian and Ijekavian pronunciation variants to create the new corpus. The total number of queries was 24 resulting in 3,442 pages. We were aware that this corpus is by no means complete but that it would provide us with a more accurate collection to test the usefulness of NLP methods in the study of musicology. For a number of collected pages, the metadata was missing, in most cases the exact publication date or the title of the periodical. We filtered the results to fit into the timeline range from 1 January 1878 to 6 April 1941. In total, 150 pages were eliminated.

As stated, one search result refers to a single page of a digitized newspaper that contains the given query terms. The query appearance is visually emphasized by a red rectangle around the query terms. From the web application, a user can click and single out only the page segment with the given query term, zoom in on it and read its textual content. Depending on the source and page layout, the segment is usually a text paragraph, a newspaper headline, a title, or an image caption. The page segmentation is not absolutely accurate, as we noticed numerous adjacent horizontal or vertical segments that merged. An example of such a scenario can be seen below followed by the extracted and intertwined text. The more complex the page layout and its visual presentation are, the more challenging the segmentation and NLP processing are.

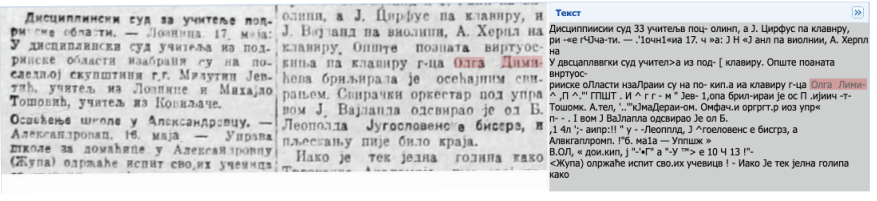


Figure 2: The page segmentation.[5]

5 *Vreme* (May 20, 1927), 4; http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00043_19270520|article:div540|page:4|query:%D0%BE%D0%BB%D0%B3%D0%B0%20%D0%BB%D0%B8%D0%BC%D0%B8.

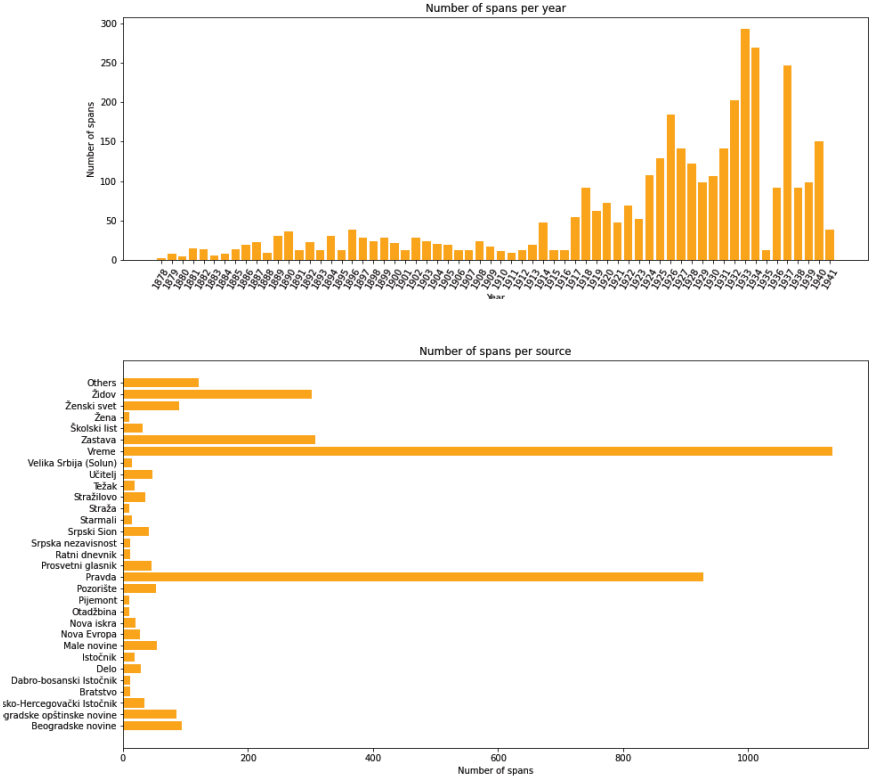


Figure 3: The distribution of spans with respect to the publication year and the source.

Each segment has its own unique identifier that becomes known only after a user clicks on it and selects it for detailed viewing. We observed this behaviour following the URLs in the application address bar. On some pages, segments with consecutive identifiers refer to two adjacent vertical paragraphs, while on other pages, this relates to two adjacent horizontal paragraphs. Therefore, it was not possible to correctly calculate the segment identifier and single out the exact text block it contains programmatically. In order to approximate the notion of the segment that corresponds to the query terms, we followed the left and right contexts represented by the number of characters. We will refer to these segment approximations as text spans throughout the rest of this paper.

We have experimented with longer text spans with a context length of 300 characters and shorter spans with a length of 150 characters. The longer spans turned out to be more informative for further analysis, but we have used the shorter spans too for the sentiment evaluation. We fixed the number of

characters instead of the number of tokens due to the errors caused by Optical Character Recognition (OCR) – many punctuation characters are misused and make the segmentation of text content in both sentences and tokens more difficult. The final repository contains 3,751 text spans in total. On the previous page, you can find the distribution of the spans with respect to both the publication year[6] and the source.[7]

Text Preprocessing and Quality Analysis

The first text preprocessing steps were related to the replacement of HTML entities with appropriate characters (for example, &quote; was replaced with ") or their deletion (for example, the entities @ and ®). We also deleted those characters that do not belong to the extended ASCII coding scheme, which were primarily related to document layout (for example, various bullet points such as □) or Church Slavonic texts (for example, the letter Ю).

As the digitization spans over an extended period, covering sources with diverse layouts, typography, and design, the number of OCR errors noticed in the created repository is not negligible. Similarly to other projects of the same kind,[8] we have seen OCR errors related to:

1) Over-segmentation, that is the segmentation of proper words such as "klav ira" instead of "klavira" (piano);
2) Under-segmentation, that is the omission of delimiters such as, for example, "otpevaopesmu" instead of "otpevao pesmu" (sang the song);
3) Misrecognized characters, for example, "hi.mnu" instead of "himnu" (anthem);
4) A missing character such as "intelekualna elia" instead of "intelektualna elita" (intellectual elite);
5) Hallucination such as "otpevao jednu sv? I.mprovizašču" instead of "otpevao jednu svoju improvizaciju" (meaning [he/she] sang one of his/her improvisations).

Many OCR errors were connected to the misuse of punctuation marks. The relative percentage of the punctuation marks with respect to the total number of alphanumerical characters given below confirms this statement (the total percentage of punctuation marks is 4.64 %). Due to the importance of

6 For the year 1935, the number of digitized newspapers is lower than for the remaining years.

7 *Others* refers to those sources with fewer than ten spans per source. The total number of sources that satisfy this criterion is 44. The aggregation was done to provide a more accessible preview.

8 Elizabeth Soper, Stanley Fujimoto, and Yen-Yun Yu, "BART for Post-Correction of OCR Newspaper Text," in *Proceedings of the Seventh Workshop on Noisy User-Generated Text (W-NUT 2021)*, (Association for Computational Linguistics, 2021), 284–290, https://aclanthology.org/2021.wnut-1.31/, DOI:/10.18653/v1/2021.wnut-1.31.

punctuation for the NLP pipeline, particularly for the sentence splitting and tokenization stages, in the preprocessing stage, we kept only the elementary punctuation marks such as sentence delimiters (.!?) and commas.

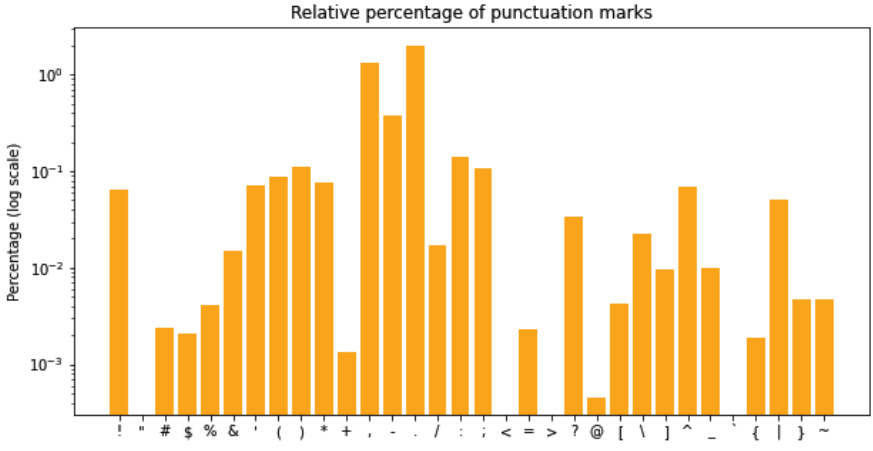


Figure 4: Relative percentage of punctuation marks.

In addition to varying publishing practices, the corpus of critical writing on music reflects diverse linguistic properties, as both Cyrillic and Latin alphabets are used for the transcription of Serbo-Croatian, as well as its distinct Ekavian and Ijekavian dialects. Therefore, the preprocessing stage required the transliteration of the collected spans into a common alphabet – for simplicity and alignment with other tools, we decided to use the Latin alphabet.[9]

To assess the quality of the text content, we analyzed the sets of short and long words. The experiment started with words of a length of less than four characters. This list was quite long, with a total of 85,165 words. However, the number of unique words was significantly lower, in total only 2,674. We manually checked the most frequent short words and handcrafted the rules for the correction of OCR errors wherever possible. We noticed many common prefixes and suffixes probably caused by over-segmentation due to newspaper layouts and column structures. In addition to short words, we analyzed the long words with a length of greater than 15 characters. This list contained 516 unique words. The majority of these words were related to hallucination, for example, *eieiemei6ieteiemeiem9i6teieiei9iei6k*, and helped us to identify the

9 For the transliteration we used the bi-directional transliterator for Python available at https://github.com/barseghyanartur/transliterate.

low-quality text spans and exclude them from further analysis. The rest of the words were primarily correct compound words.

Exploratory Analysis of the Corpus

In order to better understand the thematic structure of the extracted spans, we used *k*-means clustering.[10] The *k*-means algorithm is traditionally used in exploratory data analysis to cluster the elements by a given similarity criterion into *k* distinct groups. We ran three experiments characterized by different span representations: *n*-grams of varying length, Tf-Idf, and Tf-Idf with lemmatized tokens. In all the experiments, we used the Euclidean distance as metrics and an elbow method to calculate the optimal number of clusters.

In *n*-gram-based experiments, we used *n*-grams of varying lengths, ranging from two to four. This approach is appropriate as it is not based on specific vocabulary and can adapt to various OCR errors. However, the results obtained in these experiments could not be interpreted easily. Still, the investigation was very informative as we singled out frequent *n*-grams that reflect OCR errors and that can be used for text quality improvement in the future.

Using Tf-Idf representations without prior lemmatization, we obtained the vocabulary with 9,330 tokens. All the tokens were lowercase and all punctuation marks were eliminated, as well as those tokens with fewer than three occurrences or more than 80 % occurrences. Analyzing the tokens with fewer than three occurrences, we noticed additional OCR errors and the morphological forms that refer to the same lemma. As the number of the tokens is quite large – close to 50,000 – once again we confirmed the importance of OCR improvement and the use of lemmatization. The tokens appearing in more than 80 % of spans were also manually analyzed and used for the extension of the final stopwords list. For example, indefinite pronouns such as "svaki," "neki," "ovako" and "ovo" were extracted from this list.

Following the exact setup, we used Tf-Idf representations with lemmatization.[11] The resulting vocabulary formed a total of 5,993 tokens. The lists of stopwords and out-of-vocabulary words were still quite large, with close to 35,000 words in total. We also partially manually examined the content of these lists and incorporated the conclusions into the extension of the final stopwords list and more fine-grained text cleaning practices.

For cluster visualization, we used word clouds.[12] Observing the visualization, we concluded the following:

10 We used Python library *scikit-learn* available at https://scikit-learn.org/stable/.

11 For lemmatization and part-of-speech tagging we used Classla Python package available at https://pypi.org/project/classla/.

12 We used Python library WordCloud available at https://amueller.github.io/word_cloud/index.html.

1. One of the queries used for the repository creation (the query "izvedba") in the selected timespan was used to describe construction works and fine handcrafts. We noticed these through qualifiers such as "jeftin" (meaning cheap), "cena" (meaning price), "kvalitet" (meaning quality), and "garancija" (meaning warranty) which are not usually found in the context of music. Therefore, we marked these text spans as irrelevant and excluded them from further analysis.
2. There are repetitive spans in the repository due to advertisements published by various sources. This behaviour is reflected by a larger font size in the word clouds, most especially, by the higher frequency of the words in the advertisements. We kept only the first span occurrence and eliminated the duplicates.
3. The group of spans included words in Slovenian, such as "tekmovalec" (meaning competitor) and "vaje" (meaning exercises) which appeared in the word cloud. As we intended to use the work only for material in Serbian, we put aside these spans for future research.

Depending on the text span representations, the number of clusters ranged from nine to twelve. Some of the clusters could easily be named: Jewish culture, music education, religious ceremonies, choir performances, and so on. Below, you can see the word cloud (in Serbian) devoted to opera performances with the reception of music such as "izvrsno" (excellent), "uspeh" (success), "umetnički" (artistically), "prijatan" (agreeable) as well as the more mature language related to the technical description of the performances such as "arija" (aria), tenor (tenor), "program" (programme), "tačka" (a piece in a concert programme), "glas" (voice) and various others.

Figure 5: The word cloud related to opera performances.

Multidisciplinary Considerations

Changes in the Discourse between 1878 and 1941

In this section, historical changes to the discourse in music criticism in Serbian between 1878 and 1941 are analyzed, based on the data gathered through the process described in the previous sections of the study. The purpose is to consider whether the canon that is shaped through traditional musicological research is reinforced or contradicted by the quantitative analysis of the selected digital corpora.

Regarding the canon, we rely on the work of Roksanda Pejović, the most prolific researcher of Serbian music criticism from the historiographic perspective,[13] who identified certain fundamental changes occurred throughout the observed historical period, between 1878 and 1941. As a result, she asserts that there are notable differences between the approaches of the long nineteenth century, and the interwar period, respectively.[14]

Drawing on the wide selection of material at her disposal, and the methodology of the "close reading" of journals and newspapers, which is typical of musicological research,[15] Pejović pointed out that "Serbian music criticism was in its infancy in the nineteenth century."[16] In her opinion, the critics of this period were mostly journalists with only modest musical knowledge, and their approach to music relied on theatrical criticism; otherwise, many of them simply repeated the words of authoritative commentators on music. In both cases, the emphasis was on the cultural event itself, while expert assessment was either missing or disregarded. Musical amateurs expressed national ideas and coloured their language with romantic nuances, while also taking care to enlighten and instruct their readers.

On the other hand, after the First World War, important changes were introduced through the professionalization of music critics, and Yugoslav musical

13 Roksanda Pejović published twelve books and many articles on musical performance and criticism in Serbian covering the period between the nineteenth and early twenty-first centuries. Some of them are: Roksanda Pejović, *Srpsko muzičko izvođaštvo romantičarskog doba* (Beograd: Univerzitet umetnosti, 1991); Roksanda Pejović, *Kritike, članci i posebne publikacije u srpskoj muzičkoj prošlosti (1825–1918)*, (Beograd: Fakultet muzičke umetnosti, 1994); Roksanda Pejović, *Opera i balet Narodnog pozorišta u Beogradu (1882–1941)*, (Beograd: [s. n.], 1996); Roksanda Pejović, *Muzička kritika i esejistika u Beogradu (1919–1941)*, (Beograd: Fakultet muzičke umetnosti, 1999); Roksanda Pejović, *Koncertni život u Beogradu* (Beograd: Fakultet muzičke umetnosti, 2004).

14 The borders between these two periods are permeable: certain elements of the new professional approach may be noted before 1914, and *vice versa* – certain relics are present in the interwar period.

15 We refer here to the concept of "distant reading" created by Franco Moretti, based on quantitative and computational methods, and used to study British novels of the eighteenth and nineteenth centuries. He introduced "distant reading" as an opposition to the practice of the "close reading," which implies the careful analysis of the text, where attention is paid to critical interpretation and significant details. Cf. Franco Moretti, *Distant Reading* (London; New York: Verso, 2013).

16 Pejović, *Kritike, članci i posebne publikacije*, 2.

criticism came much closer to the typical style found in European journals and newspapers.[17] The most important goal of the writers was, as Aleksandar Vasić noted in his study dedicated to Serbian music criticism in the first half of the twentieth century, related to *The Serbian Literary Magazine* (*Srpski književni glasnik*, 1901–1914, 1920–1941), to educate readers and to include the analytical perspective in their texts.[18] The change in the profile of the critics is also important: instead of the journalists and mostly musical amateurs found during the previous period, in the interwar times music criticism was in the hands of professional musicians as well as educated intellectuals: literary critics, poets and writers, historians, and even lawyers.[19]

In the following table we offer a summary of some of the basic differences between the two periods in question.

Table 1: A comparative overview

	The Long Nineteenth Century	**The Interwar Period**
Critics	Amateurs, journalists specialized in theatre criticism	Professionals and educated intellectuals (writers, literary critics and historians)
The focus of critical writing	The cultural event	The musical piece and performance
Approach to the musical event	Descriptive	More analytical, with moderate and appropriate use of musical-technical attitudes
The typical language	Showing "romantic turns"	A literary style

Inevitably, a lot of questions arise regarding the computational exploration of the canon. Do digital corpora confirm changes in the type of description between the two periods, from mainly descriptive, generally nontechnical to a more music-specific and musically competent style of writing, or do they destabilize previous findings? What kind of aid can exploit the resources of digital newspaper archive offer to the qualitative research that has already generated certain conclusions? At this point in our research, bearing in mind all the methodological concerns and limitations imposed by the text quality, the main contribution which moves beyond the traditional approach is the ease with which digital corpora allow the searching of content and the increased breadth of the access available.

17 Pejović, *Muzička kritika*, 9.

18 Aleksandar Vasić, "Serbian Music Criticism in the First Half of the Twentieth Century: Its Canon, Its Method and Its Educational Role," *Muzikologija*, no. 8 (2008): 202.

19 Pejović, *Muzička kritika*, 8.

To illustrate this point, we referred to the content analysis of the assembled digital corpus and conducted a search for the term *harmony*, including adjectives and adverbs related to this word. Critical comments related to this particular term were chosen because the competences related to music harmony are among those parameters that are demarcating two analyzed periods. As mentioned, music writers in the long nineteenth century had modest music-theoretical knowledge, and it is expected that their comments related to harmony are mostly of general nature. On the contrary, it is presumable that representatives of the interwar period demonstrated more sophisticated knowledge on the music harmony in their critical writings.

The term harmony appears seven times in the analyzed material: twice in the first, and five times in the second phase. In terms of the Serbian historical language, several variants of these terms were used: not just the adjective "harmonski," but also "harmonijski" and even "harmoničeski" with all the propagations of the term. However, the word can have multiple meanings that are not differentiated by the NPL methods and tools: (1) it can pertain to choral singing, mostly related to the musical practice of the Orthodox Church,[20] (2) it can demonstrate performance qualities, in terms of a united and well-rehearsed ensemble (in the analyzed cases this meant choirs) and (3) a musical "vertical," in accordance with the common understanding of the term. Examples of the first understanding are not present in the digital resources covering the selected time span, resulting in the exploration of the second and the third use of the word harmonija.

The following citation comes from the critical comment on the participation of the student choir in the divine service in the Church of the Ascension (Vaznesenjska crkva) in Belgrade in 1890. According to the anonymous critic, the music for the *Liturgy of St. John Chrysostom* composed by Kornelije Stanković was sung with great precision, in a church building full of faithful citizens.

> *We are pleased to emphasize that only this liturgical music based on the folk tunes can arouse a feeling of piety among Serbs. Krestu tvojemu poklanjajemsja vladiko* [At the Most Holy Cross of our Savior] *is sung so beautifully in the traditional spirit and full, appropriate harmony (especially the bass was prominent), that one cannot stop listening to it.*[21]

Obviously, the romantically inclined critic was attracted by the coordination of the voices and musical skills of the group of performers; the syntagma

20 This is mostly related to terms "harmoničeski" and "harmonijski". Cf. Ivana Perković Radak, *Od anđeoskog pojanja do horske umetnosti: Srpska horska crkvena muzika u periodu romantizma (do 1914. godine)*, (Beograd: Fakultet muzičke umetnosti, 2008), 5–8.

21 "Sa zadovoljstvom naglašujemo, da samo ova narodna služba može u Srbinu pobuditi osećaj pobožnosti. – 'Krestu tvojemu poklanjajemsja vladiko' je tako divno otpevano u narodnom duhu i punoj, prikladnoj harmoniji (osobito se basovi pokazaše), da se dovoljno naslušati ne mogosmo." Anon., "Beogradske vesti," *Male novine* (March 15, 1890): 3, http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00031_18900315|page:3|query:otpevano.

appropriate ("prikladna") *harmony*, particularly bearing in mind the comment on the bass part, is not related to the "vertical" musical component, but to the expressive and unified sound of the choral ensemble.

The second example is the critical review of the Academic Choral Society Obilić performance in February 1921. The music critic, Petar Krstić, offered a following comment:

> *Njest svjat* [No One is as Holy] *by Mokranjac and Svjati Bože* [Holy God] *by Hristić were performed, which sounded a bit thin in the "Obilić" choir, then Romarska popevka by Štolcer for a female choir and tenor, done homophonically, with interesting harmony and dynamics* […] *Štolcer's* Ej sastali se čapljinski Tatari [Hey, the Tatars of Čapljina Met] *(a folk song from Southern Serbia) was in unison, too, so that the composer did not offer anything of his own, except for the tones held in certain parts. Both the piano accompaniment and the harmonic arrangement are too primitive.*[22]

As previously mentioned, during the first phase the word harmony was used less often than later to denote the compatibility of the members of the musical ensemble ("appropriate harmony") or general musical euphony. In the interwar period, the word "harmony" with its propagations was used more often, and its meaning mostly resonates with the contemporary implications of the word. As expected, and shown in the Krstić's quotation, writers are commenting on harmony as it related to musical pieces much more often than in terms of performance. We presume that similar search of specialized musical terms, just like "harmonija," would gain similar results.

In addition to the phenomenon of the word harmony, we explored the qualifiers, the distinct tokens, in the text spans for both periods and compared their frequencies. In our corpus, the long period is less covered by text spans with total of 290 spans. The interwar period is more elaborated, with 1,698 text spans. We used the part-of-speech tagger in order to single out the list of nouns and adjectives/adverbs related to the query term as appropriate. The numerous OCR errors propagated through the pipeline resulting, again, in approximate tags. Despite this fact, we managed to single out the qualifiers "besprekorno" (flawlessly), "solistički" (soloist), "filharmonija" (philharmonic), "tehnika" (technique), "homofono" (homophonic), "zvučno" (sonant) and "ton" (note of a certain pitch) as well as the voice types tenor, baritone, and bass that uniquely characterize the interwar period.

22 "Od crkvenih i pobožnih pesama izvođene su 'Njest svjat' od Mokranjca, 'Svjati Bože' od Hristića, koje je u horu 'Obilića' zvučalo nešto mršavo, zatim 'Romarska popevka' od Štolcera za ženski hor i tenor, rađena homofono, harmonski i dinamički zanimljiva […] Štolcerova 'Ej sastali se čapljinski Tatari' (narodna pesma iz Južne Srbije') i suviše je unisono držana, tako, da kompozitor nije uneo ničeg svoga, do držanih tonova u pojedinim glasovima. I klavirska pratnja i harmonska obrada je suviše primitivna." P. J. Kr., "Koncert Akademskog pevačkog društva 'Obilić,'" *Pravda* (February 23, 1927): 5, http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00042_19270223|page:5|query:otpevane.

Our findings confirm the previous findings that the nineteenth century approach was more informative and educational in nature, while music critics from the time of the first Yugoslavia paid more attention to the technical and stylistic layers of the musical pieces and performances. In other words, the corpus-wide analysis confirmed the musicological canon, or, as Estelle Joubert in her study dedicated to the "distant reading" practice of French music criticism, noticed, "it seemed to reinforce it."[23] However, her suggestion that certain future machine learning projects may offer further opportunities for future quantitative research in music criticism is completely reasonable and equally applicable in terms of the findings of our research.

The Emotional Impact

Unfortunately, it was not possible to apply NLP methods to the sentiment analysis of music critical writings in Serbian, as a result of the many errors caused by the OCR tool, as already explained, and the domain shift of the existing models for sentiment analysis. It would be interesting to deal with the computational analysis of the emotions expressed in the text spans and the accompanying vocabulary. The exploration of emotional keywords and adjectives, used by Serbian critics in their writing on music, would be beneficial in a number of ways[24] but – regrettably – the current state of the created corpora does not provide sufficient opportunities for this type of research.

As is widely known, emotions are, as Juslin clearly states, regarded as the key aspect of the musician's or listener's "experience, even the main motive for listening to music."[25] Even if the use of the corpus for research in this field is limited in the current phase of our research, it is intriguing to offer a glance at some of the music-induced emotions described and commented upon by musical critics who wrote in Serbian under the influence of the Romantic movement.

The collected data provided an interesting starting point for identifying evidence for one of the most fascinating themes in music research: the topic of music-induced tears/crying. As is well known, one of the most common strong experiences related to music is expressive behaviour and a physical reaction to music in the form of tears.[26] Tears, as Gabrielsson notes, are one of the most frequent physiological reactions, varying from a mild response (moist eyes) to

23 Estelle Joubert, "'Distant Reading' in French Music Criticism," *Nineteenth-Century Music Review* 19, no. 2 (2021): 291–315, DOI:/10.1017/S1479409820000476.

24 Cf. Yao Liang and Hu Wang, "Sentiment Analysis of Music Criticism Based on Data Mining," *Advances in Social Science, Education and Humanities Research* (Atlantis Press, 2018): 368–371, DOI:/10.2991/iceemr-18.2018.84.

25 Patrik N. Juslin, *Musical Emotions Explained: Unlocking the Secrets of Musical Affect* (New York: Oxford University Press, 2019), 8.

26 Alf Gabrielsson, "Emotions in Strong Experiences with Music," in *Music and Emotion: Theory and Research*, Series in Affective Science, edited by Patrik N. Juslin and John A. Sloboda (New York: Oxford University Press, 2001), 549, DOI:/acprof:oso/9780199230143.001.0001.

intense crying. Moreover, it is interesting that tears can occur both in terms of showing positive and negative emotions: positive because of the quality of the music or the performance, and negative when "the music was associated with a sad event."[27] Our selection was formed by several factors: the particular topic is underexplored (the most widely researched emotions are happiness, sadness, fear, valence, and arousal)[28] not only in the framework of national musicological research, but also from the historical perspective. It is also provocative from the contextual point of view, bearing in mind the complex historical, social and cultural situation in the selected time span.

Tears, as Sloboda points out, "may relate to emotions provoked by endings (whether of loss or the relief), and the precipitating musical structures may be those which encourage the listener to anticipate an impending ending or release of tension."[29] However, nine examples found in our repository do not relate to the musical structure at all, but rather to extra musical reasons: religious belonging (three examples), the political importance of certain people (two examples), singing with a "gusle" accompaniment (two examples), national pride (one example) and institutional belonging (one example). However, the broadening of the research corpus might bring certain other results that would further confirm Sloboda's thesis.

As an example, a critical comment on the concert given by Stevan Deskašev in Skoplje in 1896 illustrates well the idea of musical criticism as an agent of Romantic nationalism:

> *Mr. Deskašev opened the concert with the Ottoman anthem, which was interrupted by a loud* Padishah Chok Yasha! [Long live the Emperor!]. *The crown of our artist's concert was when he sang Serbian folk songs at the end. His patriotic act was very important for Serbian issues. Especially when he sang Gusle moje, the Serbs in the audience cried.*[30]

Romantic lyrics written by the famous Serbian poet Branko Radičević in his poem dedicated to the national instrument – the "gusle" (the single stringed bowed instrument used for the accompaniment of Serbian epic poetry) on

27 Alf Gabrielsson and Siv Lindström Wik, "Strong Experiences Related to Music: A Descriptive System," *Musicae Scientiae* 7, no. 2 (2003): 170, DOI:/10.1177/102986490300700201 .

28 Kazuma Mori and Makoto Iwanaga, "Two Types of Peak Emotional Responses to Music: The Psychophysiology of Chills and Tears," *Scientific Reports* 7, no. 1 (2017): 460–463, DOI:/10.1038/srep46063.

29 John A. Sloboda, "Music Structure and Emotional Response: Some Empirical Findings," *Psychology of Music* 19, no. 2 (1991): 120, DOI:10.1177/0305735691192002.

30 "G. Deskašev je otvorio koncerat otomanskom himnom, koja je sa gromkim 'Čok-jaša Padišah!' usklikom prekidana. Kruna koncerta našeg umetnika beše, što je na svršetku otpevao srpske narodne pesme. Ovim njegovim patriotskim činom mnogo je koristio srpskoj stvari. Naročito kod stavke 'Gusle moje' Srbi su plakali."
Anon., "Koncert St. Deskaševa u Skoplju," *Pozorište* (October 3, 1896): 150, http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00128_18960310|page:2|query:otpevao.

Ivan Zajc's music, caused a strong emotional response: the lyrics and music induced tears in the Serbian audience.

Former members of "Obilić," many of them already gray haired, mingled with current members, students, and sang the old national song *Hej, trubaču!* (*Hey, trumpet player!*). This song, the anthem of the choral society "Obilić," symbolically connected the old and new generations of "Obilić's people," caused tears in the eyes of many.[31]

In this case, the sense of belonging to the Obilić Academic Choral Society, founded in 1884, was reinforced by the performance of one of the distinguished conductors of the society, Josif Marinković, the composer of the patriotic song *Hej, trubaču!* The strong relationships among the members and the continuity of the institution, paired with the performance of Marinković's piece, resulted in music-elicited tears.

Enrichment of Factual Knowledge

The NLP analysis of digitized newspapers uncovered certain facts and trends that had not previously been known or observed in musicological studies. Moreover, gathering new evidence of the musical practice in Serbian society in the selected historical time span is one of the most important contributions of this type of research. It is precisely this which expands our knowledge, not just at the level of music-historical facts, but as a basis for either drawing certain new and unique conclusions for particular areas of research or else rethinking various canonical topics.

A few examples will illustrate our point: two of them based on a "close" and one on a "distant" reading of the digitized repository.

In the description of the Belgrade "slava"[32] (patron feast) celebrated on 10 June 1926, an Orthodox procession ("litije") was organized after the solemn church service:

> *At around eleven o'clock, a procession was formed to pass through the town. The Patriarch walked under the canopy, and the clergy in front of him. At the end of the procession was military music that played church hymns throughout.*[33]

31 "Bivši članovi 'Obilića', mnogi među njima već sedi, pomešali su se sa sadašnjim članovima, studentima i studentkinjama, i otpevali staru nacionalnu pesmu 'Hej, trubaču!'. Ova pesma, himna pevačkog društva 'Obilić', koja je simbolično povezala stare i nove generacije 'Obilićevaca' izazvala je mnogima suze na oči."
Anon., "Slave beogradskih društava," *Beogradske opštinske novine* (1938): 9, http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00005_19381101|page:65|query:otpevali.

32 *Krsna slava* is a particular Serbian religious celebration (a Serbian family's patron saint day). Many families have their *slava*, as a memory to the baptism day of their predecessors, but there are also *slavas* of institutions and settlements – cities or villages.

33 "Oko jedanaest časova formirana je litija za prolazak kroz varoš. Pod nebom je išao Patrijarh, a ispred njega sveštentstvo. Na kraju povorke išla je vojna muzika koja je za celo vreme svirala crkvene arije."

The information that a military orchestra played church hymns, in the presence of the Patriarch and representatives of the senior Orthodox Church hierarchy attracts our attention. It is well known that Orthodox music is purely vocal, and that not a single musical instrument is used in church practice. Even if the town procession did not have such strict rules as the Orthodox rites, it still surprises us that an orchestra took part in it by playing ecclesiastical tunes. What kind of melodies were played by the military musicians? How did the Patriarch and priests respond to this? Was it the regular practice in the 1920s in Belgrade or not? All these topics are worth further exploration using NLP research methods based on broader digital resources or the "close reading" approach.

A different, but also interesting finding is the caricature of the Belgrade quartet drawn by Pjer Križanić in 1931 published in the Belgrade newspapers.[34] The members of the quartet were teaching staff at the Music School: the violinist Marija Mihailović, the viola player Jovan Zorko, the cello player Juro Tkalčić and the pianist Ćiril Ličar. They were one of the most prominent chamber ensembles in Serbian musical life during the eight years of their existence (1925–1933).[35] As far as we know, music historians have not previously identified this caricature, which is proof of their widespread popularity.

Another topic, where a "distant reading" approach would give valuable results, is the prominent presence of female performers, particularly choirs, in the musical life of the time. There are 58 references to female choirs in our dataset, mostly in terms of performers or, much less frequently, intended ensemble of the piece. School female choirs are notably present, whether in celebrations of a school *slava* where they took part in the church ritual, or on other occasions. Bearing in mind the common opinion that female performers and choirs were less visible, due to the historical social norms, the topic is worth further research. As an example, a short passage from the text devoted to a concert in honour of St. Sava, the first Serbian archbishop and the school patron, held at the Teacher Training School (Preparandija) in Sombor in 1889 is given. The second piece on the programme was Robert Tolinger's

---

Anon. "Litija kroz Beograd," *Vreme* (June 11, 1926), http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00043_19260611|page:5|query:%D0%BB%D0%B8%D1%82%D0%B8%D1%98%D0%B0%20%D0%BA%D1%80%D0%BE%D0%B7%20%D0%B1%D0%B5%D0%BE%D0%B3%D1%80%D0%B0%D0%B4%20%D0%B7.

34 Kulundžić Zvonimir, "Karikaturista Pjer Križanić," *Beogradske Opštinske Novine* 1 (1940): 89, http://istorijskenovine.unilib.rs/view/index.html#panel:pp|issue:UB_00005_19401001|article:pageDiv84|page:89|query:%D0%BF%D1%98%D0%B5%D1%80%20%D0%BA%D0%B2%D0%B0%D1%80%D1%82%D0%B5%D1%82%20%D1%82%D0%BA%D0%B0%D0%BB%D1%87%D0%B8%D1%9B.

35 Cf. Roksanda M. Pejović, "Kamerno muziciranje i njegovi zastupnici," *Novi zvuk – internacionalni časopis za muziku*, no. 21 (2003): 95–103.

Figure 6: Križanić's caricature of the Belgrade quartet.

choir *Ljubičice* (*Violets*) composed to lyrics by Jovan Grčić Milenko. "This song was sung by a female choir, and it can be said with full authority that they are not lagging behind the male choir at all. Tolinger's art is vividly reflected in this piece as well."[36]

In addition to the female choirs, the corpus contains evidence of solo performances where female performers are referenced in various ways as "umetnice" (artists), "pijanistkinje" (pianists), "pevačice" (singers), or just with a title "gospođica" (Miss) or "gospođa" (Madam). The graph with the relevant span distribution is shown below.

The comparation with the male choir in terms of the quality of the performance is the guideline for future research of the musicological canon related to female ensembles in the long nineteenth century.

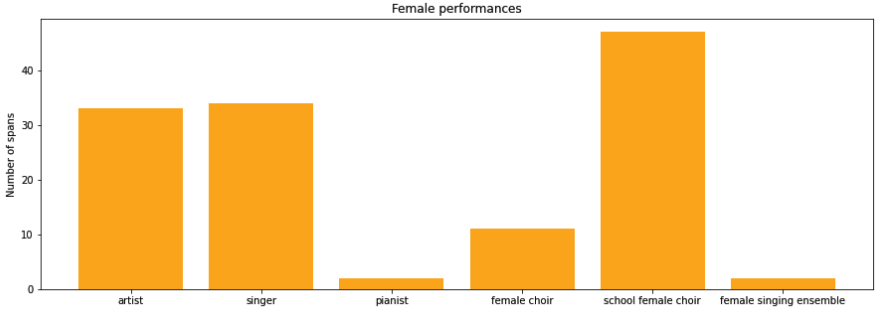


Figure 7: Statistics of female performances.

36 "Ovu je pesmu ženski lik otpevao i s punim pravom kazati se može da ni malo nije ustupio muškima. I u ovom komadu živo se ogleda umetništvo Tolingerovo."
IVAN., "Svetosavska Beseda u Somboru," *Školski list* 15 (1889): 31, http://istorijskenovine.unilib.rs/view/index.html#panel:pa|issue:UB_00015_18890215|article:div115|query:otpevao.

Conclusion

The digital corpus selected for this study, after the procedure of the narrowing down of resources on critical writing in newspapers in Serbian, included 3,751 text spans in 3,442 pages available via the official web application of the Svetozar Marković University Library in Belgrade. The process of multidisciplinary collaboration aiming to connect the quantitative analysis of the digital resources and musicological research on the music criticism written between 1878 and 1941, showed that there are many challenges, but also great opportunities for both disciplinary areas. Even if the preparation of digital material was demanding and required a lot in terms of effort and time, our results encourage and support further study.

Some of the primary issues related to the creation of the corpus are the selection of adequate initial search queries, challenges in newspaper page segmentation, (too) many OCR errors, and consequently, out-of-vocabulary words that influenced the accuracy of the NLP tools used. Due to the corpus size, the intention was to perform as many as tasks possible automatically and in an unsupervised manner.

From the musicological point of view, narrowing the research terms was one of the challenges, as well as finding the right balance between broader concerns brought by distant reading methods and the intense examination of certain topics that came as a result of close reading. Furthermore, the abundance of available digital material was another concern, in terms of defining the most appropriate focus.

However, the main goal of the study showed that there are multiple and creative ways to combine computational and musicological approach to assess music criticism in Serbian, so as to identify new approaches to the topic.

The community interested in NLP and the Digital Humanities might find interesting the pipeline for the creation of sub-corpora on top of the reach and undiscovered resources provided by the Svetozar Marković University Library. Fortunately, there are initiatives[37] related to the correction of text after OCR, the restoration of diacritics, and switching between the different language variants for Serbian based on the cascades of finite state transducers and e-dictionaries, as well as more machine-learning guided approaches for other languages[38] which we would like to investigate and deepen in the future. In addition, sub-corpora related to music and music practices represent a vital starting point for the systematization and creation of the music-related language resources necessary for the analysis of both past and present music sources.

37 Cvetana Krstev and Ranka Stanković, "Old or New, We Repair, Adjust and Alter (Texts)," *Infotheca* 19, no. 2 (2019): 61–80, DOI:/10.18485/infotheca.2019.19.2.3.

38 Thi Tuyet Hai Nguyen et al., "Survey of Post-OCR Processing Approaches," *ACM Computing Surveys* 54, no. 6 (2021): 1–37, DOI:/10.1145/3453476.

Musicological analysis of the selected corpus directed towards discourse changes in the selected historical periods (before the First World War and in the interwar times) offered the possibility to reinforce the traditional findings that the nineteenth century approach was more informative and educational in nature, while in the interwar period more attention was paid to stylistic and technical aspects, as well as the layers of musical performances and pieces. Furthermore, even if the current state of the digital material does not provide sufficient opportunities for research in broader "strokes," the collected data provided interesting prospect for one of the most fascinating themes in music research: the topic of music induced tears/crying. However, it was explained that, in the available critical writing in Serbian, strong emotions were stimulated by the feeling of belonging (whether national and religious), more than by the music itself. Finally, experiments with NLP methods demonstrated exciting possibilities for the gathering of new evidence regarding musical practice in Serbian society between 1878 and 1941. Although further work is necessary to develop/refine the computational tools designed for music-related texts – particularly in the field of NLP – and to create new open access repositories of digitized newspapers, this study has shown that it is not possible to deny the benefits of the digital endeavours in the field of musicology.

References

[Anon.] "Beogradske vesti." *Male novine* (March 15, 1890).
[Anon.] "Koncert St. Deskaševa u Skoplju." *Pozorište* (October 3, 1896).
[Anon.] "Litija kroz Beograd." *Vreme* (November, 1926).
[Anon.] "Slave beogradskih društava." *Beogradske opštinske novine* (November, 1938).
Gabrielsson, Alf. "Emotions in Strong Experiences with Music." In *Music and Emotion: Theory and Research*, 431–449. Series in Affective Science. New York: Oxford University Press, 2001.
Gabrielsson, Alf, and Siv Lindström Wik. "Strong Experiences Related to Music: A Descriptive System." *Musicae Scientiae* 7, no. 2 (2003): 157–217. DOI:/10.1177/102986490300700201.
IVAN. "Svetosavska beseda u Somboru." *Školski list* 15 (1889).
Joubert, Estelle. "'Distant Reading' in French Music Criticism." *Nineteenth-Century Music Review* 19, no. 2 (2021): 291–315. DOI:/10.1017/S1479409820000476.
Juslin, Patrik N. *Musical Emotions Explained: Unlocking the Secrets of Musical Affect*. New York: Oxford University Press, 2019.
Kr., P. J. "Koncert Akademskog Pevačkog Društva 'Obilić.'" *Pravda* (February 23, 1927).
Krstev, Cvetana, and Ranka Stanković. "Old or New, We Repair, Adjust and Alter (Texts)." *Infotheca* 19, no. 2 (2019): 61–80. DOI:/10.18485/infotheca.2019.19.2.3.
Kulundžić Zvonimir. "Karikaturista Pjer Križanić." *Beogradske Opštinske Novine* 1 (1940).
Liang, Yao, and Hu Wang. "Sentiment Analysis of Music Criticism Based on Data Mining." *Advances in Social Science, Education and Humanities Research* (2018): 368–371. DOI:/10.2991/iceemr-18.2018.84.

Ljubešić, Nikola, and Kaja Dobrovoljc. "What does Neural Bring? Analysing Improvements in Morphosyntactic Annotation and Lemmatisation of Slovenian, Croatian and Serbian." In *Proceedings of the 7th Workshop on Balto-Slavic Natural Language Processing*. Association for Computational Linguistics, 2019: 29–34. DOI: 10.18653/v1/W19-3704.

Moretti, Franco. *Distant Reading*. London; New York: Verso, 2013.

Mori, Kazuma, and Makoto Iwanaga. "Two Types of Peak Emotional Responses to Music: The Psychophysiology of Chills and Tears." *Scientific Reports* 7, no. 1 (2017): 460–463. DOI:10.1038/srep46063.

Nguyen, Thi Tuyet Hai, Adam Jatowt, Mickael Coustaty, and Antoine Doucet. "Survey of Post-OCR Processing Approaches." *ACM Computing Surveys* 54, no. 6 (2021): 1–37. DOI:/10.1145/3453476.

Pejović, Roksanda. "Kamerno muziciranje i njegovi zastupnici." *Novi zvuk – internacionalni časopis za muziku*, no. 21 (2003): 95–109.

Pejović, Roksanda. *Koncertni život u Beogradu*. Beograd: Fakultet muzičke umetnosti, 2004.

Pejović, Roksanda. *Kritike, članci i posebne publikacije u srpskoj muzičkoj prošlosti (1825–1918)*. Beograd: Fakultet muzičke umetnosti, 1994.

Pejović, Roksanda. *Muzička kritika i esejistika u Beogradu (1919–1941)*. Beograd: Fakultet muzičke umetnosti, 1999.

Pejović, Roksanda. *Opera i balet Narodnog pozorišta u Beogradu (1882–1941)*. Beograd: [s. n.], 1996.

Pejović, Roksanda. *Pisana reč o muzici u Srbiji: Knjige i članci (1945–2003)*. Beograd: Fakultet muzičke umetnosti; Signature, 2005.

Pejović, Roksanda. *Srpsko muzičko izvođaštvo romantičarskog doba*. Beograd: Univerzitet umetnosti, 1991.

Perković Radak, Ivana. *Od anđeoskog pojanja do horske umetnosti: Srpska horska crkvena muzika u periodu romantizma (do 1914. godine)*. Beograd: Fakultet muzičke umetnosti, 2008.

Sloboda, John A. "Music Structure and Emotional Response: Some Empirical Findings." *Psychology of Music* 19, no. 2 (1991): 110–120. DOI:/10.1177/0305735691192002.

Soper, Elizabeth, Stanley Fujimoto, and Yen-Yen Yu. "BART for Post-Correction of OCR Newspaper Text." In *Proceedings of the 7th Workshop on Noisy User-generated Text (W-NUT 2021)*. Association for Computational Linguistics, 2021: 284–290. DOI:/10.18653/v1/2021.wnut-1.31.

Vasić, Aleksandar. "Serbian Music Criticism in the First Half of the Twentieth Century: Its Canon, Its Method and Its Educational Role." *Muzikologija*, no. 8 (2008): 185–202.

Weliver, Phyllis, and Katharine Ellis, eds. *Words and Notes in the Long Nineteenth Century*. Woodbridge, UK; Rochester, NY: Boydell & Brewer, 2013.

POVZETEK

Računalniška analiza glasbene kritike med letoma 1878 ter 1941 v srbskem jeziku: Kaj se lahko naučimo iz digitalnega arhiva zgodovinskih časopisov v Univerzitetni knjižnici Svetozarja Markovića?

Proces digitalizacije je vplival na veliko področij muzikoloških raziskav, vključno s področjem glasbene kritike. Vendar se računalniška analiza o recepciji glasbenikov, glasbenih del ter izvajalcev le-teh v srbščini do sedaj ni izvajala zaradi različnih vzrokov. Ključni med njimi so: 1) omejena količina digitaliziranih virov in 2) zahteve t. i. cevovoda procesiranja naravnih jezikov (*NLP pipeline*) v okviru jezika glasbe in zgodovinskih virov. Multidisciplinarna raziskava, ki je bila izvedena za potrebe tega članka – po našem vedenju prva te vrste, ki se ukvarja s srbskimi viri – se je začela z definicijo arhivskega depoja; v glavnem je šlo za kritiško pisanje, ki je zdaj na voljo v digitalnem formatu. Sama definicija je bila iterativna, vodila so jo načini podatkovne analize in prakse nenadziranega strojnega učenja, morala pa se je ujemati tudi z glavnim ciljem študije: raziskati, kako združiti priložnosti, ki jih ponuja računalniška kvantitativna analiza, s tradicionalnimi kvalitativnimi muzikološkimi metodami raziskovanja ter nakazati, kaj lahko to sodelovanje doprinese k raziskovalnim metodam glasbe, posebej v smislu potencialnih področij raziskav.

Ustvarjeni depo predstavlja sub-korpus digitaliziranih časopisov v srbščini, ki ga je pripravila Univerzitetna knjižnica Svetozarja Markovića v okviru projekta Europeana Časopisi. Izbor relevantnih virov, pred-procesiranje in analiza teksta so bile zaznamovane s številnimi metodološkimi izzivi; nekateri so bili povsem tehnični in v povezavi z zbiranjem podatkov ter pridobivanjem informacij ter drugi, bolj računalniški, povezani z ocenjevanjem kvalitete pisanja tekstov, izboljšavami optičnega prepoznavanja znakov (OCR) in zmožnostjo orodij za procesiranje naravnih jezikov, da sledijo glasbeni terminologiji in kronološkim spremembam v jeziku. Na osnovi tega depoja tekstov, ki so bili objavljeni v 63 letih – večinoma v časopisih – med letom 1878 (datum neodvisnosti Srbije) ter začetkom druge svetovne vojne v Jugoslaviji (1941), smo kvalitativne ugotovitve združili z rezultati eksplorativne analize podatkov z namenom, da bi preučili nekatere izbrane teme, ki so relevantne za raziskovanje glasbene kritike.

Za potrebe tega članka so bile izbrane tri glavne teme, ki so najbolj relevantne v tradicionalnih muzikoloških raziskavah o glasbeni kritiki v srbščini: 1) spremembe v diskurzu v izbranem zgodovinskem obdobju, 2) jezik, ki se nanaša na emocionalni učinek določene izvedbe oz. nove glasbene kompozicije, in 3) obogatitev našega dejanskega znanja o glasbeni zgodovini. Možne smeri nadaljnjega raziskovalnega dela ne izključujejo drugih tem in področij, ki se lahko izluščijo iz ogromne zbirke zbranega materiala; nasprotno – v prihodnosti se odpirajo možnosti širšega ter hkrati bolj pretanjenega uvida, odvisno od izbire raziskovalnega diskurza.

ABOUT THE AUTHORS

IVANA PERKOVIĆ (ivanaperkovic@fmu.bg.ac.rs) is a musicologist and professor at the Department of Musicology of the Faculty of Music, University of Arts in Belgrade. She is author and co-author of five books (on Serbian religious music, history of Serbian music, Faculty of Music, music and interdisciplinarity), over 60 articles and chapters in peer-reviewed journals and monographs. Her research fields include Orthodox, particularly Serbian, music; music references in literature; interdisciplinary approach to music; topics of Self and Other in the context of European 18th century music; digital musicology, etc. She is member of the: IMS, SMS, ISOCM, editorial board of the Matica Srpska *Journal of Stage Arts and Music*, the Commission for Acquiring Scientific Title of the Ministry of Education, Science and Technological Development (MESTD) of the Republic of Serbia, Secretary General of the European Association of Conservatoires (AEC). She is experienced in creating/leading many national and international academic and research projects.

ANĐELKA ZEČEVIĆ (andjelkaz@mi.sanu.ac.rs) is a Ph.D. candidate in the domain of Natural Language Processing at the Faculty of Mathematics, University of Belgrade. She is currently employed as a researcher at the Mathematical Institute of the Serbian Academy of Sciences and Arts.

O AVTORICAH

IVANA PERKOVIĆ (ivanaperkovic@fmu.bg.ac.rs) je profesorica na Oddelku za muzikologijo na Fakulteti za glasbo Univerze za umetnost v Beogradu. Je avtorica ali soavtorica petih knjig (o srbski verski glasbi, zgodovini srbske glasbe, glasbeni fakulteti, glasbi in interdisciplinarnosti) ter več kakor 60 člankov in poglavij v recenziranih revijah in monografijah. Njena raziskovalna področja so pravoslavna glasba (zlasti srbska), glasbene reference v literaturi, interdisciplinarni pristop k glasbi, tema Sebe in Drugega v kontekstu evropske glasbe 18. stoletja, digitalna muzikologija idr. Je članica nacionalnih in mednarodnih združenj, kot so IMS, SMS in ISOCM, članica uredniškega odbora *Revije za uprizarjajoče umetnosti in glasbo* Matice Srpske, komisije za pridobivanje znanstvenih nazivov na Ministrstvu za izobraževanje, znanost in tehnološki razvoj (MESTD) Republike Srbije ter generalna sekretarka Evropskega združenja konservatorijev (AEC). Ima izkušnje s pisanjem predlogov ter vodenjem številnih nacionalnih in mednarodnih akademskih in raziskovalnih projektov.

ANĐELKA ZEČEVIĆ (andjelkaz@mi.sanu.ac.rs) je doktorska kandidatka na področju procesiranja naravnega jezika na Fakulteti za matematiko Univerze v Beogradu. Trenutno je zaposlena kot raziskovalka na Inštitutu za matematiko Srbske akademije znanosti in umetnosti.

DOI: 10.4312/mz.58.2.107-119
UDK 781.7(560):004.93

Temporal Evolution of *Makam* and *Usul* Relationship in Turkish *Makam*

[*]Benedikt Wimmer,[a] Esteban Gómez[b]

[a]*University of Applied Sciences Würzburg-Schweinfurt*
[b]*Aalto University*

ABSTRACT

Turkish *makam* music is transmitted orally and learned through repetition. Most previous computational analysis works focus either on *makam* (its melodic structure) or *usul* (its rhythmic pattern) separately. The work presented in this paper performs a combined analysis to explore the descriptive potential of the relationship between these in over 600 *makam* pieces.

Keywords: music information retrieval, Turkish *makam*, computational musicology

IZVLEČEK

Turška *makam* glasba se prenaša skozi ustno izročilo in usvoji s pomočjo ponavljanja. Večina prejšnjih računalniških analiz se osredotoča bodisi na *makam* (melodično strukturo) ali *usul* (ritmične vzorce). Pričujoče delo pa predstavlja kombinirano analizo obeh in tako raziskuje opisni potencial odnosa med *usul*om in *makam*om v preko 600 skladbah.

Ključne besede: pridobivanje glasbenih informacij (MRI), turški *makam*, računalniška muzikologija

* The authors contributed equally to this work.

Introduction

Numerous traditions belonging to a large geographical region of Asia, North Africa and Eastern Europe include the term of *makam*/*maqam* as part of their music vocabulary. This work is focused on the Ottoman-Turkish *makam* music (OTMM) tradition that proliferated in the Ottoman Empire and continues developing until nowadays. The term Ottoman-Turkish Music (*Osmanlı-Türk Musikis*) was coined by Behar (2015).[1] OTMM is comprised by a melodic structure called *makam* (plural *makamlar*) and rhythmic patterns called *usul* (plural *usuller*) described in the following subsections.

Makam

Makam derives from the Arabic *maqam* that means place, location, position or station/stop which is conceptually related with space, motion and stop/final in music. The concept of *makam* that has given a distinctive quality to Turkish music is based on multifaceted relations that are still very controversial from a musicological point of view.[2] For instance, the *makam* concept is not equivalent to the Western music definition of scale, even when some aspects can be regarded as similar considering that some notes play a key role in the development of a melodic progression such as the *durak* or *tiz durak* (functionally related to tonic), *güçlü* (related to dominant) or *yeden* (related to leading tone) in Western music. In addition, the initial and final tone (*agâz* and *karar*, respectively) also play an important role in *makam* theory.[3] Differently from Western music, a single *makam* can have more than one note playing the same role. As an example, *makam Segâh* is shown in Figure 1. In OTMM, the basic intervallic unit is the *Holdrian comma* that is obtained by dividing the octave into 53 equal parts. However this resolution has never been fully utilized in Turkish *makam*.[4] For these reasons, a higher number of different notes and accidentals are usually found in scores and there is no one-to-one mapping to fixed frequency values.[5] Therefore, it is especially important to consider these aspects while performing analyses based on symbolic data, due to the limitations they represent in regards to the ground truth performance where

1 Sertan Şentürk, "Computational Analysis of Audio Recordings and Music Scores for the Description and Discovery of Ottoman-Turkish *Makam* Music" (Doctoral dissertation, Universitat Pompeu Fabra Barcelona, 2016), 7, DOI: http://mtg.upf.edu/node/3675.

2 Okan Murat Öztürk, "How Was the Traditional Makam Theory Westernized for the Sake of Modernization," *Rast Müzikoloji Dergisi* 6, no. 1 (2018): 1773.

3 Ibid., 1769–1787.

4 Ozan Yarman, "A Comparative Evaluation of Pitch Notations in Turkish Makam Music," *Journal of Interdisciplinary Music Studies* 1, no. 2 (2007): 51–62, DOI:/10.13140/RG.2.2.14971.72483.

5 Mustafa Kemal Karaosmanoglu, "A Turkish Makam Music Symbolic Database for Music Information Retrieval: SymbTr," in *Proceedings of the 13th International Society for Music Information Retrieval Conference* (Porto: FEUP Edições, 2012), 223–228.

differences are possibly larger compared to Western music scores. Additionally, the total number of *makamlar* is estimated to be over four hundred. However, not all of them are frequently used.

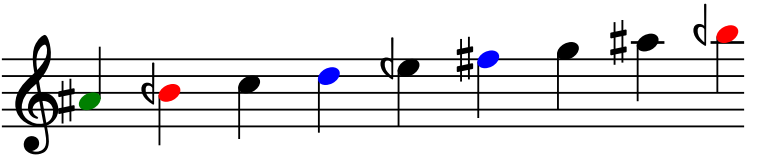


Figure 1: Makam Segâh. Colored noteheads correspond to the leading tone (green), root (red) and dominant (blue).[6] It can be observed that this makam has two dominant tones.

Usul

The term *usul* is used to describe a rhythmic pattern that is usually given by a sequence of onomatopoeic words that describe a series of intonations with varying weights that in practice are ornamented and varied by the performer, starting from a baseline pattern. A particular *usul* may present more than one baseline pattern, as shown in Figure 2 where two different baseline patterns are presented for *usul Musemmen*. Generally, multiple ornamentations of different *usuller* can be found for different tempi as well as for different percussion instrument sets.[7] When an *usul* is given in score notation, it will not describe the notes' onsets in the same way as in Western music. Instead, it will serve as a mere guideline and cannot be easily mapped into a well-formed hierarchical rhythmic structure, perhaps except for the fact that notes in the upper part of the staff commonly correspond to strongly accented strokes as opposed to notes in the lower part of the staff that correspond to less accented strokes. Additionally, the concept of syncopation seems to be inherently present in some *usuller* (such as *Düyek*) more than others.[8]

6 Ali C. Gedik and Barış Bozkurt, "Pitch-Frequency Histogram-Based Music Information Retrieval for Turkish Music," *Signal Processing* 90, no. 4 (2010): 1049–1063, DOI:/10.1016/j.sigpro.2009.06.017.

7 Barış Bozkurt, "Usul Samples by barisbozkurt," *Freesound.org*, sound recordings posted by user barisbozkurt, accessed April 16, 2021, https://freesound.org/search/?q=usul.

8 André Holzapfel and Barış Bozkurt, "Metrical Strength and Contradiction in Turkish Makam Music," in *Proceedings of the 2nd CompMusic Workshop* (Istanbul: Universitat Pompeu Fabra, 2012), 83.

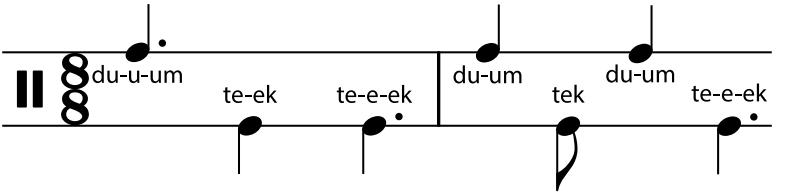


Figure 2: *Usul Musemmen*.

In Figure 2, each bar represents a different baseline. The accompanying expression of each note provides information about how it should be played as an onomatopoeic expression. In the case of baseline form I (left), the pattern is composed by three different onomatopoeic expressions (du-u-um, te-ek and te-e-ek), whereas in the case of baseline form II (right), the pattern has four expressions instead (du-um, tek, du-um, te-e-ek) where one of them (du-um) is repeated twice. These expressions just serve as a baseline and further ornamentations may be played in between.

Combined Approach

For all previously mentioned reasons, working with symbolic data can provide a significant simplification for some OTMM exploration tasks that otherwise would involve a laborious audio processing work where algorithms created for other music traditions may not be applicable. However, additional considerations of this music tradition may be required to perform a sensible interpretation of the results. While previous research works separately explore aspects of *usul* or *makam* in OTMM,[9] this research is focused on a combined exploration of the relationship between estimate *usul* and *makam* offsets for a subset of 687 scores corresponding to ten *makamlar* and twelve *usuller* extracted from the SymbTr dataset in order to find potentially useful patterns of interest in (ethno-)musicological research as well as development of computational tools for OTMM. Our work explores the temporal evolution of the vertical relationship of the *usul* and *makam* progression over time as we hypothesize that by studying it, potentially descriptive outlines may be encountered as a product of the intrinsic and idiomatic interaction between rhythm and melodic progression in this music tradition.

9 Barış Bozkurt, "Features for Analysis of Makam Music," in *Proceedings of the 2nd CompMusic Workshop* (Istanbul: Universitat Pompeu Fabra, 2012), 61–65; Barış Bozkurt, "Computational Analysis of Overall Melodic Progression for Turkish Makam Music," in *Penser l'improvisation*, ed. Ayari Mondher (Sampzon: Éditions Delatour France, 2015), 289–298; Gedik and Bozkurt, "Pitch-Frequency Histogram-Based Music," 1049–1063; André Holzapfel, "Relation Between Surface Rhythm and Rhythmic Modes in Turkish Makam Music," *Journal of New Music Research* 44, no. 1 (2015): 25–38, DOI:/10.1080/09298215.2014.939661; Holzapfel and Bozkurt, "Metrical Strength," 79–84.

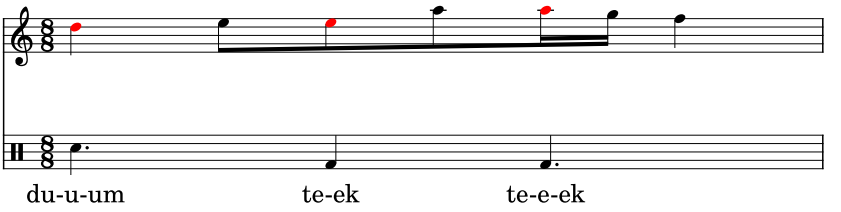


Figure 3: Melody notes filtering based on coincidence with the underlying *usul* pattern exemplified on an excerpt of the proposed SymbTr subset.

The excerpt shown in Figure 3 features *makam Hüseyni* and *usul Musemmen*. In this study, the notes highlighted in red are referred to as being visited because the onset of both *usul* and *makam* coincide. Every time the *usul* and *makam* onset are temporarily aligned counts as a visitation.

Methodology

To be able to explore the data, we have chosen a subset of the SymbTr dataset that contains the highest amount of scores per *makam* among all the available ones and that we were able to gather bibliographical support for. This selection corresponds to *makamlar Hicaz*, *Nihavent*, *Rast*, *Hüzzâm*, *Hüseyni*, *Segâh*, *Mâhur*, *Sabâ*, *Acemaşiran*, *Bûselik* and *usuller Aksak*, *Düyek*, *Sofyan*, *Curcuna*, *Semai*, *Nim Sofyan*, *Aksak Semai*, *Turk Aksagi*, *Yuruk Semai*, *Devr-i Hindi*, *Evfer* and *Musemmen*. For our analysis, we worked with the concept of what we refer to as a 'visitation.' It refers to the temporal alignment of melody and *usul* pattern. A visitation happens when the onsets of melody notes coincide with strokes of the underlying *usul* pattern (see Figure 3). The frequency (number of instances, as exemplified in Figure 5d) and mean duration in quarter notes of such visitations (Figure 5b) have been shown to correlate with theoretical *usul* weight patterns (Figure 5a) by Holzapfel and Bozkurt.[10] All visitation measurements were done respecting the individual *usul* baseline pattern and time signature of each score. In order to simplify the subsequent analysis, scores that presented more than one *makam*, time signature or *usul*, were discarded from the initial selection. Additionally, a synthetic score note to the *Holdrian comma* representation was curated based on the text annotations of the SymbTr dataset[11] which was exclusively designed and used for hierarchical visualization purposes rather than as ground truth tones due to the notation limitations discussed in section *Makam* above.

10 Holzapfel and Bozkurt, "Metrical Strength," 79–84.

11 Karaosmanoglu, "A Turkish Makam Music," 223–228.

Durations of* Usul *Visitations

First, we computed the mean note duration for each visitation with respect to the underlying *usul* patterns for each song on the chosen SymbTr subset. Additionally, we collected the mean note duration of melody notes that did not meet the criteria of a visitation or – in other words – did not happen to temporally coincide with the *usul* pattern. On the whole corpus, we then compared the mean note duration of visitations and non-visitations. To filter out notes that we assumed to have a rather ornamental function, we also disregarded notes that did not temporally coincide with an eighth note grid (see Figure 4).

Accent Patterns and Melody

We proceeded to extend previous work done by Holzapfel,[12] who measured correlations of theoretical *usul* accent patterns with melodic note onset patterns and could show significant discriminative potential in an *usul* classification task. We further investigated in this direction by making observations on visitation distribution patterns, specifically visualizing distributions against the underlying *usul* strokes. Measurements were taken on groups of scores that shared the same *usul* and in three metrical categories. One category counts the frequency of visitations (exemplified in Figure 5d), the second one measures the average duration for each of these visitations (see Figure 5b) and a third category sums all note durations in such cases (see Figure 5c).

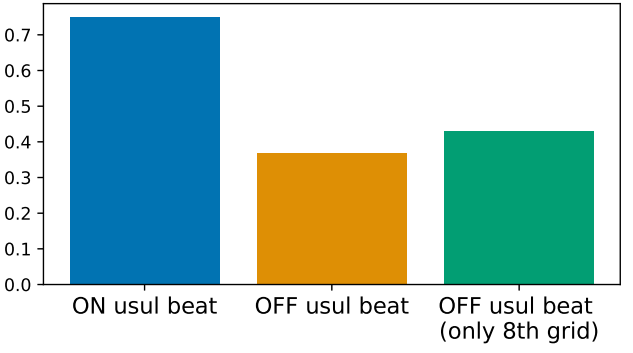


Figure 4: The y axis represents the average duration (in quarter notes) of notes that coincide with *usul* strokes (blue) and notes that do not (yellow). For a less fine-grained measurement grid, we filtered out notes that do not rhythmically coincide with eighth note multiples (green).

12 Holzapfel, "Relation Between Surface," 25–38.

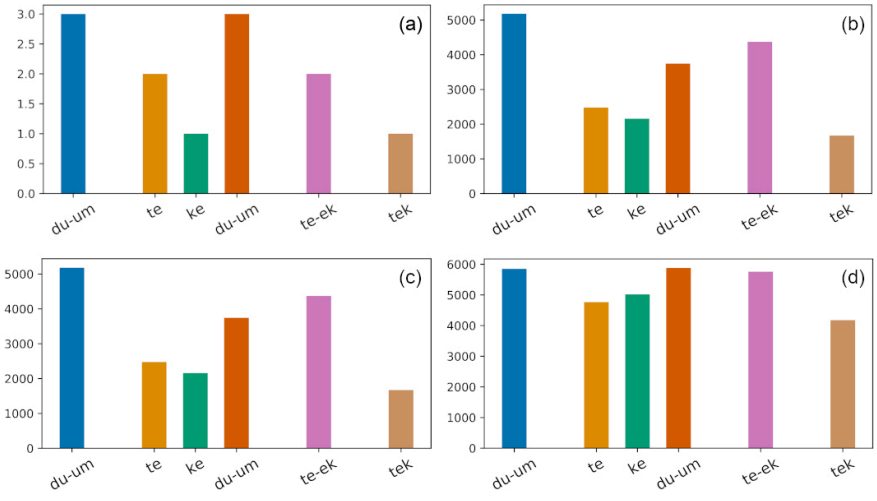


Figure 5: Example of usul Aksak in comparison to melodic features (inspired by Holzapfel's and Bozkurt's measurements):[13] (a) theoretical weight patterns, (b) mean duration per visitation in quarter notes, (c) sum of durations per visitation, (d) frequency count of usul visitations. The x axis represents stroke types according to their temporal occurrence in the given usul pattern. The y axis represents visitation measurements for each stroke type based on the aforementioned metrics.

Melodic Visualization over Histogram

Motivated by the visualization work on melodic progressions by Bozkurt,[14] we implemented a computational approach to complement melodic analysis of OTMM through multi-feature visualization of melodic and rhythmic information over time. This includes a note histogram and note outline based on melodic *usul* visitations (hence disregarding non-visitations) over time. For this purpose, scores are separated in various time frames, from which their respective mean pitch and pitch histogram are derived. In Bozkurt's proposal, the temporal selection of these melodic time frames does not take into account musical form (or structure) and hence we wanted to present an extended approach to this type of analysis. In an effort to better represent musical form, our time frame selection corresponds to individual bars. Extensive analysis plots were created for individual scores from the dataset (as opposed to aggregated groups of scores used in Bozkurt's work).[15] With this approach,

13 Holzapfel and Bozkurt, "Metrical Strength," 79–84.

14 Bozkurt, "Computational Analysisof," 291.

15 Ibid., 289–298.

we propose a summarized rhythmic and melodic analysis that accounts for the temporal evolution of a score. We have also ensured to provide melodic-semantic information such as the note function as well as the description of a *makam* direction (ascending, descending or ascending-descending).

Results

All previously described computations were performed on our selection of scores. In this section, the results are separately addressed for each analysis presented throughout the methodology.

Durations of Usul Visitations

By calculating the average duration in quarter notes of all notes categorized by their visitation property, a tendency toward longer melody note length for visitations versus non-visitation notes can be observed. On the entire selected SymbTr subset, visitations average about 0.75 quarter note lengths in duration, while non-visitations last for 0.37 quarter note lengths (0.43 quarter note lengths ignoring all notes that do not align with the eight note subdivisions grid). While the outcome in Figure 4 might appear biased through the fact that all *usul* baselines in this study have a stroke on the first beat of each measure, we have found that a similar relative distribution of note durations can be observed even when ignoring all notes that occur on beat one. In fact, the measured average note duration for *usul* visitations is 0.66 quarter note lengths, while non-visitations correspond to an average of 0.37 quarter note lengths (0.45 quarter note lengths ignoring all notes that do not align with eight note subdivision grid).

Accent Patterns and Melody

On our data of 687 scores and due to uneven distribution of scores across the proposed *usul* classes, we have measured between 110 and 31,450 overall melodic visitations per *usul* in total. For each stroke of each *usul*, between 13 and 6,703 occurrences of melodic visitations were counted, which lasted between 0.39 and 1.65 quarter note lengths on average. An outcome of this measurement task for the *usul Aksak* is shown in Figure 5.

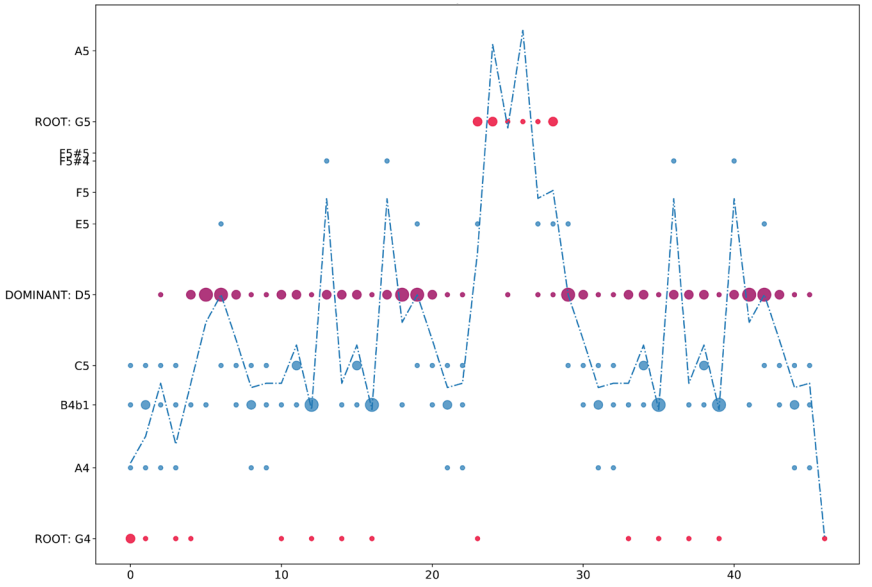


Figure 6: The proposed visualization of melody based on *usul* visitations for *makam Rast* and *usul Yuruk Semai*. The x axis represents the measure number. The y axis represents the note pitch calculated using our synthetic *Holdrian comma* mapping. The colored circles represent note histograms for each measure. Dominant (D5) and root notes (G4 and G5) are highlighted in purple and red, respectively. The mean pitch value of the notes played in each measure creates the melodic outline represented as a dashed blue line.

Melodic Visualization over Histogram

We have processed all scores in our SymbTr subset and computed plots that show the melodic outlines of *usul* visitations together with measure-wise histograms. To facilitate the analysis, we have organized these plots to be grouped by *makam* type and *usul* type pairs in the accompanying repository. The resulting 120 groups (combining ten *makamlar* and twelve *usuller*) show to yield between zero and 26 scores (average 5.26). It is observed that the chosen approach of creating a time frame for each bar facilitates the visual assessment of melodic repetitions in the outline, while histograms help to visualize melodic target points over time.

Discussion

We have found that the hypothesis of relative semantic importance of melodic onsets over an *usul* baseline pattern can be supported by the observation of longer note durations for visitations versus non-visitations as shown in Figure 4. However, it is important to note that we do not consider the metric of note durations as sufficient for semantic importance of melodic events, because additional aspects outside of the scope of this research may also have impact on this feature such as the limited information that can be extracted by analyzing purely symbolic data. Further investigations on other metrics such as pitch or dynamics would need to be conducted to state such a claim and could be the topic of further research. These findings could also be contrasted with audio recordings of OTMM.

After the application of the methodology described in section *Accent Patterns and Melody*, we noticed that the combination of occurrence count and average duration – the sum of durations – seems to reflect Holzapfel's theoretical accent pattern weight distributions[16] in the melody in most cases (example in Figure 5c).

In the majority of cases, both the histogram and temporal plot (see Figure 6) coincide with the fact that the note that can be regarded as 'dominant' is the most visited along the score, being even more frequent than the root, regardless of the underlying *usul*. Additionally, when a *makam* presents two 'dominants,' usually one of them is predominant over the other, and the root can be also more predominant than the second 'dominant.'

As seen in Figure 6, the temporal patterns described by the matched *makam*/*usul* onsets can visually summarize the melodic progression of the score. Ornaments and variations added by the performer may not be present in this visualization since these usually occur between the baseline *usul* pattern onset and therefore, we believe that the depicted visualization can potentially help to summarize a score and be used to detect repeating patterns in melody as well as form, especially through the property of using individual bars as the smallest temporal unit. Future work may start from this visualization in order to explore the usefulness of it in tasks such as phrase segmentation or form detection.

Conclusion and Future Work

This research presents a collection of analysis strategies motivated by the interaction between rhythm and melodic progression embodied by the concepts of *usul* and *makam* in Ottoman-Turkish *makam* music (OTMM). The concept of visitation is also introduced as a criterion to obtain a summarized description

16 Holzapfel, "Relation Between Surface," 25–38.

of a score. Our results corroborate previous work on rhythmic analysis and also contribute with an extended temporal analysis that includes both melodic and rhythmic progressions that are observed to have descriptive potential to summarize the content of a *makam* score. This analysis could also drive future work on *makam* segmentation and classification tasks. An accompanying repository is included as a contribution of this research, enabling other researchers to adapt our methodology, replicate our results and to further explore the SymbTr dataset.

References

Bozkurt, Barış. "Computational Analysis of Overall Melodic Progression for Turkish Makam Music." In *Penser l'improvisation*, edited by Ayari Mondher, 289–298. Sampzon: Éditions Delatour France, 2015.

Bozkurt, Barış. "Features for Analysis of Makam Music." In *Proceedings of the 2nd CompMusic Workshop*. Istanbul: Universitat Pompeu Fabra, 2012, 61–65.

Bozkurt, Barış. "Usul Samples by barisbozkurt." Freesound.org. Sound recordings posted by user barisbozkurt. Accessed July 8, 2022. https://freesound.org/search/?q=usul.

Gedik, Ali C., and Barış Bozkurt. "Pitch-Frequency Histogram-Based Music Information Retrieval for Turkish Music." *Signal Processing* 90, no. 4 (2010): 1049–1063. DOI:/10.1016/j.sigpro.2009.06.017.

Gómez, Esteban, and Benedikt Wimmer. "Turkish Makam Temporal Analysis." GitHub. Accessed October 2022. https://github.com/eagomez2/turkish-makam-temporal-analysis.

Holzapfel, André. "Relation Between Surface Rhythm and Rhythmic Modes in Turkish Makam Music." *Journal of New Music Research* 44, no. 1 (2015): 25–38. DOI:/10.1080/09298215.2014.939661.

Holzapfel, André, and Barış Bozkurt. "Metrical Strength and Contradiction in Turkish Makam Music." In *Proceedings of the 2nd CompMusic Workshop*. Istanbul: Universitat Pompeu Fabra, 2012, 79–84.

Karaosmanoglu, Mustafa Kemal. "A Turkish Makam Music Symbolic Database for Music Information Retrieval: SymbTr." In *Proceedings of the 13th International Society for Music Information Retrieval Conference*. Porto: FEUP Edições, 2012, 223–228.

Öztürk, Okan Murat. "How Was the Traditional Makam Theory Westernized for the Sake of Modernization." *Rast Müzikoloji Dergisi* 6, no. 1 (2018): 1769–1787. Accessed July 8, 2022. https://dergipark.org.tr/tr/download/article-file/540599.

Şentürk, Sertan. "Computational Analysis of Audio Recordings and Music Scores for the Description and Discovery of Ottoman-Turkish Makam Music." PhD dissertation, Universitat Pompeu Fabra Barcelona, 2016. http://mtg.upf.edu/node/3675.

Yarman, Ozan. "A Comparative Evaluation of Pitch Notations in Turkish Makam Music." *Journal of Interdisciplinary Music Studies* 1, no. 2 (2007): 51–62. DOI:/10.13140/RG.2.2.14971.72483.

Zachariadou, Anastassia. "The M (Maqam/Makam – Mode) App." *Series Musicologica Balcanica* 1, no. 1 (2020): 29–55. DOI:/10.26262/smb.v1i1.7735.

POVZETEK

Časovni razvoj odnosa med *makam*om in *usul*om v turškem *maka*mu

Turška *makam* glasba izvira iz ustne tradicije in se poučuje prek vajeništva oz. odnosa med mojstrom in vajencem, kjer se vajenec skladb nauči s ponavljanjem. Monofone kompozicije so grajene v okvirih melodične strukture, ki se imenuje *makam*, ter ritmičnih vzorcev, poimenovanih *usul* (edn.). Ker v primerjavi z zahodno glasbeno tradicijo turški *makam* uporablja večje število tonov v oktavi, pa tudi veliko množico idiosinkratičnih ritmičnih struktur, analitičnih modelov, ki delujejo po premisah tradicije zahodne glasbe, pogosto ne moremo neposredno prenesti na *makam*.[17] Dosedanje računalniške analize turškega *makam*a uporabljajo metode, kot so historigrami tonskih višin, n-gram analize in kratkoročni historigrami tonskih višin, ter se tako osredotočajo predvsem na melodični vidik kompozicije[18] oziroma analizirajo ritem ločeno.[19] Pričujoči članek proučuje deskriptivni potencial kombinirane časovne analize ritmičnih vzorcev ter melodičnih postopov, pri tem pa uporablja podsistem sistema SymbTr, nabor simbolnih glasbenih notacij, ki vsebuje več kot 1.500 notnih zapisov s 155 različnimi *makam*i in 48 *usul*i.[20] Na voljo je tudi podatkovni repozitorij, ki omogoča reproduciranje te raziskave ter omogoča drugim raziskovalcem, da uporabljajo ta skupek podatkov (*dataset*).[21]

17 Mustafa Kemal Karaosmanoglu, "A Turkish Makam Music Symbolic Database for Music Information Retrieval: SymbTr," v *Proceedings of the 13th International Society for Music Information Retrieval Conference* (Porto: FEUP Edições, 2012), 223–228.

18 Barış Bozkurt, "Features for Analysis of Makam Music," v *Proceedings of the 2nd CompMusic Workshop* (Istanbul: Universitat Pompeu Fabra, 2012), 61–65; Barış Bozkurt, "Computational Analysis of Overall Melodic Progression for Turkish Makam Music," v *Penser l'improvisation*, ur. Ayari Mondher (Sampzon: Éditions Delatour France, 2015), 289–298; Ali C. Gedik in Barış Bozkurt, "Pitch-Frequency Histogram-Based Music Information Retrieval for Turkish Music," *Signal Processing* 90, št. 4 (2010): 1049-1063, DOI:/10.1016/j.sigpro.2009.06.017.

19 André Holzapfel, "Relation Between Surface Rhythm and Rhythmic Modes in Turkish Makam Music," *Journal of New Music Research* 44, št. 1 (2015): 25–38, DOI:/10.1080/09298215.2014.939661; André Holzapfel in Barış Bozkurt, "Metrical Strength and Contradiction in Turkish Makam Music," v *Proceedings of the 2nd CompMusic Workshop* (Istanbul: Universitat Pompeu Fabra, 2012), 79–84.

20 Mustafa Kemal Karaosmanoglu, "A Turkish Makam Music Symbolic Database for Music Information Retrieval: SymbTr," v *Proceedings of the 13th International Society for Music Information Retrieval Conference* (Porto: FEUP Edições, 2012), 223–228.

21 Esteban Gómez in Benedikt Wimmer, "Turkish Makam Temporal Analysis," GitHub, dostop oktobra 2022, https://github.com/eagomez2/turkish-makam-temporal-analysis.

ABOUT THE AUTHORS

BENEDIKT WIMMER (benedikt.wimmer@fhws.de) is a computational musicological researcher who is working on the understanding of interaction patterns in dyadic music improvisations. As a doctoral candidate, he currently works together with Prof. Dr. Thomas Wosch of University of Applied Sciences Würzburg-Schweinfurt. After his undergraduate studies of informatics (TU München), he graduated with a Master in Sound and Music Computing at the Pompeu Fabra University in Barcelona. His previous works include music educational software as well as AI-based voice technology.

ESTEBAN GÓMEZ (esteban.gomezmellado@aalto.fi) holds a master's degree in Music Production, Technology and Innovation from Berklee College of Music and a master's degree in Sound and Music Computing from the Pompeu Fabra University. He currently is a doctoral candidate in Electrical Engineering at Aalto University, Finland. His previous work also includes music technology research oriented toward preserving music heritage, performing arts and machine learning applied to music analysis and speech processing.

O AVTORJIH

BENEDIKT WIMMER (benedikt.wimmer@fhws.de) je raziskovalec na področju računalniške muzikologije. Ukvarja se z razumevanjem interakcijskih vzorcev v diadični glasbeni improvizaciji. Po zaključku študija informatike na Tehnični univerzi v Münchnu je magistriral na Univerzi Pompeu Fabra v Barceloni (računalništvo zvoka in glasbe), trenutno pa kot doktorski kandidat dela skupaj s prof. dr. Thomasem Woschem na Univerzi za aplikativne vede Würzburg-Schweinfurt. Njegova prejšnja dela vključujejo izobraževalni računalniški program ter glasovno tehnologijo, osnovano na umetni inteligenci.

ESTEBAN GÓMEZ (esteban.gomezmellado@aalto.fi) je magistriral iz glasbene produkcije, tehnologije ter inovacije na Berklee kolidžu za glasbo ter iz računalništva zvoka in glasbe na Univerzi Pompeu Fabra. Trenutno je doktorski kandidat s področja elektrotehnike na Univerzi v Aaltu (Finska). Njegova predhodna področja delovanja vključujejo raziskovanje glasbene tehnologije za ohranjanje glasbene dediščine, umetniško udejstvovanje na področju glasbe ter strojno učenje za področje glasbene analize in procesiranje jezika.

DOI: 10.4312/mz.58.2.121-153
UDK 781.63:781.5:004

The Role of Orchestration in Shaping Musical Form: Theory and Practice of a Methodological Proposal and Its Computational Implementation

Charles de Paiva Santana,[a] Didier Guigue[b]

[a]*Aix-Marseille University, CNRS, PRISM, Marseille*

[b]*Federal University of Paraiba*

ABSTRACT

We introduce a method for computer-assisted analysis of orchestration. We also look into the role that texture and orchestration have in structuring musical form. The method comprises a numerical representation, a hierarchy of 'textural situations' and measures for heterogeneity, diversity and complexity of orchestral-textural configurations.

Keywords: musical analysis, orchestration, musical texture, computational musicology, audio analysis

IZVLEČEK

Predstavimo metodo za računalniško podprto analizo orkestracije. Pregledamo tudi vpliv teksture in orkestracije na izgradnjo glasbene oblike. Metoda vključuje številčni prikaz, hierarhijo »teksturnih situacij« in merila za heterogenost, raznolikost in kompleksnost orkestrsko-teksturnih konfiguracij.

Ključne besede: glasbena analiza, orkestracija, glasbena tekstura, računalniška muzikologija, avdio analiza

1 Orchestration, a Challenge for Musical Analysis

From the end of the nineteenth century, composers began to adopt increasingly systematic orchestration strategies that tended to actively involve this dimension in the structuring of the work, and thus in the expression of musical thought and its consequent perception.[1]

Makis Solomos[2] observes that Rimsky-Korsakov, in his *Treatise on Orchestration* of 1891, insists on the use of instruments "in relation to the categories of *écriture*." Solomos cites, for instance, a paragraph in which Rimsky-Korsakov discusses "the amplification [...] of sound qualities, a technique by which the resonance of two different groups (or the different timbres of a single group) is contrasted [...] to transform a simple timbre into a complex timbre."[3]

Our objective is to establish and evaluate, through experimental applications, a theory and method of analysis that would, by hypothesis, make it possible to evaluate the impact of these techniques on formal dynamics. Even briefly, Walter Piston, in his book on orchestration published in 1955 and now a classic, underlines the relevance of such an undertaking:

> *The objective in analysis of orchestration is to discover how the orchestra is used as a medium to present musical thought.* [...] *It is a means of studying how instruments are combined to achieve balance of sonority, unity and variety of tone color, clarity, brilliance, expressiveness, and other musical values. Ultimately, the analytical process shows the differences in orchestral style between various composers and periods.*[4]

Piston then lists the steps by which he believes a method of orchestration analysis should be carried out.

We can also mention the monumental *Traité* that Charles Koechlin published at the same time.[5] Based exclusively on his immense empirical knowledge, Koechlin advances as far as possible in the systematization of the relationships between the various acoustic parameters that define the sound of an instrument, in particular volumes, intensities, and densities, for which he manages to constitute gradual "scales" that make it possible to put in a situation of relative comparison various instrumental configurations, an approach unprecedented in this field.[6]

---

1 Pioneers preceded them, who formed a genealogy that had not yet been studied extensively, which, starting as far back as Rameau, reached Debussy, passing through the Mannheim School, Gossec, Haydn, the post-revolutionary musical practices in France (Cherubini, Méhul), Beethoven, Berlioz, Meyerbeer and Wagner. The tool we present here aims to help analyze the history of the evolution of orchestration as an active dimension of composition.

2 Makis Solomos, *De la musique au son: L'émergence du son dans la musique des XXe-XXIème siècles* (Rennes: Presses Universitaires de Rennes, 2013).

3 Ibid., 31.

4 Walter Piston, *Orchestration* (New York: Norton, 1955), 355.

5 Charles Koechlin, *Traité de l'orchestration en quatre volumes* (Paris: Max Eschig, 1954).

6 Ibid., 288.

In 1985, the Editions Moeck published *Instrumentation in der Musik des 20. Jahrhunderts: Akustik – Instrumente* by Walter Gieseler, Luca Lombardi and Rolf D. Weyer.[7] Unlike traditional treatises, this book understands and approaches instrumentation through the concrete study of the acoustics of instrumental and vocal sounds, considering the manipulation and organization of the sound material as an integral and interactive part of the compositional process – and not as an isolated activity. The extraction of instrumentation data from a large number of contemporary representative works is not intended to establish a catalogue of empirical prescriptions, but rather to provide a basis for understanding the techniques of producing "sound colors" (*Klangfarben*). Instrumentation as a compositional technique is approached by conceptual categories of compositional results, such as comprehensibility (*Fasslichkeit*), distinctness (*Deutlichkeit*), intention (*Absicht*) ..., an approach that breaks with the tradition of the genre and which moreover allows the incorporation and combining of any sound resources, not only of those presented in that book.[8]

As for the most innovative part of the book *Sonic Design*,[9] written about ten years earlier, it resides in the project to develop a theory of "sound color" and orchestration. The authors' criticism of the "common practice" of the musical analysis of their time is striking and reveals their confidence in the validity of their approach:

> *Analysis of sonic design adds a new dimension to musical understanding. It provides a rationale for such features as instrumentation and orchestration, registration*[10] *and dynamics*[11] *– crucial aspects of music, which, until now, have largely escaped analytical understanding. Sonic design is a mode of analysis that accounts for the complete sound of music.*[12][...] *Interference phenomena (especially beats), tone modulation, and noise, regarded so often in the past as negative or irrelevant properties of sound, are now found to be necessary, positive features of sound experience. Indeed, they are fundamental constructive elements of music* [...]. *Ultimately, it must be acknowledged that those modes of analysis and understanding that ignore the supranotational elements*[13] *and the total sound of music are limited and (to say the least) often misleading.*[14]

7 Walter Gieseler, Luca Lombardi, and Rolf-Dieter Weyer, *Instrumentation in der Musik des 20. Jahrhunderts: Akustik, Instrumente, Zusammenwirken* (Celle: Moeck Verlag, 1985).

8 Ibid., 119.

9 Robert Cogan, and Pozzi Escot, *Sonic Design: The Nature of Sound and Music* (New Jersey: Prentice-Hall, 1976).

10 I.e. the distribution of sounds between different regions of the instrumental range.

11 In our approach, we prefer to call them *intensities*.

12 In italics in the original.

13 By this they mean elements that are not explicitly codified in the score but are activated at the time of the performance of the work.

14 Cogan, *Sonic Design*, 397.

Aware that their undertaking was taking them to the "limits of our present knowledge" the difficulties they experienced show how far we have progressed on certain technical aspects – for example, in the analysis of the timbre of the instruments and the various factors involved in the constitution of their sound identity, data that are now widely available, but whose insufficiency was cruelly felt by these authors at the time[15] – although the practice of orchestration analysis has not become so widespread as to occupy the space they called for in the range of tools that should nowadays be commonly used in musical theory, composition or analysis.

In a way, our intentions inherit these *insights* and pursue a similar objective. In this article, we present an experimental theory of orchestration analysis and a practical method of application, followed by a description of our tool to assist in this analysis developed for the *SOAL* library in *OpenMusic*. In a way, our intentions inherit these insights and pursue a similar objective.

SOAL is intended to be useful for a range of analytic purposes, in situations where a 'top bottom' approach is more or equally pertinent that a 'bottom-up' one. The root of SOAL background concept is the *compound sonic unit*, technically defined as the combination and interaction of musical 'primary' components (a collection of pitches) with 'secondary' components – namely intensities, ranges, registering, densities, modalities of statistical distribution of pitches or other low-level elements, e.g. deviations, entropy and others. Being modular, any other *ad hoc* analytic component can be add at any time. The idea is to infer musical structures by comparing the relative sonic qualities of a sequence of such units, which are ranked onto a 'relative complexity' vector. As the reader will see, our proposal will present new functions for SOAL that are able to integrate the *orchestration* dimension into the arsenal of analytical tools already proposed.

Our method is intended to systematically elucidate how orchestration strategies come into play in the formal structure of a work, and what would be its impact in all the dimensions of the compositional practice that contribute to the construction of a musical form based on sound. The field of application can range from the first symphonists to the most recent large-scale productions.

The methodology is based on the information provided by the composer in the score. It involves both quantitative and qualitative evaluation of the various instrumental configurations by means of which the composer articulates a sound dynamics over time, and the way in which they are organized to create more or less dense or complex textures. To do this, we use "Partitional Analysis," which provides the agglomeration and dispersion indices of the instrumental parts.

15 Ibid., 365.

In a second stage, if there is one, an audio recording of the work is used, which is analyzed in order to assess the concrete effect of the written prescriptions, and to see to what extent their impact on the form reflects it.

Finally, it is suggested how a synthesis of these two approaches could be achieved. We are of course aware of the difficulty of addressing a field whose "rational and scientific approach is still to be done", and for which "the obstacles that must be overcome in its analysis and formalization are considerable", especially when dealing with music from the second half of the twentieth century, for which "spectral and noisy revolutions have reshaped the relationship with traditional orchestration."[16]

To illustrate our approach in concrete terms, we have chosen, for this publication, to concentrate most of the musical illustrations on Webern's *Variations* Op. 30 (1940), which as we know mark a fundamental milestone in the consolidation of serialism as a composition technique. It is the high level of "timbral chromaticism" of its orchestration that seemed to us to provide a privileged field for experimentation.[17] A sound fragmentation pushed to the extreme – because it sometimes goes down to the note-for-note – offered us the possibility to sharpen the tools under development and to test their sensitivity to this dimension of the compositional technique. However, we are simultaneously experimenting on other corpora, including Beethoven, Berlioz and Rameau, as well as, Murail and other contemporary composers closer to us. However, in order to save on reading and consulting scores, we have preferred to limit ourselves to asking the reader to follow us on an excerpt from this opus 30, in this case bars 56 to 82 of the Edition Philharmonia.

The remainder of this document is organized as follows: the following section elaborates step by step on the proposed model, illustrating it with real musical examples; the third section describes the implementation in *OpenMusic*. The fourth section outlines the analytical conclusions that should be possible to draw from this method and addresses the question of the future interaction between the analysis of written prescriptions and that of the sound recording of the work.

2 A Model for Analyzing Orchestration

We conceive this project as being part of a global project of analysis based on "sonority," or, more precisely, on the concept of a *compound sonic unit*, a term that identifies, at a given moment, a certain sound state, a "instantaneous

16 Yann Maresz, "Pour un traité d'orchestration au XXIe siècle," *L'Etincelle*, no. 11 (2006).

17 Jinho Kim, "Représentation et analyse musicale assistée par base de données relationnelle de la partition des variations pour orchestre op. 30 d'Anton Webern: Vers un système d'analyse musicale assistée par base de données relationnelle" (Doctoral Dissertation, Université Paris IV, 2006), 426 and 434.

synthesis of a certain number of components [of the compositional technique] that act and interact in complementarity."[18] In other words, what we call at the bottom of this flowchart the "Orchestration Relative Complexity" will have to or will be able to interact with other aspects of the compositional technique that we have already modeled and implemented in the SOAL library, such as achronic and diachronic relative densities, harmonicity and sonance rates, periodicity, relative entropy, etc.[19] The objective of this data set is to systematize the qualification of a *compound sound unit* in all aspects relevant to sound, including that of the *orchestration dimension*, when it plays a structuring role.

The orchestration is evaluated on two levels. First, we identify the prescriptions recorded by the composer in the score. We have formalized them within a hybrid component – *LSS Relative Complexity* in the flowchart – which counts the various instrumental combinations used during the work and qualifies them according to the way in which the instruments "agglomerate" or on the contrary "disperse" to generate more or less complex textures. In a second part – on the right side of the flowchart – the audio files of these same configurations are examined using ad hoc statistical and psychoacoustic descriptors in order to assess the concrete effect of the prescriptions, and to see to what extent their impact on the form reflects it. The measurement of the interaction between symbolic prescriptions and concrete sound results is given by the synthetic component *Orchestration Relative Complexity*.

In other words, it is a question of approaching the object of study at the same time at the abstract/symbolic level of the written code and at the concrete level of its effective sound realization, two angles of approach whose convergence and synchrony we feel will not always be the case. The objective is to make the model capable of withstanding these possible dichotomies as intrinsic to the *orchestration* dimension, since the endless uncertainties that can arise in the performance of a work for orchestra in concert situations have never inhibited composers in their desire to fix on paper the smallest details of the performance, as if they were as objective and stable as a metronomic indication.

2.1 Score Analysis: Identification of Instrumental Configurations

2.1.1 The Sonic Resources Index

For the first part of the model, the analysis at the symbolic level, the process consists in identifying, in the score, all the sound configurations selected by the composer. To do this, we first establish a *Sonic Resources Index* (SRI),

18 Didier Guigue, *Esthétique de la sonorité: L'héritage de Debussy dans la musique pour piano du XXe siècle* (Paris: L'Harmattan, 2009), 40.

19 Ibid., 52 and 391; Didier Guigue, "Sonic Object Analysis Library: OpenMusic Tools for Analyzing Musical Objects Structure," Version 5.0. (MacOS, 2016).

which is the non-ordered set of sound resources that are deployed during the work. It takes the form of a textual list corresponding to the nomenclature of sound producing sources mentioned or described. These are, in most cases, and always in the traditional repertoire, the instrumental parts indicated at the top of the score (*Orchestral Parts*), to which is added a list of all the information, textual or symbolic, which aims to produce a particular sound for a given instrument or desk, and which the composer mentions, either in *incipit*, for a permanent effect, or in the score during play, for specific effects - which is probably the most frequent case. This may include, in particular, the various modalities of sound modification by mechanical means (mute or other), electroacoustic means (distortions, transformations by digital processes …), or specific techniques (*flatterzung*, *col legno battuto*, etc.). In some circumstances, the *solo* and *divisi* indications of a desk may be considered sound decisions and are therefore included in the index. In the flowchart, this information is defined as *Instruments, Timbres & Effects*. The listed *Sound Resources* can be constituted, in addition or alternately, by *ad hoc* groups of instruments or objects producing sounds,[20] or by themes, patterns, motifs.[21] For the analysis of Hermeto Pascoal's *Sinfonia em Quadrinhos* (1986) made by our collaborators,[22] an enumeration by group and topics proved more relevant, since the composer conceived his orchestra by blocks of complex sounds, very rarely isolating one or another instrument.

The index therefore encompasses the universe of sounds from which the composer will draw the subsets that will mold the sound plastic of the work over time. Part of Webern's SRI list of *Variations* Op. 30 is shown in the Table below. It is noticeable that there are two different Sound Resources for the

20 In future developments of the model, it will be necessary to be able to systematize the inclusion of noninstrumental sounds in the index, whether they have been fixed on a support or whether they are produced in real time, from an acoustic or digital source. To do this, it will be necessary to group them into distinct sound categories according to their physiognomy. Each of these categories will be incorporated into the index as an additional resource. For an overview of the possible techniques for this classification, see Stéphane Roy, *L'Analyse des musiques électroacoustiques: Modèles et propositions* (Paris: L'Harmattan, 2004). However, the reader should keep in mind that, in this part of the analysis, knowledge of the concrete sound characteristics of the resources is not taken into account.

21 The concept of Sonic Resource is quite close to Tagg's "participant," which "refers to the source (the oboe, lead vocals, kick drum track, scratch sample, alto voice, etc.) that participates in the generation of a strand [...] and/or a layer." Participant is a useful notion in music semiotics because it acknowledges the "[...] music as socially constructed activity." In Tagg's model, a "strand" is a wider and not so euroclassical-connoted substitute for "voice," while a "layer" roughly matches our *Local Sonic Setup*. See Philip Tagg, *Music's Meanings: A Modern Musicology for Non-Musos* (New York and Huddersfield: Mass Media Music Scholars' Press, 2012), 447 and 449.

22 For a first approach to this work see Didier Guigue, and Thiago Cabral, "Entropia e Textura Rítmica na Sinfonia em Quadrinhos de Hermeto Pascoal," abstract, paper presented at *XXVI Congresso da Associação Nacional de Pesquisa e Pós-Graduação em Música (22–26 August, 2016)*, https://docplayer.com.br/121008799-Entropia-e-textura-ritmica-na-sinfonia-em-quadrinhos-de-hermeto-pascoal.html.

flute, depending on whether it is played normally or *flatterzung*. Also observe the two resources for the harp and timbals, and the many differentiated resources for the first violins.[23]

2.1.2 The Local Sonic Setups

A *Local Sonic Setup*[24] is a particular configuration at a given time. A new *setup* is identified each time the composer changes the previous instrumental configuration or modifies a timbre or playing mode of one or more instruments or includes or modifies an electronic intervention. Since, according to our theoretical premises, the *compound sound unit* is the product of the combination of a varied number of components, "the rupture in structural continuity of at least *one of these components* implies […] a rupture in sound continuity and, consequently, identifies a new structural articulation, that is, a new unit."[25] This means that each new orchestral setup has the ability to generate a new unity, since it causes a break in continuity on the sound level. In other words, a *local sound setup* is both a marker of sound discontinuity and a *compound sonic unit* defined by the orchestration criterion.[26]

This reading, which depends only on a careful reading of the score,[27] provides the initial database. Figure 1 illustrates the setup tracking process for some measures of the selected extract from the Webern's *Variations*. In this excerpt, the segmentation process uses 8 LSS, respectively: bars 68 and 69 (the thicker box indicates the most prominent sound unit in the sequence), 70.3 (the segmentation is caused here by the break in the continuity of intensity – change of "nuance" in violas and cellos), 71.2, 72, 73, 74 and 75. The reader will find this sequence in the table in Table 1.

Some scores are more fluid, more progressive than others, manifesting a less clear-cut sonic structure. This means that the segmentation process may have to deal with sequences where the LSS interlock, link together in tiling, rather than by juxtaposition. We show in Figure 2 a page from *Akrata* (1964–1965) by Xenakis with its segmentation.

23 For the sake of space saving, the index in the table is interrupted. It actually contains a total of 78 *Sound Resources*.

24 In this text, *LSS* and *setup* can be used alternatively as synonymous shortcuts.

25 Didier Guigue, *Esthétique de la sonorité: L'héritage de Debussy dans la musique pour piano du XXe siècle* (Paris: L'Harmattan, 2009), 58.

26 If other criteria were to complete the analysis, they would be subordinate to it, i.e. they would not have the ability to re-segment the piece into different and contradictory units from the one caused by the orchestration.

27 The implementation of a computer support for this task makes it necessary to encode the score into a MIDI file in which each of the sound resources is the subject of an independent track. But it is quite possible that this may not be possible in all cases, making human control essential in any case.

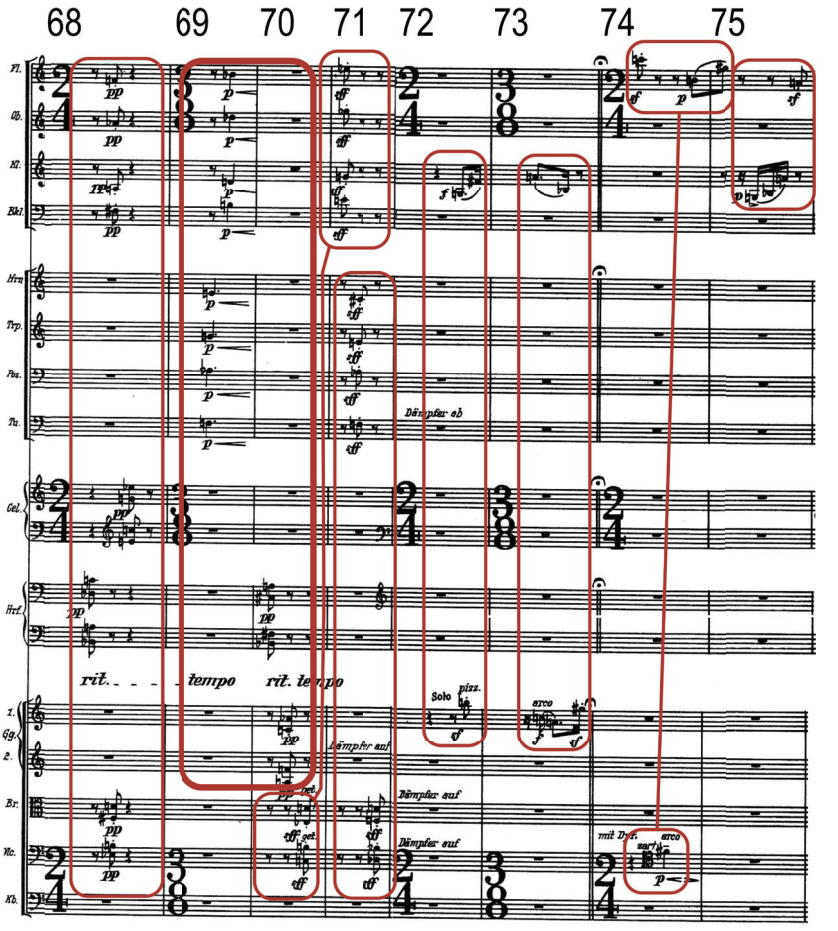


Figure 1: Anton Webern, *Variations*, Op. 30, bars 68–75: segmentation process by local sonic setups.[28]

This listing is formatted in a table in which the list of all the sound resources identified is placed in a column and the setups are arranged in line in sequential order of appearance, labelled with the bar number where they begin. An integer is inserted for each active resource in each *setup*. This integer is equivalent to the maximum number of simultaneous sounds played by the instrument in the analyzed *setup*[29] (1).

28 Copyright: Universal Edition.

29 This information has not yet been incorporated into the model. It would function as an additional

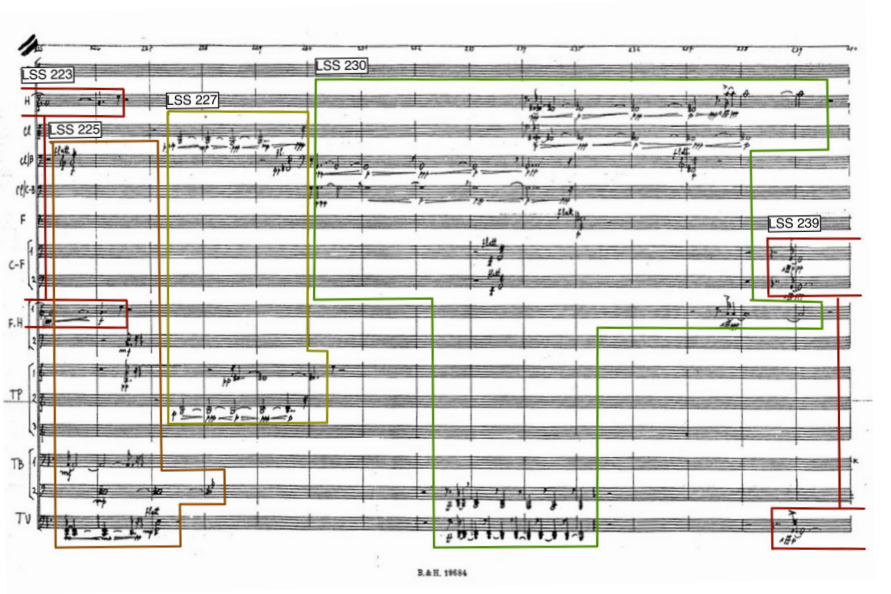


Figure 2: Iannis Xenakis, *Akrata*, bars 225–239: segmentation process by local sonic setups.[30]

This table can be used to map the distribution of instruments during the work (from the information provided by the "Recur" column) and to obtain statistical data on the frequency of their use by the composer. It also allows, using pattern recognition algorithms, to identify how many times and which configurations are repeated, to classify LSS according to the number of SRs they contain, in order to know the most frequent solutions, etc.

If the number of SRs is not disproportionately high, this table can also be displayed as a clock. In this case, each SR is placed on a point on the circle and each LSS is represented by the junction of the points corresponding to the resources used. Figure 3 shows, for example, 4 neighboring LSS in a passage from Beethoven's Trio from the Scherzo of the 3d Symphony, whose SRI contains 24 resources.[31] The instruments are classified from top to bottom according to their register, on the left for strings, on the right for winds. This representation makes the sound contrasts caused by the composer's orchestral writing very visible.

---

but "virtual" sound resource (since it does not require a new concrete resource); it also acts, to an extent yet to be studied, on the sensation of "agglomeration" of textures (we define this term below).

30 Copyright: Boosey & Hawkes for the score.

31 Namely: woodwinds by two, three horns, two trumpets, timpani, and the string desks that we have chosen to separate from the point of view of sound rendering on the basis of the playing technique (L=*ordinario* and/or *legato*, S=*arco staccato*).

2.1.3 The Weighted Number of Resources (WNR)

The next step is to weight the setups according to the number of sound resources they contain, assigning them a relative value called *Weighted Number of Resources*, or WNR. The basic information is obtained by summing the

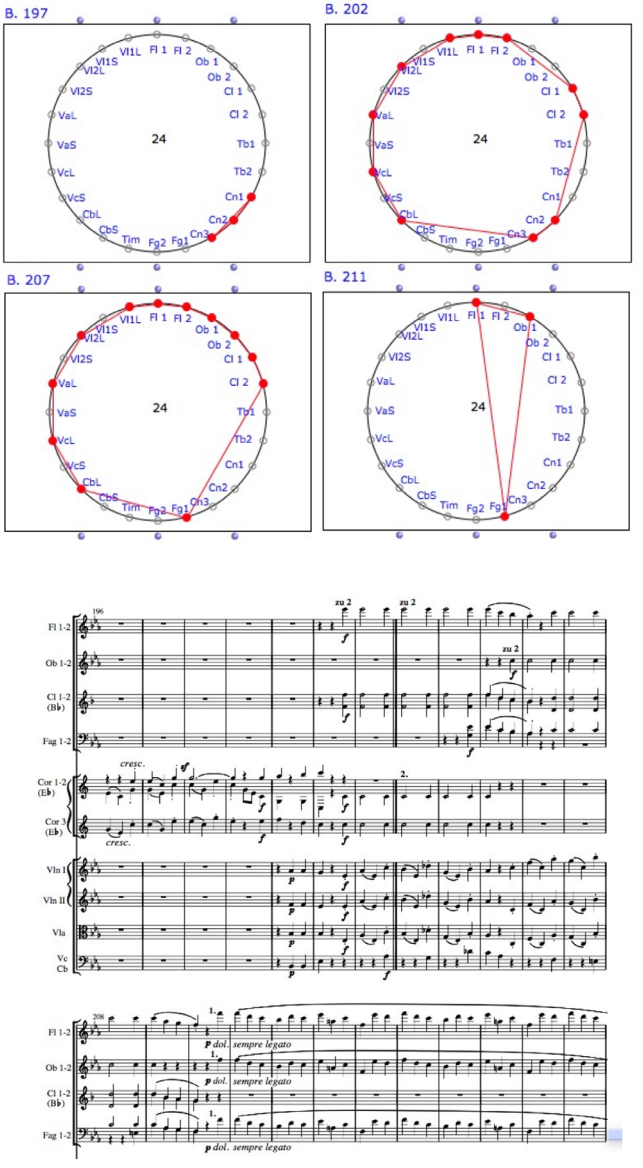


Figure 3: Ludwig van Beethoven, excerpt from the "Trio" from the Symphony No. 3: 4 LSS in clock representation.

non-empty cells of the table (line Total Resources).[32] This must be normalized in order to reach the maximum (1) when this sum is equal to the maximum number of *Sound Resources* that can be used in the same *setup*. The calculation of this maximum will depend on how the Index is calculated. In general, classical symphonic writing induces a selection by desk. The total number of possible resources is therefore over. But in the case of works such as Pascoal's symphony, for which the index is composed not of individuals but of subsets of instruments, the potential number of groupings, based on the available instrumental complement, is close to infinity because there is practically no combinatory impossibility. We are therefore not currently considering a single solution for obtaining the standardization paradigm applicable to WNR.

Table 1: Structured data from orchestration and textural analysis of Anton Webern's *Variations for Orchestra*, Op. 30

Header column refers to the SRI of the work, while the header row indicates the bar numbers. For improved readability, sound resources not employed are hidden. The column recurs refers to how much the specific sonic resource is used during the entire piece.

Recur.	Sonic Res.Index (SRI): bars >	68	69	70.3	71.2	72	73	74	75
35	Fl	1	1	1				1	1
39	Ob	1	1	1					
44	Bb Cl	1	1	1		1	1		1
19	Bass Cl	1	1	1					
14	Hn F sord.		1		1				
34	Tp C sord.		1		1				
18	Tbn sord.		1		1				
11	Basstuba sord.		1		1				
35	Celesta	4							
52	Hp	4	4						
14	Vln I solo arco						1		
4	Vln I solo pizz.					1			
15	Vln I tutti arco		2						
9	Vln II tutti arco		2						
3	Va div. 1 arco			1	1				
3	Va div. 2 arco			1	1				

32 Also, it is not obtained by summing the values contained in these cells (see note 19).

9	Va tutti arco	2							
3	Celli div. 1 arco								
2	Celli div. 2 arco			1	1				
10	Celli tutti arco.	2							

Total resources	8	11	8	8	2	2	1	2
WNR	0,64	0,74	0,64	0,64	0,2	0,21	0,2	0,21
Agglomeration	-7	-13	-12	-12	0	0	0	0
Dispersion	21	42	16	16	1	1	1	1
Difference	14	29	4	4	1	1	1	1
Setup Complexity	0,82	1	0,69	0,69	0,2	0,21	0,2	0,21

In the current state of our experiments, and in cases where the SRI is established from individual instruments or desks and the timbre effects applied to them, we have worked with two normalization values: the first is the simple result of the sum of the *Sound Resources* contained in the index. This calculation probably satisfies all works, which contain little or no special sound effects. But it is very likely that in many cases from the twentieth century onwards, this sum will be much higher than the actual number of performers. In *De Natura Sonoris* (1966), Penderecki prescribed eight string playing modes: *sul tasto*, *sul ponticello*, *col legno*, *legno battuto*, three unconventional bow effects, in addition to *ordinario*. Moreover, the first two flutes must play the piccolo alternately. Besides, several types of vibratos and tremolos are described. Finally, the six percussionists must have a very large arsenal of instruments and mallets. Thus, there are many distinct sound resources to index, resources that cannot be played simultaneously, at the same time. The procedure then consists in establishing, on the one hand, the list of the number of instruments prescribed by the composer, classified by desk, and, on the other hand, the total number of sound effects that each instrument is called upon to perform. From this double list we extract the minimum value for each desk. Indeed, either the number of sound effects is less than the number of instruments on the desk, in this case the number of SR corresponds exactly to the number of different timbre effects, or the number of instruments is less than the number of effects requested, in which case it is this number that imposes its limits. The sum of these minima constitutes the normalization paradigm. The Table 2 shows how the *De Natura Sonoris*[33]index could be

33 This table is presented for illustrative purposes only and is not intended to be a reference for the analysis of this work.

hypothetically realized. The nomenclature prescribes 86 instruments (Penderecki indicates precisely how many strings he wants for each desk, which is not always the case). The sum of the prescribed different sound effects is 60,[34] but only 52 different sounds can be played at the most at the same time. It is this last value that will be used to normalize the number of resources used for each LSS.

Table 2: *De Natura Sonoris*, no. 1, Sound Resource Index. The score specifies 86 instruments, including the exact number of string instruments needed for each section. The score indicates a total of 60 different sound effects, of which only 52 different sounds can be performed simultaneously.

name	**# instr.**	**# sonic res.**	**n. max simul. res.**
4 fl (2 picc)	4	2	2
ob	3	1	1
eh	1	1	1
cl	2	1	1
bcl	1	1	1
sax	2	1	1
bn	3	1	1
cbn	1	1	1
hn	6	1	1
tpt	4	1	1
tbn	3	1	1
tba	1	1	1
perc	6	24	6
pf	1	1	1
harm	1	1	1
flexatone	1	1	1
vn	24	8	8
vl	8	8	8
vc	8	8	8
db	6	6	6
Total	**86**	**60**	**52**

34 Probably much more if we went into detail about the different playing modes and timbres of the percussion.

The formula we have chosen and implemented in *SOAL* for the factoring of these two values (the number of SRs of each LSS and the constant denominator) is logarithmic. Indeed, the logarithmic curve introduces a compensatory equilibrium, by giving more visibility to *Setups* with fewer resources – and for which we hypothesize that they tend to be, as a general rule, the most used – and by bringing as close as possible to (1) those that are close to the maximum. So, for each Local Sonic Setup, we have,

$$\mathrm{WNR} = \frac{\ln(\rho)}{\ln(P)} \qquad (1)$$

where WNR (*Weighted Number of Resources*) is the weighting, ρ is the number of Sonic Resources in the *Setup*, and P is the total number of *Resources* identified according to the methodology adopted.[35]

2.2 An Application of Partition Theory

The impact that the manipulation of sound resources can have on the formal dynamics over time is directly affected by the way the composer organizes them into more or less autonomous flows. It can be said that from quantitative data, the composer makes qualitative choices, and that these choices have an impact on quantitative decisions. The distribution in polyphonic flows characterizes what is known as *texture*, a dimension that signs a composer's personal style of orchestration, because it reflects his way of negotiating instrumental individualities and more or less stratified sound masses. In his classic *Structural Functions in Music*, Wallace Berry proposes a representation of texture according to the degree of independence or interdependence of the voices that compose it.[36] According to him, a texture would be composed, on the one hand, of *real components*, each of which would correspond to a "voice" – i.e. a part that individualizes in general polyphony – and of *sound components* that represent the sum of the sound resources used in what I call here a *setup*. It is the measurement of the degree of independence/interdependence of a resource that groups it into a real component or leaves it outside as an isolated flow.

Although he does not mention it, this reasoning, as well as the numerical representation it proposes, offer obvious convergences with the classical mathematical theory of the partition of integers, initially developed by Euler as early

35 The reader can compare the lines *Total Resources* and *WNR*, for a demonstration of the impact of the logarithm on the weighting of the number of sound resources: *Setup* 63, for example (AR column), uses only 16 of the 78 *Sound* Resources indexed.

36 Wallace Berry, *Structural Functions in Music* (New York: Dover Publications, 1987), 184.

as 1748.[37] According to this one, number 5, for example – a setup of five sound resources, let's say, to stay in our field of study – has seven partitions ($p(5) = 7$), i.e. seven ways by which it can be represented by the sum of other integers, in this case: (5,4 + 1,3 + 2,3 + 1 + 1,2 + 2 + 1,2 + 1 + 1 + 1,1 + 1 + 1 + 1 + 1). A standard form of representing this set in an abbreviated form consists in grouping the "real components" into vectors: 5,41,32,311,311,221,2111,11111, or according to a formula in which the base indicates the part and the exponent its multiplicity 5, 1^4, 2^3, 1^23, 12^2, 1^32, 1^5.[38]

We have adapted the first of these representations so that it can be directly read and understood in *OpenMusic*, which is written in Common Lisp. This is how we will write ((5)(4 1)(3 2) … (1 1 1 1 1 1 1 1)). In this case, the scores with the most numbers are those with the highest rate of *dispersion* – Berry speaks of *independence* – hence it follows that representation (1 1 1 1 1 1 1) means that each of our five instruments plays an independent part. In Berry's terminology, we have here a texture with five real components. The nominal value of each figure reflects the *agglomeration* rate, which corresponds to Berry's *interdependence*. In this case (4 1) would be the way to represent a texture with two real components, a soloist accompanied by a chord played by the other four instruments.

In music, however, the possible number of partitions of a finite set of sound resources is much higher than that obtained by partitioning the total, because it is necessary to include all possible partitions of subsets that can be constituted by groups that use only a part of the resources. To use the same scenario, the possibilities of partitions, and therefore textural configurations, of five resources, amount to 18.

The complexity of a texture is therefore directly related to the dispersion rate of its components, as well as being proportional to the number of them. To calculate the rate of agglomeration or dispersion of a given Local Sonic Setup, firstly we need to count every combination, or rather every possible relation of any two elements of the LSS. We can do it by referring to the general formula for finding the number of combinations of p objects from a set of n objects, known as *n* choose *p*:

37 George Andrews, *The Theory of Partitions* (Cambridge: Cambridge University Press, 1998); Pauxy Gentil-Nunes, "Análise Particional: Uma mediação entre composição musical e teoria das partições," in *Simpósio de cognição e artes musicais (20–26 May, 2009)*, 343–354; Pauxy Gentil-Nunes, "Particiograma e indexograma: Topologia e dinâmica das progressões particionais," paper presented at *XXI Congresso da Associação Nacional de Pesquisa e Pós-Graduação em Música (22–26 August, 2011)*, https://anppom.org.br/anais/anaiscongresso_anppom_2011/ANAIS_do_CONGRESSO_ANPPON_2011.pdf. In the field of composition, Milton Babbitt is known to have been the first composer to make exhaustive use of the total number of partitions of the number 12 in serial music, by inventing the all partition table. See Robert Morris, "Mathematics and the Twelve-Tone System: Past, Present, and Future," in *Mathematics and Computation in Music*, eds. Timour Klouche and Thomas Noll (Heidelberg and Berlin: Springer-Verlag, 2009).

38 Gentil-Nunes, "Análise Particional"; Gentil-Nunes, "Particiograma e indexograma"; George Andrews and Eriksson Kimmo, *Integer Partitions* (Cambridge: Cambridge University Press, 2004).

$$C(n,p) = \frac{n!}{p!(n-p)!} = \frac{n(n-1)(n-2)\dots(n-p+1)}{p!}. \qquad (2)$$

For instance, in a setup composed of 4 sonic resources playing agglomerated parts, let's say a woodwind quartet, represented by the singleton list (4), there is a total of 6 unique pairs as

C(4,2) = 6, that is
(Fl Ob) (Fl Cl) (Fl Fg) (Ob Cl) (Ob Fg) (Cl Fg)

On the other hand, in a LSS of four soloists playing independent parts, that is (1 1 1 1), when we consider any of its individual real-components or instrument, we find a total of zero unique pairs as *C*(1,2) = 0.

We will refer to the total number of unique pairs of any resource or real component of a given setup as T_2 or simply *T*. By reworking the equation given at (1), we will define it as a function in the following way:

$$T_2 : \mathbb{N}^* \to \mathbb{N}$$
$$n \mapsto \frac{n(n-1)}{2} \ . \qquad (3)$$

This way, the sucessive total unique pairs when n is mapped to the first eight positive integers, that is *T2* * (1 2 3 4 5 6 7 8) = (*T2* (1), ... , *T2* (8)) is equal to (0 1 3 6 10 15 21 28).

It follows that, in order to calculate the rate of agglomeration of a given local setup, we need to sum the *T2* value of each of its components. For instance, the rate of agglomeration of the setup represented by the list (211) is given by (*T2* (2) + *T2* (1) + *T2* (1)) which results in 1. It is formally defined by the following function:

$$\mathcal{A} : \mathbb{N}^r \to \mathbb{N}$$
$$(a_0 \dots \ a_{r-1}) \mapsto \sum_{i=0}^{r-1} T_2(a_i) \, , \qquad (4)$$

where the list (*a*0 ... *ar*–1) represents an LSS, *ai* each of its elements, that is, its real-components, and *r* the length of the LSS.

The dispersion index (*d*) is the result of the difference between (*a*) and *T*[9].

$$D: N^r \rightarrow N$$
$$(a0 \ldots ar{-}1)\ 7 \rightarrow T2(\rho)\ {-}A(a0 \ldots ar{-}1), \qquad (5)$$

where ρ is the sum, the number of sonic resources of the LSS, that is, $\sum_{i=0}^{r-1} a_i$.

We then obtain a pair of indices (*a, d*) whose visual arrangement in the form of an indexogram contributes to the interpretation of the dynamics of textural configurations on the time axis, by means of a symmetric presentation of *a* and *d* around zero, made possible by transforming (*a*) into negative values.

But the negative of (*a*) has another virtue. When added to (*d*), it forms the sum I, so

$$I(a0 \ldots ar{-}1) = (D{-}A)(a0 \ldots ar{-}1). \qquad (6)$$

This produces a synthetic evaluation that shows the *trend* of the texture, either to agglomeration (when the sum is negative) or to dispersion (positive sum). And, of course, the values give us the graphic plot of this trend. This synthesis seemed to us to be of significant interest for our model because, intended to weight a quantitative data – the number of instruments or resources used – it has the power to modulate it possibly *less*, i.e. to weaken its qualification, when its agglomeration index weighs more than that of its dispersion. In other words, if, as we have argued above, it is the dispersion rate that defines the complexity of a texture, the integration of the calculation of its agglomeration rate allows a more precise calibration. It is therefore this synthesis *I* that we will preferably use.[39] The lower graph in the Figure 4 provides an example of *I* for an excerpt from Rameau, the beginning of the aria "Un Horizon serein," from his opera *Les Boréades* (1764). The upper graph shows the indexogram of values from which the values for *I* (the textural tendency) originate. The analysis will show that the orchestra only produces clearly agglomerated textures to characterize certain events related to dramaturgy. The rest of the time, it is the dispersion of the instrumental parts into rhythmically independent flows that tends to dominate. The comparison of the two representations shows that each can make a specific contribution to understanding the texture of the objects analyzed and their relationships in the overall form.

39 It is possible that in some contexts, it is the indices (*a*) or (*d*) alone that may be more relevant. The implementation in *OpenMusic* offers all the alternatives.

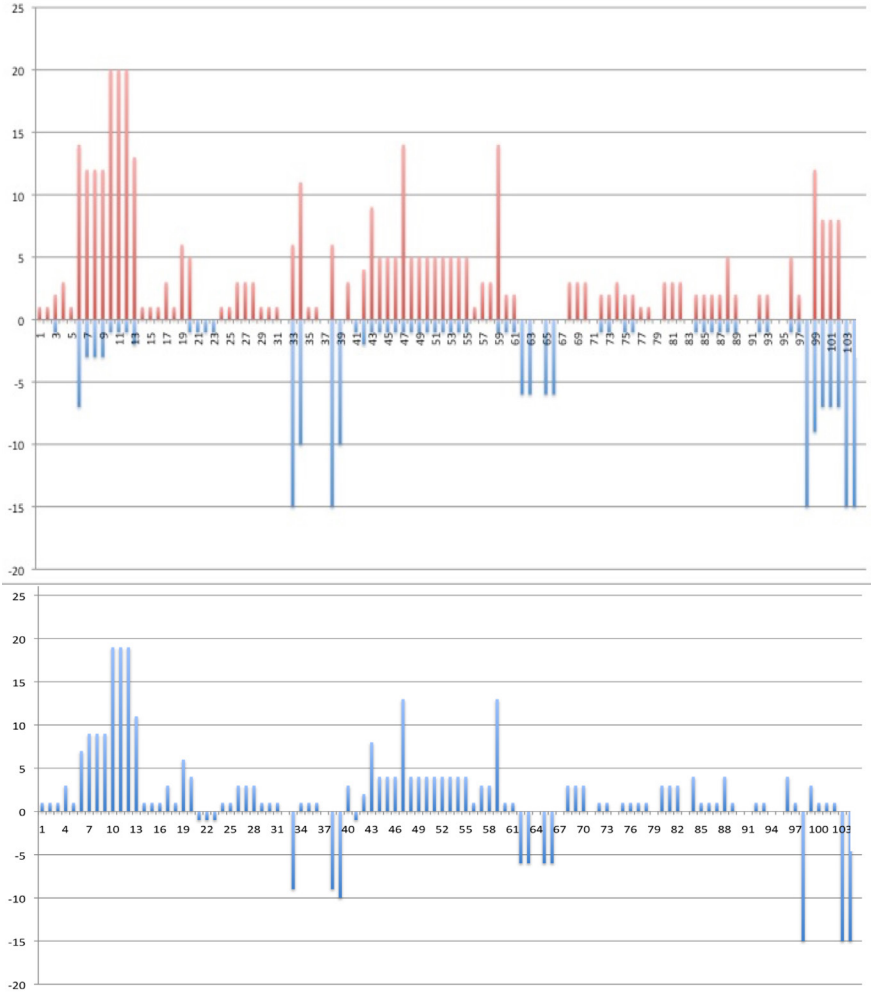


Figure 4: Jean-Phillippe Rameau, "Un Horizon serein" (*Les Boréades*, Act I, Scene IV), bars 1–105. Top: Indexogram of conjugated indices *a* (blue) and *d* (red). Bottom: The tendency *I* of the texture complexity.

2.3 A Qualitative Evaluation of Textures

2.3.1 Relative Voicing Complexity

In order to integrate orchestration into a general model of analysing musical morphologies based on the concept of a *composite sound unit*, it is necessary to place the descriptors and measurements on a single axis of "relative complexity." A solution to obtain a normalization is to divide *I* by the value *T* of the *setup* that has the highest (*max*) number of *Sound Resources*; in other words, by

the greatest number of binary relationships possible in a given set of setups. A configuration with a dispersion index equal to this number would in fact represent the greatest possible complexity in the context. We therefore obtain a relative index *RVC* (*Relative Voicing Complexity*).

$$\mathrm{RVC}(a_0 \ldots a_{r-1}) = \frac{\mathcal{I}(a_0 \ldots a_{r-1})}{T_2(\rho_{\max})} \ . \qquad (7)$$

The RVC value is scaled through the application of $\frac{(\cdot)-\min \lambda}{\max \lambda}$, where λ stands for $(a_0..ar-1)$.

The partitional analysis, however, is neutral as to the musical criteria that would define the agglomeration and dispersion rates. Berry essentially takes responsibility for the rhythm, direction of contrapuntal lines and interval content. It recognizes three categories of interaction identified by the prefixes *homo-*, *hetero-* and *contra-*, the first of which reflects the "identity" of the parties (interdependence or agglomeration), and the other two, two levels of dispersion (independence or dispersion), the most pronounced of which is characterized by opposing movements.[40]

If heterorhythmia seems in many cases to be the most effective criterion for provoking a dispersion of voices, there are examples for which the textural writing requires other parameters and strategies. Below is a list of the criteria that we have used to date in our various analytical experiments. We have tried to rank them in descending order of effectiveness in terms of their ability to cause dispersion in LSSs.[41]

(1) dominant heterochromy, when the dispersion is caused by the splitting into streams of different sounds – e.g. high-pitched woodwinds against low-pitched brass. It can encapsulate an undetermined number of other criteria which have a less effective influence on complexity; they are placed on a lower hierarchical position;
(2) dominant heterorhythmy (divergence of rhythmic structures, phase asynchrony); It can encapsulate an undetermined number of other criteria, which operate in a lower hierarchical position;
(3) heterokinesis; (divergence of melodic direction) includes contrary motion *stricto sensu*, to which we do not see the need to assign a different weight as Berry does;
(4) heteroarthria (divergence of articulation, typically *legato* versus *staccato*);
(5) heterophony (understood as a homokinetic and homorhythmic texture, but with interval divergences).

40 Berry, *Structural Functions in Music*, 193.

41 This effectiveness is measured primarily by estimating the impact that the criterion has on listening. Further studies are needed to make this classification less subjective.

We hypothesize that the last three criteria only contribute significantly to the qualification of texture complexity in the absence of the first two.

This classification is not static: on the contrary, it is context-sensitive, which means that it may be appropriate to modify it according to the music, and to add or remove criteria.[42] It is also not uncommon to find that in some cases more than one criterion can be considered equally effective in causing dispersion.[43]

To implement this hierarchy, the solution adopted consists in "increasing" [to weight] by a certain percentage the relative indices according to the criterion by which they will have been evaluated. The musicologist decides to which aspect of the texture he will assign each percentage. In the proposed ranking above, a minimum percentage of 5% could be established for criterion (5) and increased in steps of 5% to 25% for criterion (1).[44] These rates are applied to the *RI* values to give the overall *Relative Voicing Complexity* (*RVC*) rate.

2.3.2 Local Sonic Setups Relative Complexity

As mentioned at the beginning of this text, these two groups of data – the weighted number of sound resources used (*WNR*), and how they interact to modulate the sound texture (*RVC*) are closely interdependent. Indeed, the quantity of voices in which a texture can be stratified obviously depends on the number of resources made available. A setup consisting of a single monophonic instrument can only produce a technically "null" texture. On the other hand, it was established that the maximum dispersion – which was assumed to configure the most complex textures – was produced when each of the sound resources played an independent part. But it is quite obvious here too that the complexity effect is once again put into perspective by the number of instruments involved. If there are only two, it is much more likely that their parts will have a higher degree of independence than in a tutti of sixty instruments, which will not prevent the texture of our duo from remaining thin despite this greater independence. In both logical and algorithmic terms, it is therefore clear that RVC weights only make sense as qualitative modulators of *setups*. Because it is the instrumental configurations that, in the first place, determine the possibilities of polyphonic composition. In practice, RVC weights multiply those of WNR, in a way as a metaphor for the *frequency modulation* process. More precisely, the result of this multiplication is added to the value of WNR. The weight of the modulator can also be adjusted, up or down. The result configures what we will call the *Local Sonic Setup Relative Complexity*, a simplified acronym SRC, hence

42 For Webern, we have adopted the hierarchy (1) heterorythmy, (2) heterokinesis, (3) heterophony (which rarely occurs); for Xenakis and Pascoal, only heterochromy is considered.

43 In this case, we apply the criterion that gives the most dispersed partition, i.e. returns the highest quality of complexity.

44 The steps we are currently adopting in our experiments range from 5 to 12.5.

$$SRC = WNR + (WNR \times RVC_w) \qquad (8)$$

where w is a weight (a percentage) of the RVC modulator.

The result of this modulation corresponds to a formalization of the complexity of the orchestral texture that reflects the compensatory play between the two components of analysis, the quantitative and the qualitative balance.

The reader should note that the evaluation does not take into account a priori the duration of *setups*, although this can be included, for visual information, in the graphical representations in *OpenMusic* (see Figure 6), since LSSs are segmented according to their sound configuration. They therefore last as long as it does not change. This process can generate segments of very different duration, from a fraction of a second to several minutes. The musicologist may therefore feel the need to refilter the value of SRC according to the relative duration of the LSS, following a logic where the longer ones should acquire more weight. The information required for this support is the intervals between the *onsets* (starting points of the LSS). The unit of evaluation of the size of these intervals can be a beat - this choice is only satisfactory if the work has a stable tempo – or absolute time (for example in milliseconds). This information can only be extracted from a MIDI or audio file of the work.[45] This file must first have been segmented in accordance with the LSSs identified in the partition. It is obviously sensitive to the performers' agogic choices.

The relative duration of each LSS is obtained by dividing its individual duration, either by the duration of the longest LSS of the work, or by the total duration of the work, this second choice generating generally very small values.[46] These values modulate the SRC. If this operator is the multiplication, the previous formula will be rewritten as follows, where t is the relative duration:[47]

$$SRC = WNR + (WNR \times RVCw) \times tw \qquad (9)$$

45 The MIDI file must contain the tempo data and its variations.

46 This function is available in SOAL under the name of relative span.

47 Like RVC, d can be weighted by a percentage p.

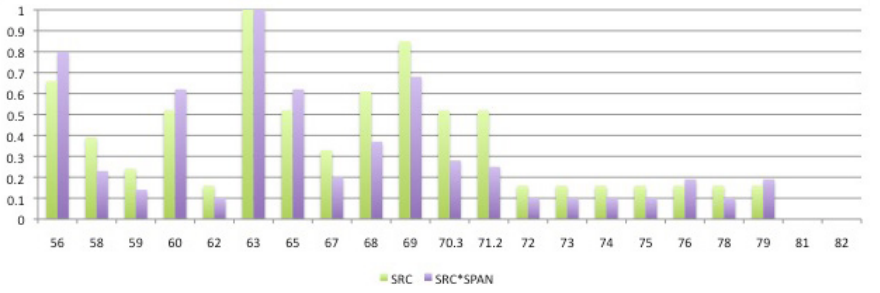


Figure 5: Histograms showing the evolution of SRC weights with or without the inclusion of the relative duration or span (Anton Webern, *Variations for Orchestra*, Op. 30, bars 56–80).

This methodological process therefore emits a final weighting that aims to qualify each sound unit on a complexity vector related to the orchestration strategies adopted, as they can be identified from the score.

3 Implementation in *OpenMusic* and Procedure

In the current state of our work, this process is assisted, initially, by a spreadsheet, in which information of the score is collected. These are then exported to an *OpenMusic* patch. We have implemented a function called soal-texture-complexity, which is located in the "Partitional Analysis" folder of SOAL. Equation *T* was also made available. The *soal-texture-complexity* function gathers all the algorithms and patches developed for this project. The SOAL library is implemented using the Common LISP language and a standalone, python version also exists.

Figure 6 shows the compiled function, in a patch analyzing the Webern extract we have chosen for demonstration. The numbers and letters refer respectively to inputs and outputs, as described below. Some steps and secondary outputs will not be detailed here.

3.1 Inputs

(1) As a main entry, the list of *setups*, described by two arguments (encapsulated list), the first of which contains the partition of each *setup* and the second the partition criterion sequence number.
   (a) First argument: the sequence of integers in the score corresponds to the number of real components, and their value to the number of sound resources each contains. The format adopted is that described in section on partitional analysis.[48] Their sum must correspond to the total number of resources counted in the *setup*.

48 By convention, *setups* with zero resources (*Gran Pause*) are identified by the value (0.9) and not (0) which would produce a division error.

(b) Second argument: the order number of the criterion chosen for the score. It starts at 1 (the most "effective" criterion). There are as many order numbers as there are criteria, plus one that will be assigned to the setups without any dispersion, i.e. containing only one real component.[49]

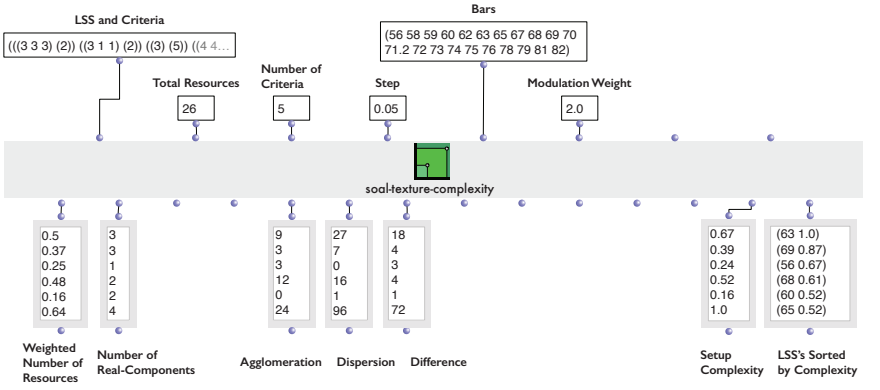


Figure 6: OpenMusic patch with the soal-texture-complexity function prototype in use to analyze bars 56–82 of Anton Webern's *Variations for Orchestra*, Op. 30.

3.2 Resources

The process is currently done manually, in the same table where the various sound resources and setups have been annotated (see Table 1).

Thus, in Figure 6, we can see that the first three setups have the following format:

((3 3 3)(2)) ((3 1 1)(2)) ((3)(5))

What it says: the first setup totals 9 sound resources distributed between 3 real components each containing 3 of these resources, according to partition criterion (2) (in this case, according to our personal choice for Webern, heterokinesis). The second, 5 resources distributed equally among 3 real components according to the same criteria, but of which two components have only one resource each. The third setup is a chord of 3 sounds (3 agglomerated sound resources); the number 5 precisely indicates that no partition criteria are applicable – in an analysis where in this case we adopted 4 hierarchical partitioning criteria.

49 In the *Dispersion Criteria* section, we give an example of a hierarchy with 5 criteria. In this case, 6 order numbers will therefore be required.

(2) Here we enter the total number of sound resources indexed in the complete work (*Sonic Resources Index*) – 78 in this case, for the *Variations*.
(3) An integer corresponding to the number of criteria chosen, plus one (see above, 1b).
(4) The step of progression of the percentages that will be added according to the hierarchical weight of the chosen partition criterion; in the figure: 0.05 = 5%.
(5) Receives the list of setup labels (bar numbers).[50]
(6) The Modulation weight of WNR output by RVC output, a number (2.0 in the figure).
(7) The user's choice for Partitional Analysis: (1) relative agglomeration index (*a*); (2) relative dispersion index (*d*); or (3): index of relative sum of ((*a**(-1)) + *(d)*).
(8) Either remove duplicates or not when calculating the real-components.

3.3 Outputs

(A) WNR: Weighted Number of Resources. This is the quantitative part of the orchestration analysis. The figure shows, below the output of the function, in the form of a column in a filebox, the results obtained for the Webern extract, as well as, at the very bottom, these same values represented in a curve (*breakpoint function*).
(B) Real Components: number of real components per LSS. Similarly, the values obtained are shown below.
(C) The *T* index of the total number of resources (a single integer) – for Webern in this case, this index is 120.
(D) Outputs 4, 5 and 6 inform respectively the absolute indices of agglomeration (*a*), dispersion (*d*), and their sum *I*. The values referenced to Webern are shown in the corresponding boxes below.
Output 7 returns the sum a*(-1) + d. Outputs 8 to 10 return the same calculations as (D) but in normalized, i. e. relative values (from 0.00 to 1.00).
(E) RVC (Relative Voicing Complexity): the texture (voicing) complexity, according to Partitional Analysis user's option in input 7.
(F) RSC (Relative Setup Complexity): This is the main function's output. The *Relative Setup Complexity* corresponds to the WNR list (output A) weighted by the RVC list (output E). The figure shows both the list of Webern's RSCs in a filebox and a graphical representation of them (bottom).
(G) orders the setups (labelled by their bar number or string name) according to their relative complexity (the F list values): most complex ones at beginning. In our sample, the most complex setup occurs in the bar 63, and the simplest is the bar 82's. These bars are shown in the figure.

50 We have chosen to label the *setups* with the bar number where they start. But a *string* of any kind (alphabetical list, words ...) can be used.

(H) This is not a soal-texture-complexity output, but the combination of that two *OpenMusic* basic tools, x->dx then dx->x, provided the former is fed by the sequence of bar numbers, or any other data relative to the position in time of the LSSs, can be used as the x-coordinates of a breakpoint function curve, thus displaying the points on the horizontal axis according to their relative durations. However, we prefer histograms to curves, because the former induce a linear progression from one point to another, which does not correspond to reality: we are indeed in the presence of configurations that change without transition. The build histogram function allows this representation, in which the width of the histograms is a function of the relative duration of the LSSs.

4 Audio Analysis

4.1 Preparing the Audio Material

The segmentation of the score into units that are coherent from the point of view of orchestration, explained above, must be reproduced identically for the audio file of the work: these segments are called *Local Audio Units*. LAUs are indeed replicas of LSS in the audio file. The aim is to analyse how and to what extent the written prescriptions are implemented, and to evaluate the convergences and divergences between them.[51] The segmentation task is automated thanks to the *Generate Markers* function available in the *Audiosculpt* software.[52] Proper programming of the generator parameters requires some testing and depends in any case on the work and its recording. In our experience, *Positive Spectral Difference* segmentation detects very finely the changes in energy, which, as a general rule, correspond to changes in sound, i. e. *setup*. Then we manually adjust the markers that would not be placed exactly where we want them to be a written simultaneity on the score may not be as synchronous in the real world of its acoustic performance – we add the segments that the score has induced but that have passed unseen to spectral detection (or we reset the function so that it recognizes them), we remove those that do not match the pre-established segmentation – unless we prefer to incorporate them into the original cutting (and return to the previous step).

The next step, still in *Audiosculpt*, uses the *Chord Sequence Analysis* function and its method of calculating the *average spectrum*. For orchestral music, we used a maximum number of between 40 and 60 partials, and an amplitude threshold of -70 dB or related to the sonogram. The results of the analysis

51 It is also by this means that comparative analyses of different recordings of the same work can be carried out.

52 *Audiosculpt* is of course not the only software on the market to offer an automatic generation of markers. But it is the complementary features we use that make it preferable for our project.

(such as the one shown in Figure 10) are saved on the one hand as a collection of small audio files, each of which corresponds to a segment, therefore to a LAU, and on the other hand as a single SDIF file. It is this material that will be required for the analysis of the orchestration itself, in *OpenMusic*.

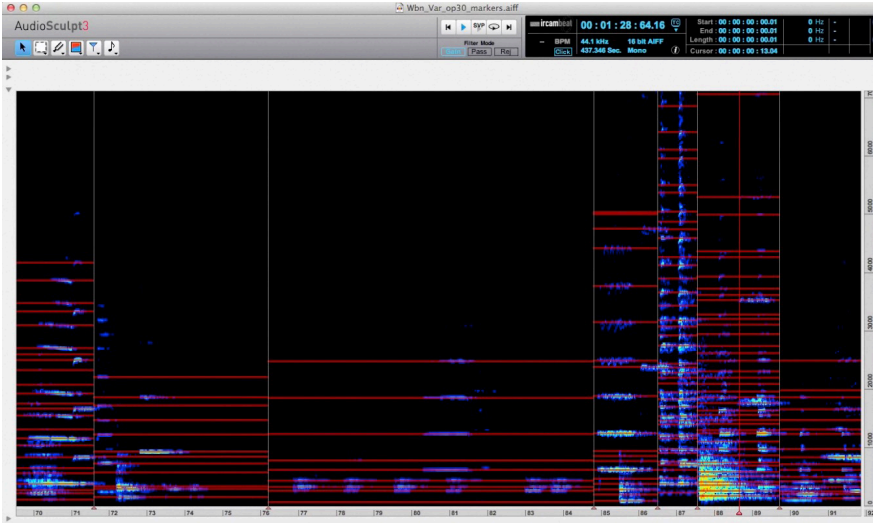


Figure 7: A screenshot of *Audiosculpt* showing the LAU segmentation and the results of the Chord Sequence Analysis by Average Spectrum, for an extract from the same work by Webern. The LAUs are identified by the vertical markers, and each horizontal line corresponds to one of the partials preserved by the analytical process.

4.2 The LAU's for Orchestration Analysis

The main function of setups in their audio format (LAU) is to allow, if the musicologist so wishes, to compare the prescriptions set by the composer with the work. In particular, as we announced at the beginning of this article, it is a question of measuring the real impact of these requirements on the form, and of observing how they are perceived in various performance and audience contexts. This branch of the theoretical model requires computer tools that deal with the sound signal, first and foremost psychoacoustic descriptors. As Philippe Lalitte has already clearly shown in his analysis of *Sequenza VII* de Berio, "the extraction of sub-symbolic information operated by psychoacoustic descriptors offers the possibility of approaching the perception of several musical dimensions such as time […], height (roughness, salience, […], etc.) and timbre (brilliance, inharmonicity, envelope, spectral clarity, etc.)."[53] Many

53 Philippe Lalitte, "Du son au sens: Vers une approche sub-symbolique de l'analyse musicale

of them may be adequate to highlight the area of timbre that is most affected by the composer's orchestration, or the one that offers the most salience to perception. The problem lies in the quantity of descriptors available, and the heterogeneity of the information produced. Indeed, it is important to keep in mind that the basic concept of a descriptor is to "flatten" a multi-dimensional component, the stamp, on a single dimension. In other words, it makes a generic and oriented reduction of the signal, depending on the information they are supposed to return. Therefore, relying on them alone would not provide the analysis we need. The idea is therefore to constitute a modular network of descriptors that would be used according to contexts, and to standardize their results on the same vector of relative complexity to which the other components of the model have been subjected. This variable network of descriptors is standardized in our model by the *LAU Relative Complexity* component, acronym *ARC*. The advantage of this formatting is that it can produce a more synthetic, holistic vision of the behavior of sound configurations over time. Indeed, it is not so much a question of qualifying *local audio units* in absolute terms, but rather of evaluating the degree of difference, or *distance*, between one unit and the other in a given field.

However, the development of *ad hoc* descriptors seems essential and is part of the specifications of our future steps. In the meantime, or in parallel, some of the statistical analytical tools offered in the *SOAL* library may be of some help, thanks to its ability to read both MIDI and SDIF files and extract data sets, all standardized on the simplicity-complexity vector. For audio sources, one may speculate that some of the following capabilities of *SOAL* could be useful in our specific context: the calculation of the relative range of the LAU – that is, the distance between its lowest and highest extracted partials; the manner in which the partials are distributed along the spectrum, giving if necessary a statement of the number of partials for each selected frequency band, and a weighting of the LAUs according to the register of occupied bands;[54] how harmonically and/or linearly that partials are distributed along the spectrum; estimates of the relative average amplitude of each LAU and their relative duration.

This last information is already available if you want to weigh the *setups* according to their relative duration. We have mentioned above the possible relevance of this factor and how it could be integrated into the model. One of its most immediate uses is to compare various recorded versions of a work according to the musicians' interpretations of time and tempo indications. For example, we compared the relative durations of two recorded versions of our

assistée par ordinateur," *Musurgia* 18, no. 1 (2011): 116.

54 These frequency bands and weights are user-defined. It may be thought that an analysis may wish to weight *setups* with a majority of very low or very high frequencies more heavily, for example, because, in general, they are noisier and have a greater impact on overall sound complexity.

Webern extract with the durations induced by writing time in the score. These are the recordings by Pierre Boulez (1969) and Hans Zender (2007).[55] Figure 8 shows the data. From top to bottom, the first histogram shows the representation of the relative complexity of the LSSs (RSCs) as a function of the relative durations deducted from the number of time/measures each occupies. Remember that the width of the histograms is a function of the value assigned to the durations. The second and third histograms compare these same *setups* according to the relative durations adopted by each of the two conductors in the recordings. The last two repeat the comparison, but this time including the relative duration as a weighting of complexities in the calculation. Our goal here is not to start an analysis of this data, but only to show one of the functionalities of including the analysis of the works' audio support.

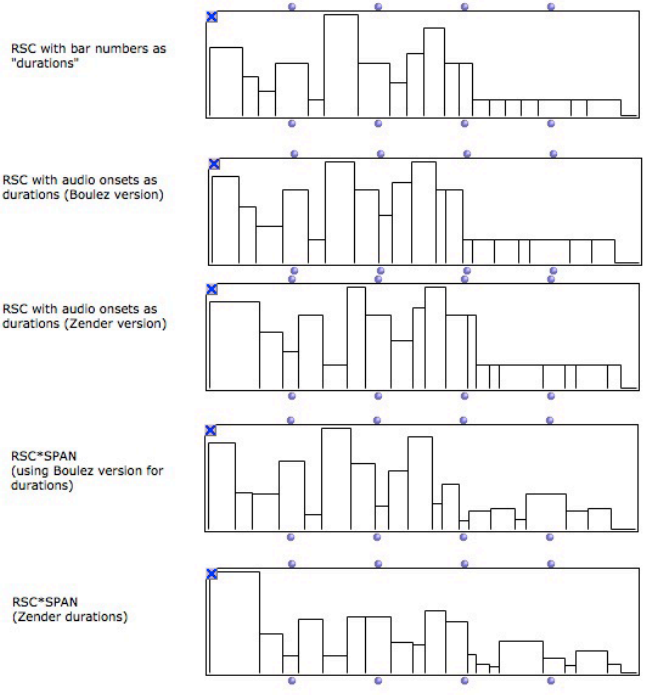


Figure 8: Anton Webern, *Variations*, Op. 30, bars 56–82: comparative analysis of two recorded versions of the work with the relative durations induced by writing.

55 Pierre Boulez (conductor), *Variationen für Orchester Op. 30*, London Symphony Orchestra (recorded live in London, 1969), in *Webern Complete Works* (Sony Classical, 1991); Hans Zender (conductor), *Anton Webern: Variations For Orchestra Op. 30 & Franz Schubert: Symphonies No. 1 & 4*, SWR Sinfonieorchester Baden-Baden und Freiburg (SWR Classic, 2007).

5 Conclusions

The aim of the method, whose theoretical bases and practical procedure we have outlined here, is to offer the possibility of evaluating the involvement of orchestration in the structuring of the work. To do so, we started from the axiom that each local sound configuration (an orchestral configuration in the case of symphonic music), or *Local Sonic Setup*, delimits a sound unit. The qualification of these setups according to the number of *Sound Resources* used and the way in which they are distributed to create more or less polyphonic complexity is information that comes in addition to the other dimensions that contribute to the elaboration of the form through sound. Its formatting, a vector on an axis of relative complexity, allows it to be integrated in a way that is compatible with the other dimensions that we have already formalized in our previous research. Correlations and other statistical calculations can be applied to allow a better understanding of the interaction of all these elements in the construction of a musical form based on the articulation of sonorities.

Analysis at the symbolic level, which isolates written prescriptions from the sound results they are supposed to produce, reveals the orchestral technique, style and aesthetics of the composer under study. After all, as we have pointed out, it is on paper that composers orchestrate. The analysis of the concrete results of these prescriptions, based on one or more recorded media of the work, then makes it possible to confront them with the real world of performance, a dimension that is beyond the absolute control of the composer. The creation of a formal flow therefore involves a complex dialectic that this analytical model aims to shed light on.

The results, obtained on these *Variations* by Webern's well as on the other composers in our research program, encourage us to continue our exploration of the multi-instrumental or mixed repertoire with the experimental methodology presented here, focusing, for the time being, on the development of more specific tools for the analysis of the sound carriers of the selected works.

References

Andrews, George. *The Theory of Partitions*. Cambridge: Cambridge University Press, 1998.

Andrews, George, and Kimmo Eriksson. *Integer Partitions*. Cambridge: Cambridge University Press, 2004.

Berry, Wallace. *Structural Functions in Music*. New York: Dover Publications, 1987.

Cogan, Robert, and Pozzi Escot. *Sonic Design: The Nature of Sound and Music*. New Jersey: Prentice-Hall, 1976.

Dolan, Emily. *The Orchestral Revolution: Haydn and the Technologies of Timbre*. Cambridge: Cambridge University Press, 2013.

Gentil-Nunes, Pauxy. "Análise Particional: Uma mediação entre composição musical e teoria das partições." In *Simpósio de cognição e artes musicais (20–26 May, 2009)*, 343–354.

Gentil-Nunes, Pauxy. "Particiograma e indexograma: topologia e dinâmica das progressões particionais." Paper presented at *XXI Congresso da Associação Nacional de Pesquisa e Pós-Graduação em Música (22–26 August, 2011)*. https://anppom.org.br/anais/anaiscongresso_anppom_2011/ANAIS_do_CONGRESSO_ANPPON_2011.pdf.

Gentil-Nunes, Pauxy, and Alexandre Carvalho. "Densidade e linearidade na configuração de texturas musicais." In *IV Colóquio de Pesquisa do Programa de Pós-Graduação da Escola de Música da UFRJ* (2003).

Gieseler, Walter, Luca Lombardi, and Rolf-Dieter Weyer. *Instrumentation in der Musik des 20. Jahrhunderts: Akustik, Instrumente, Zusammenwirken*. Celle: Moeck Verlag, 1985.

Goubault, Christian. *Histoire de l'instrumentation et de l'orchestration: Du baroque à l'électronique*. Collection Musique ouverte. Paris: Minerve, 2009.

Guigue, Didier. *Esthétique de la sonorité: L'héritage de Debussy dans la musique pour piano du XXe siècle*. Paris: L'Harmattan, 2009.

Guigue, Didier. *Sonic Object Analysis Library – OpenMusic Tools for Analyzing Musical Objects Structure*. Version 5.0. MacOS. 2016.

Guigue, Didier, and Thiago Cabral. "Entropia e Textura Rítmica na Sinfonia em Quadrinhos de Hermeto Pascoal." Abstract. Paper presented at *XXVI Congresso da Associação Nacional de Pesquisa e Pós-Graduação em Música (22–26 August*, 2016). https://anppom.org.br/anais/anaiscongresso_anppom_2016/3998/public/3998-13999-2-PB.pdf.

Kim, Jinho. "Représentation et analyse musicale assistée par base de données relationnelle de la partition des variations pour orchestre op. 30 d'Anton Webern: Vers un système d'analyse musicale assistée par base de données relationnelle." Doctoral Dissertation, Université Paris IV, 2006.

Koechlin, Charles. *Traité de l'orchestration en quatre volumes*. Paris: Max Eschig, 1954.

Lalitte, Philippe. "Du son au sens: Vers une approche sub-symbolique de l'analyse musicale assistée par ordinateur." *Musurgia* 18, no. 1 (2011): 99–116.

Maresz, Yann. "Pour un traité d'orchestration au XXIe siècle." *L'Etincelle: Le journal de la creation à l'Ircam*, no. 11 (2006). http://etincelle.ircam.fr/652.html.

Morris, Robert. "Mathematics and the Twelve-Tone System: Past, Present, and Future." In *Mathematics and Computation in Music*, edited by Timour Klouche and Thomas Noll, 266–288. Heidelberg and Berlin: Springer-Verlag, 2009.

Piston, Walter. *Orchestration*. New York: Norton, 1955.

Roy, Stéphane. *L'Analyse des musiques électroacoustiques: Modèles et propositions*. Paris: L'Harmattan, 2004.

Solomos, Makis. *De la musique au son: L'émergence du son dans la musique des XXe-XXIème siècles*. Rennes: Presses Universitaires de Rennes, 2013.

Tagg, Philip. *Music's Meanings: A Modern Musicology for Non-Musos*. New York and Huddersfield: Mass Media Music Scholars' Press, 2012.

Tucker, Alan. *Applied Combinatorics*. New Jersey: John Wiley & Sons, 2012.

POVZETEK

Vloga orkestracije pri oblikovanju glasbene oblike: Teorija in praksa metodološkega predloga ter računalniške implementacije le-tega

Predstavimo metodo za računalniško podprto analizo orkestracije. Naš cilj je vzpostaviti formalno razumevanje teh simbolnih dimenzij, ki bi lahko bile enakovredne obstoječim računalniškim pristopom k ritmu in tonski višini. Prav tako poskušamo raziskati vlogo, ki jo ima kontrola teksture in orkestracije pri izgradnji glasbene oblike. Naša raziskava je osnovana na teoretičnih opažanjih o glasbeni teksturi, ki jih je predstavil Wallace Berry v klasičnem delu Strukturne funkcije v glasbi (Structural Functions in Music), in posledičnem številčnem prikazu ter kombinatorični manipulaciji, osnovani na matematični teoriji razčlenitve naravnih števil (integer partititions), ki jo je opredelil Pauxy Gentil-Nunes.

Metoda vključuje: 1) splošni številčni prikaz ki omogoča abstrakcijo in posledično računalniško obdelavo teksturnih konfiguracij; 2) hierarhijo 'kriterijev disperzije' ali 'teksturnih situacij,' ki omogočajo stratifikacijo glasbene površine v različne realne komponente; 3) merilo, ki omogoča kvantifikacijo heterogenosti odnosov v teksturnih konfiguracijah; 4) merilo, ki ocenjuje, kako so različni zvočni viri uporabljeni pri realizaciji teksturnih konfiguracij; 5) model relativne teksturne kompleksnosti, osnovan na diverziteti orkestracije in kompleksnosti alokacije realnih komponent v določenem glasbenem delu. Računalniški postopki so bili implementirani v programskih jezikih Common Lisp (Open Music) in Python. Da bi opredelili vlogo orkestracije v glasbeni obliki, smo predpostavljali, da vsaka zvočna konfiguracija (oz. orkestrska konfiguracija v primeru simfonične glasbe), lokalna zvočna postavitev, predstavlja formalno enoto. Kvalifikacije teh postavitev glede na število uporabljenih zvočnih virov ter načinov njihove razporeditve, s katerimi ustvarjajo večjo ali manjšo polifonično kompleksnost, potem pretehtamo skupaj z ostalimi dejavniki, ki pripomorejo k formiranju glasbene oblike skozi zvok.

ABOUT THE AUTHORS

CHARLES DE PAIVA SANTANA (charles@prism.cnrs.fr) holds a PhD in music from the University of Campinas and in computer science from the University Pierre-et-Marie-Curie. His research focuses on the analysis, modeling and computer simulation of compositional strategies of contemporary repertoire, as well as their impact on perception. He teaches 20th century music and computer music at the Aix Marseille University.

DIDIER GUIGUE (didier.guigue@gmail.com) was born in France and lives in Joao Pessoa, Brazil, since 1982. As a Senior Researcher at the Brazilian National Council for Scientific and Technological Development (CNPq) and Tenured Senior Teacher at the Universidade Federal da Paraiba, his academic production and lecturing activities are mainly in the fields of 20th and 21st century Music Theory, History & Aesthetics, and Computational musicology. PhD in musicology by the E.H.E.S.S., Paris (France) under the direction of philosopher and composer Hugues Dufourt, he is since 1997 the founder and director of the Mus3 Research Group, a IRCAM associated partner, and member of other research groups and laboratories in Brazil and France. Among his publications we find the book *Esthetique de la sonorité* (Paris: L'Harmattan, 2009). His concerns as a composer is about digital music and multimedia art.

O AVTORJIH

CHARLES DE PAIVA SANTANA (charles@prism.cnrs.fr) je doktoriral iz glasbe na Univerzi v Campinasu in iz računalništva na Univerzi Pierre-et-Marie-Curie, njegove raziskave pa se osredotočajo na analizo, modeliranje in računalniško simulacijo kompozicijskih strategij sodobnega repertoarja ter vpliva teh na recepcijo. Glasbo 20. stoletja in računalniško glasbo poučuje na Univerzi Aix Marseille.

DIDIER GUIGUE (didier.guigue@gmail.com) je rojen v Franciji, od leta 1982 pa živi v kraju Joao Pessoa v Braziliji. Iz muzikologije je doktoriral na E.H.E.S.S. v Parizu pod mentorstvom filozofa in skladatelja Huguesa Duforta. Deluje kot raziskovalec v Brazilskem narodnem svetu za znanstveni in tehnološki razvoj in je redni profesor na Zvezni univerzi v Paraibi. Ukvarja se predvsem s teorijo in zgodovino glasbe 20. in 21. stoletja, estetiko in računalniško muzikologijo. Od leta 1997 je ustanovni član in direktor raziskovalne skupine Mus3 (IRCAM partner) ter je član drugih raziskovalnih skupin in laboratorijev v Braziliji in Franciji. Med drugim je izdal knjigo *Esthetique de la Sonorité* (Paris: L'Harmattan, 2009). Kot skladatelj se ukvarja predvsem z digitalno glasbo in multimedijsko umetnostjo.

DOI: 10.4312/mz.58.2.155-174
UDK 781.6:791:004

Transcoding as a Compositional Paradigm: The Association of Compositional Parameters and Computer Analysis of Moving Images in *Outer Space*

Javier Elipe-Gimeno, Charles de Paiva Santana

Aix Marseille University, CNRS, PRISM, Marseille

ABSTRACT

This paper focuses on one of the author's compositions, *Outer Space*, conceived using transcoding techniques between musical and visual parameters, such as the relative percentage of black and white dots per frame and the difference between the position of the dots from one frame to another.

Keywords: algorithmic music, musical composition, experimental film, video analysis, Max/MSP, orchestration

IZVLEČEK

Prispevek se osredotoča na eno od avtorjevih kompozicij, *Outer Space* (*Vesolje*), ki je bila zasnovana s tehnikami prekodiranja med glasbenimi in vizualnimi parametri, ki jih določa relativni odstotek črnih in belih pik v posameznem kadru oz. razlika v položaju pik med prvim in drugim kadrom.

Ključne besede: algoritemska glasba, glasbena kompozicija, eksperimentalni film, video analiza, Max/MSP, orkestracija

Introduction

Composers and musicologists who work with computational tools have to deal, on a daily basis, with different types of association, at varying levels of sophistication, between musical, sonic and digital code.[1] Be it due to the MIDI protocol, the parameterization of audio processing (bitrate, sample rate, loudness), the analysis of sound through descriptors and representation systems such as MEI,[2] MusicXML[3] and Humdrum,[4] among others, the digital code plays the role of mediator between musical phenomena and computational processing. The imposition of communication in numerical or 'digital' code comes from the computer: it is commonplace and applies to virtually any kind of operation we wish to do on it, be it of a musical, textual or visual nature.[5]

In regard to the humanities, art, and musical composition, the use of the computer and consequent omnipresence of the digital code favors the conception of the sensorial stimulus as something fluid, as something which has plasticity.[6] Musical forms and materials can, despite their many individual specificities, be transposed to, or adapted from, other representational manifestations, mediated by the digital code.[7] This kind of approach can be identified

1 Geraint A. Wiggins, "Computer Representation of Music in the Research Environment," in *Modern Methods for Musicology*: *Prospects, Proposals, and Realities*, eds. Tim Crawford and Lorna Gibson (London: Routledge, 2016), 27–42.

2 Perry Roland, "The Music Encoding Initiative (MEI)," paper presented at *MAX2002*: *Proceedings of the First International Conference on Musical Applications Using XML*, 55–59, http://xml.coverpages.org/MAX2002-PRoland.pdf.

3 Michael Good, "MusicXML for Notation and Analysis," in *The Virtual Score: Representation, Retrieval, Restoration*, eds. Walter B. Hewlett and Eleanor Selfridge-Field (Cambridge, MA: Mit Press, 2001), 113–124.

4 David Huron, "Music Information Processing Using the Humdrum Toolkit: Concepts, Examples, and Lessons," *Computer Music Journal* 26, no. 2 (2002): 11–26; David Huron, "Humdrum and Kern: Selective Feature Encoding," in *Beyond MIDI: The Handbook of Musical Codes* (Cambridge, MA: MIT Press, 1997), 375–401.

5 "To mediate an object, a digital or *computational* device requires that this object be translated into the digital code that it can understand. […] The key point is that without the possibility of *discrete* encoding there is no object for the computational device to process." David M. Berry, "The Computational Turn: Thinking About the Digital Humanities," *Culture Machine* 12 (2011).

6 "[…] sensory substitution operates by mapping an otherwise absent modality into an existing one; absent vision into existing hearing. […] However for most, audiovisual transcoding links two modalities, 'channels' already in perceptual use. Secondly, sensory substitution involves long-term integration and interaction with the environment; […] there are some striking parallels, and transcoded AV certainly hints at artificial synesthesia and a rewired sensorium, but as bounded aesthetic objects these works cannot realise that perceptual transformation." Margaret Schedel, "Colour is the Keyboard: Case Studies in Transcoding Visual to Sonic," *The Oxford Handbook of Algorithmic Music*, eds. Roger T. Dean and Alex McLean, Oxford Handbooks Online (Oxford University Press, 2018), DOI:/10.1093/oxfordhb/9780190226992.013.8.

7 "[…] a computer requires that everything is transformed from the continuous flow of our everyday reality into a grid of numbers that can be stored as a representation of reality which can then

in what has been called multimodality.[8] Works in the contemporary repertoire integrate, in a structured way, music, dance, scenography and light through sophisticated mappings. Examples of computer programs that specialize in generating new musical structures from an algorithmic mapping of extra-musical phenomena such as fractals,[9] text,[10] or images[11] abound. The same can be said for recent approaches to sonification.[12]

If the alliance between music and digital code is an obvious one, having been treated on numerous occasions in the literature, the study of specific transcoding strategies, sometimes called translational models in the context of algorithmic music,[13] seem to have received less attention.

In this paper, we adopt the definition of musical transcoding as the act of transferring patterns, forms, or structures from a system of principles or rules (a code proper to an artistic or scientific domain) to the musical or compositional code, and vice versa. In practice, in the musical context, transcoding refers to a series of creative techniques that call upon extra-musical elements and may seek a certain unity of musical content by sharing the same structure between several distinct parameters of the musical discourse.

---

be manipulated using algorithms. These subtractive methods of understanding reality (*episteme*) produce new knowledges and methods for the control of reality (*techne*). They do so through a digital mediation, which the digital humanities are starting to take seriously as their problematic." Berry, "The Computational Turn."

8 Meinard Müller et al., "A Multimodal Way of Experiencing and Exploring Music," *Interdisciplinary Science Reviews* 35, no. 2 (2010): 138–153; Marina Gall and Nick Breeze, "Music Composition Lessons: The Multimodal Affordances of Technology," *Educational Review* 57, no. 4 (2005): 415–433; W. Clemens, *Body, Sound and Space in Music and Beyond: Multimodal Explorations*, ed. Clemens Wollner, 1st ed. (London: Routledge, 2018).

9 See Omar López-Ortega and Shiani Ioana López-Popa, "Fractals, Fuzzy Logic and Expert Systems to Assist in the Construction of Musical Pieces," *Expert Systems with Application* 39, no. 15 (2012): 11911–11923; Eduardo Miranda, *Composing Music with Computers* (London: Routledge, 2001); David Little, "Composing with Chaos: Applications of a New Science for Music," *Journal of New Music Research* 22, no. 1 (1993): 23–51.

10 For instance, Hannah Davis and Saif Mohammad, "Generating Music from Literature," paper presented at *Proceedings of the 3rd Workshop on Computational Linguistics for Literature (CLFL 2014)*, 1–10, DOI:10.3115/v1/W14-0901.

11 See Luísa Ribas, "Sound and Image Relations: A History of Convergence and Divergence," *Divergence Press* 1, no. 2 (2014); Ernest Edmonds et al., "Audio-Visual Interfaces in Digital Art," paper presented at *Proceedings of the 2004 ACM SIGCHI International Conference on Advances in Computer Entertainment Technology (ACE 2004)*, 331–336, DOI:10.1145/1067343.1067392; Esther Lemi, Anastasia Georgaki, and James Whitney, "Reviewing the Transformation of Sound to Image in New Computer Music Software," paper presented at *Proceedings of the 4th Sound and Music Computing Conference (SMC 2007)*, 57–63, DOI:10.5281/zenodo.849384.

12 For instance Antonio Polo and Xavier Sevillano, "Musical Vision: An Interactive Bio-Inspired Sonification Tool to Convert Images into Music," *Journal on Multimodal User Interfaces* 13, no. 3 (2019): 231–243.

13 Margaret Schedel identifies the following synonyms to the word transcoding: "synaesthetic algorithm, sensory substitution, transcoding, crossmodal, intermedia, and so on." Schedel, "Colour Is the Keyboard."

Not only the association of music with the digital code but also the use of extra-musical forms, patterns and structures as a compositional resource precedes the invention of the computer and goes back at least to classical antiquity.[14]

If we think broadly, this definition of transcoding can encompass the practice of association between mathematical proportions and musical intervals by the Pythagoreans, or the associations between modes and ethos in the ancient and medieval world, the association between musical metrics and poetics, or the music of spheres.

In the West, one of the first treatises on composition, the *Micrologus* (1026 A.D.) by Guido d'Arezzo,[15] inaugurated a practice of transcoding that would last for centuries, the association of alphabetic code with musical pitches (Chapter XVII). In this eleventh century, Guide introduces a strategy to algorithmically map vowels from a given text musical pitches.

After the method of composition combining text and melody introduced by d'Arezzo and taken up by Johannes Cotto,[16] another incarnation of this technique will be at the origin of one of the most intriguing scores of the Renaissance, the *Missa Hercules dux Ferrariae* by Josquin des Prez.[17] The work is one of five compositions by different composers dedicated to Duke Hercules II of Ferrara, using the syllables of his name as the melodic basis, the *cantus firmus*, for each composition. This technique, called "Sogetto Cavato dalle vocali di queste parole" by Gioseffo Zarlino's famous treatise on music theory, would resonate well into the twentieth century, when cellist Mstislav Rostropovich commissioned twelve composers, including Pierre Boulez, Luciano Berio, and Henri Dutilleux, to write a tribute to the patron of the arts Paul Sacher.[18]

Boulez's composition, *Messagesquisse*, will use not only the association between syllables and pitches, but also syllables and rhythm through the Morse code.[19] In addition to its use as a tool of homage, the *sogetto cavato* will be used, throughout the history of Western music, as a means of introducing constraints into the compositional work, as a challenge.

If in the past the links between music, alphabetic code and literature have shaped most transcoding approaches, in the modern and contemporary period,

14 For a history of related practices see Helmut Kirchmeyer, "On the Historical Constitution of a Rationalistic Music," *Die Reihe* 8 (1968): 11–24.

15 Claude Palisca (ed.), *Hucbald, Guido, and John on Music: Three Medieval Treatises* (New Haven: Yale University Press, 1977).

16 Ibid.

17 Lewis Lockwood, "Soggetto cavato," *New Grove Dictionary of Music and Musicians*, ed. Stanley Sadie (London: Macmillan, 1980), 17: 442–443.

18 C. Samuel, Works presentation by Claude Samuel (in the Volume's order), in *Pierre Boulez: Œuvres Complètes*, CD collection (Universal Music Division Decca Records France, 2013).

19 Antoine Bonnet, "Ecriture and Perception: On *Messagesquisse* by Pierre Boulez," *Contemporary Music Review* 2, no. 1 (1987): 173–209.

composers are going to look in other domains for structural sources. One of the most influential musical works of the 1950s was Iannis Xenakis's *Metastaseis*, in which the composer developed a framework of orchestral lines through a compositional plan that shared structural elements with the *Philips Pavilion*, a building commissioned by the Brussels Exposition Universelle of 1958 where Varèse's *Poème écletronique* was premiered.[20]

Since the beginning of the twentieth century, in many artistic practices, the interactions between visual and sound parameters form a cohesive and interdependent whole. Visual art schools such as the expressionist "Blue Knight" group led by Kandinsky, or the visual music of Hans Richter and Oskar Fischinger have paved the way for the transcoding art of today.[21]

In the case of the music made by Spanish composer Javier Elipe-Gimeno for Peter Tscherkassky's film *Outer Space* (2019), a transcoding approach allowed an investigation associating parameters of musical composition and computer analysis of data extracted from film frames (data such as the relative percentage of black and white dots per frame, the difference between the position of the dots from one frame to another). Other approaches to transcoding from experimental film to music are found in the work of artists like Bernhard Lang and Norbert Pfaffenbichler.

Outer Space Projects

Film Project

Outer Space, by Peter Tcherkassky,[22] is an Austrian experimental film made in 1999. This film uses the technique of "Found Footage,"[23] which uses images from other films to create a new editing (and create new sensations). In this case, Tscherkassky based himself on the American horror film *The Entity*[24] (Sidney J. Furie, 1982) to create the films *Outer Space* (1999) and *Dream Work* (2000).[25] For the realization of these films, the Austrian director copied several frames from the original film (*The Entity*) on a 35 mm virgin film in a camera obscura. For this, he used several laser devices (of different sizes and

20 Kurt Stone, "Reviews of Records: Xenakis: *Metastaseis* (1953–54); *Pithoprakta* (1955–56); *Eonta for Piano, Two Trumpets, and Three Trombones* (1963–64)," *The Musical Quarterly* 54, no. 3 (1968): 387–395, DOI:/10.1093/mq/LIV.3.387.

21 See Schedel, "Colour is the Keyboard."

22 *Outer Space, Index 8: Films From a Dark Room*, DVD, directed by Peter Tscherkassky (Vienna: Index Edition, 2006).

23 Jonathan Rosenbaum, "Lost Material and Found Footage: Peter Tscherkassky's Dark Room – and Ours," *Found Footage* 4 (2018), published also at https://jonathanrosenbaum.net/2021/08/lost-material-and-found-footage-peter-tscherkasskys-dark-room-and-ours-tk/.

24 *The Entity*, DVD, directed by Sidney J. Furie (Los Angeles: Twentieth Century Fox, 1982).

25 *Dream Work, Index 8: Films From a Dark Room*, DVD, directed by Peter Tscherkassky (Vienna: Index Edition, 2006).

shapes), which allow him different ways of copying the photograms.[26] This way of working accentuates certain impressions and sequences of the film. The new "Found Footage" editing creates in *Outer Space* an additional emphasis on the scenes of aggression, creating a new sensory dimension. We can see an example of this concept in the sequence of the film that begins at minute 5'57", where the same sequence of shots is repeated several times.[27] This continuous repetition creates a new sensation in the viewer.

For the creation of the original soundtrack, Tscherkassky used a similar technique, but applied to sound. For this, he copied some fragments of the sound part of the original film onto the virgin film.[28] This sound composition was therefore composed of residual sounds from the original film (*The Entity*), caused by copying parts of the image into the sound part of the virgin film. This process causes a certain type of saturated sounds. This soundtrack creates a perfect balance between moments of emptiness and moments of visual sound saturation of the film. The articulation between the images and the film is organized in an organic way, thanks to the use of common structures between the sound and the visual part (use of images as waveforms, use of images as a musical motif, etc.).

The composition[29] of a new soundtrack for the film *Outer Space* for electric guitar, piano, saxophone, percussions and electronics was a difficult exercise – the Tscherkassky films are a very energetic, alternating between very dense and empty scenes (e.g. white screens, etc.). From a traditional image composition point of view, this could lead us to an illustrative composition that would only accentuate the visual intention. Likewise, a counterpoint composition could give us information that is not related to the images. The work of transcoding can allow us to find new musical propositions which are adapted to the complexity of the images. The information provided by the transcodage work can show us how to adapt to the constant evolution of the film. For this purpose, it is necessary a search for common structures between the visual and sound planes (in a certain way, similar to the work that Peter Tcherkassky had done). The use of computer analysis in this work has as its main motivation the search for common structures between the musical and cinematographic parts. This work show us how to explore and search for new articulations between the musical/sound and visual parts. For instance, we can discover with the computer

26 Matthew Levine, "Controlled Chaos: The Cinematic Unconscious of Peter Tscherkassky," *Found Footage Magazine* 4 (2018).

27 "Peter Tscherkassky – Outer Space," Vimeo Video, 9:22, January 30, 2019, in *Index 8: Films From a Dark Room*, DVD, directed by Peter Tscherkassky (Vienna: Index Edition, 2006), https://vimeo.com/314251447.

28 You can see an example of this way of working in the following link: "Cinémas de traverse [excerpt]: Peter Tscherkassky Interview," YouTube video, 0:40, May 26, 2015, accessed November 19, 2022, https://www.youtube.com/watch?v=aitaaM-ZmHU.

29 Javier Elipe-Gimeno, "Outer Space," unpublished edition (Paris, 2019).

analysis some musical-visual gestures that we cannot appreciate in a simple viewing of the film, finding new links between film and music. The objective is then to work and explore a writing of the film/music relationship, which will evolute during the whole film.

Using Algorithms for the Analysis of the Film's Visual Data

In order to find common parameters between film and music, we realized different types of analysis performed with the Jitter library in Max/MSP[30] software.[31] For this, we searched for different types of algorithms, such as:

1. Predominance of blacks/whites: The first of these algorithms is based on the analysis of the average brightness, establishing for example the value 0 when the brightness color is black, 1 when is white and 0.5 when the amount of black and white is similar. As *Outer Space* is a film with rapidly changing events, this analysis generates luminosity gestures that could be interpreted in a musical way. In Figure 1, we can see an exemple of this kind of analysis programmed in Ircam in 2018.
2. Number of oscillations per second: The second type of algorithm to explore is to perform a calculation of the rhythm of footage and the rate of change of shots in the film. The idea was to calculate predominant shots and to obtain the rhythm and proportions: This would allow us to be aware in a general way of thematic proportions of each shot.
3. Spatialization in the picture: The third type of algorithm allows us to calculate in where of the picture action takes place. One can see that, for example, in Figure 3, when action of the film occurs either in the center at the edges or distributed evenly over the whole frame.
4. The fourth type of algorithm performs a calculation of intermediate planes that can exist between two main planes. This would allow us to calculate the transitions and the type of permutation between them. Therefore it creates a progression graph.
5. The last type of algorithm for the analysis of the film images is the disturbance (number of elements per shot), which allows us to calculate intelligibility of the shots or the number of elements per shot. For example, the intelligibility of the images in relation to basic geometric figures, such as the circle, square or triangle.

30 Max/MSP is an object programming language for music and multimedia initiated at Ircam-Centro Pompidou in 1985 (originally called The Patcher), and currently developed by the Californian company Cycling '74. "What is Max?," *Cycling '74*, accessed November 19, 2022, https://cycling74.com/products/max.

31 The jitter library is a collection of Max objects that can be used in the Max/MSP software for video processing and analysis.

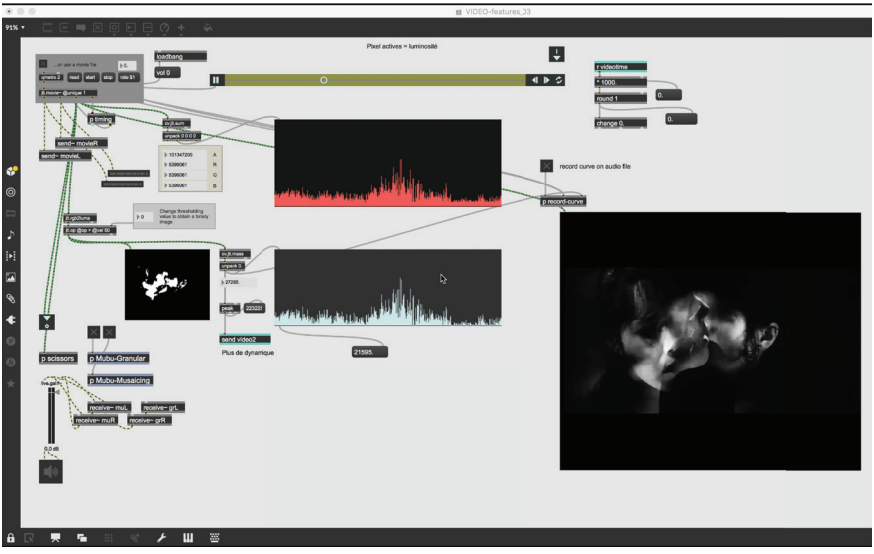


Figure 1: Analysis of the average brightness, from a Max/MSP/Jitter patch made in Ircam in 2018.

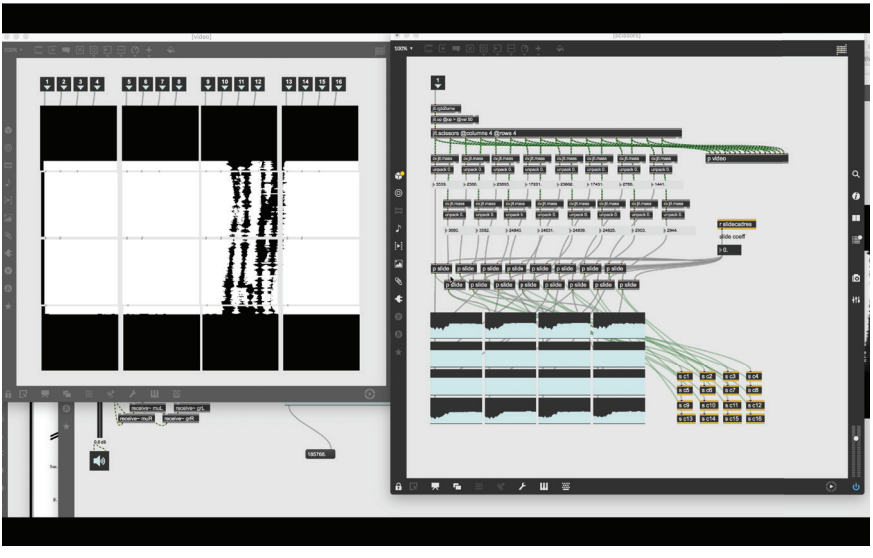


Figure 2: Analysis of the spatialization in the picture, from a Max/MSP/Jitter patch made in Ircam in 2018.

Application of the Concepts of Music in Film Analysis Using Computer Analysis

Among the different algorithms planned, we have studied in more depth the first one, based on the light analysis or predominance of blacks/whites (the other algorithms will be used later in future stages of the work). We have chosen this first algorithm because it was the one that, from the beginning, gave the clearest and most direct results. The luminosity curve of this analysis shows us a graphic that we use in four different ways: global structure; relationship between film and music; complementarity relations with the visual part and part and rhythmic counterpoint.

A) Analysis of the general structure

This first use of the analysis help us to obtain a global structure of the film. The Max/MSP patch[32] used for this analysis permitted us to record the curve and to give the global structure of the film. As we can see in Figure 3, the general brightness curve shows different sections. We have divided the curve into nine parts, coinciding with the nine sections of the musical composition. As mentioned in the In the section *Using Algorithms* [...], when the waveform is at its lowest value, it represents the abundance of black in the image. When it is at its highest value, a predominance of white.

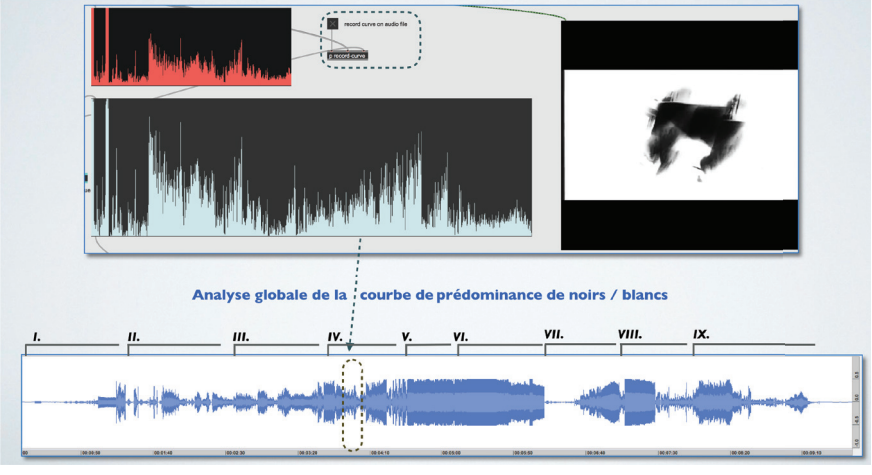


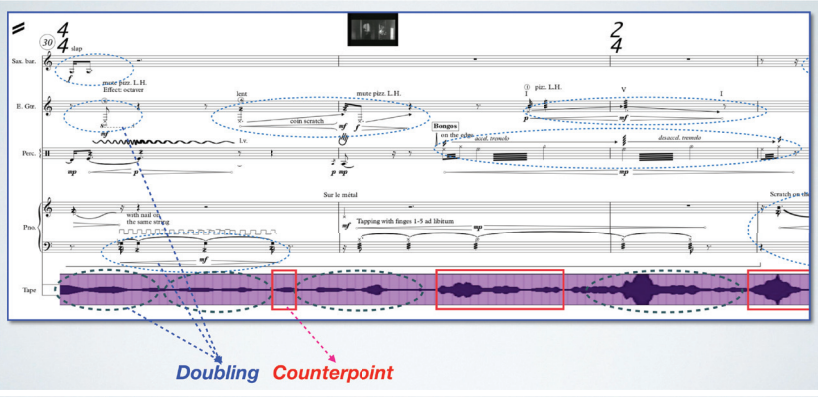
Figure 3: Analysis of the general structure using the luminosity curve.

The brightness curve represented by a waveform makes an analogy with music. We can find several coincidences between the sound and visual structure. In Figure 3, the different sections have been ordered by different criteria: the size,

32 This patch Max was worked at Ircam in collaboration with the RIM Carlo Laurenzi.

the geometry and the temporality of the waveforms. The first two criterias show us a structure that is common to the visual and sound plane. The temporal criteria allow us to find sections that had a similar duration, causing visual shapes that can help us to find these nine divisions.

B) Writing the relationship between film and music
We can also use the brightness curve in order to make it dialogue with the other instruments. The visual form of this analysis allows us to make a similarity between the luminosity curve and the instrumental lines. In Figure 4, we can observe how the luminosity curve interacts with the other instrumental lines, treating this curve as a fifth instrument.



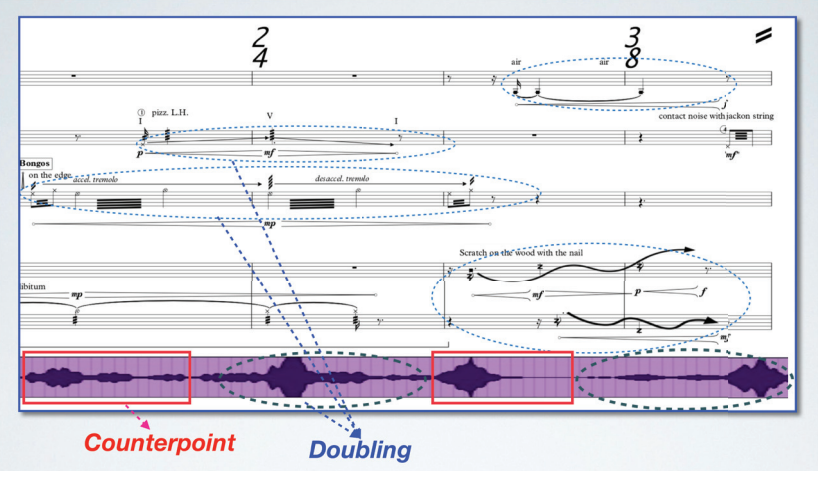


Figure 4a: Use of the luminosity curve in Javier Elipe-Gimeno's *Outer Space* score (bars 30–34).
Figure 4b: Use of the luminosity curve in Javier Elipe-Gimeno's *Outer Space* score (bars 30–34).

In Figure 4, the design of the curve allows us to interact with the instruments in different ways: doubling, making a sort of sonficiation of the luminosity or by counterpoint (brightness gesture does not correspond to that of the instrumental lines). This type of work offers different ways of interaction with the images:

1. From parallelism to non-synchronism: This results in a musical composition that constantly alternates between a work of accompaniment and a synchronization between the image and the music. We can appreciate a fairly regular balance between doubling and counterpoint.
2. Phenomenon punctuation: Different types of punctuation, such as anticipation, association, narrative counterpoint or recall, combine naturally with audiovisual discourse.
3. Using the black/white dominance curve analysis, the dialogue between instruments and film. The luminosity, which is a visual parameter, is used as a sound parameter. This therefore provokes a relatively organic film-music interaction.

C) Principle of complementarity with the visual part: audiovisual orchestration. This third kind of application of the luminosity curve shows the exchange of energy between the visual and sound parts. In other words, how the audiovisual action passes from the screen to the sound, and vice versa. In some moments, the audiovisual activity is on the screen, other times in the sound part, and in other moments, in visual and sound levels at the same time. This give us a sensation of audiovisual orchestration. In Figure 5, we can see how the brightness curve has a rather low value. At that moment, the instrumental formation is active. At the moment when the brightness curve increase (two bars before the end), the other instruments stop, having the sensation of energy exchange between the visual and the soundart.

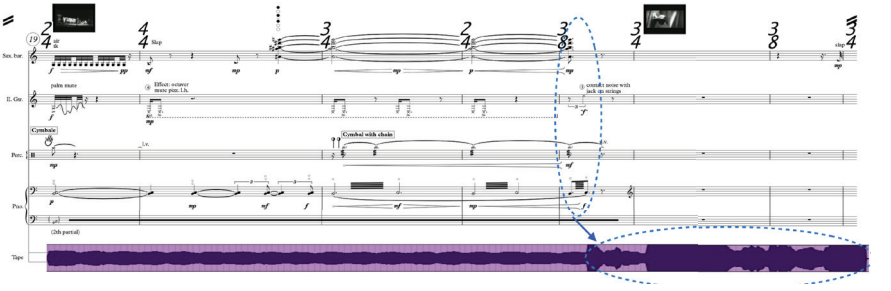


Figure 5: Principle of complementarity in Javier Elipe-Gimeno's *Outer Space* score (bars 19–25).

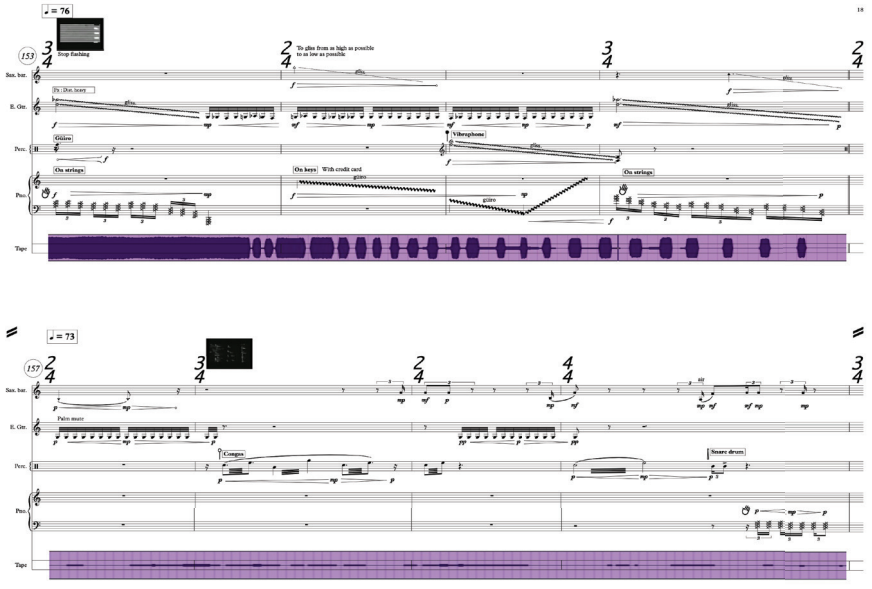


Figure 6: Principle of parallel audio-visual orchestration in Javier Elipe-Gimeno's *Outer Space* score (bars 153–160).

This effect or sensation of audiovisual orchestration is used in other moments in a progressive way. Audiovisual orchestration is not always used in a compensatory way (i.e. more music when there is less action in the images, and vice versa). It can also act in a parallel way. For exemple, increase or decrease of the action takes place at the same time in the sound and visual part. An example of this parallel audiovisual orchestration is shown in Figure 6. The progressive decrease of the intensity of the images (and of the marked rhythm they provoke) is accompanied by a similar work in the music. The dynamics used in the music decrease at the same time as the brightness curve reaches the value 0.

D) To give a rhythmic counterpoint to the energy given by the images
The luminosity curve can also be used to obtain a rhythmic counterpoint. In this case we can create a rhythmic counterpoint with the help of granular synthesis. To obtain it, we use a percussion sound (a symphonic bass drum in our case) which will allow us to obtain a precise rhythm. This gives us a rhythmic value that varies constantly. This value will decrease when the white light increases (getting an acceleration effect) and increase (longer values) when there is a predominance of black tones.

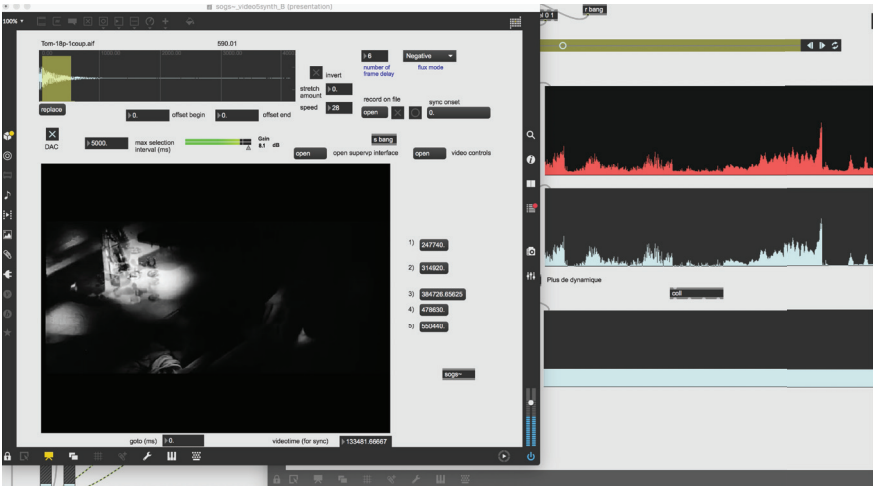


Figure 7: Granular synthesis Max/MSP patch used to determine the rhythm contra point of the *Outer Space* composition.

In Figure 7, we can observe a granular synthesis module at the output of the luminosity analysis. A Max object for beat analyse can be used to determine precisely the rhythm of this counterpoint. In this way we link the luminosity gesture to a time scale, giving us a kind of rhythmic gestures.

Other Transcoding Parameters in Addition to Computer Analysis

The different types of analysis shown in the previous section allow us to transport visual structures to the sound part, but also to analyze the images of a film with parameters of musical analysis, obtaining a set of parameters common to both planes (visual and sound). This analysis does not intend to give precise information that has to be used to make the musical composition. The idea is to obtain a musical-and visual analysis that gives us a series of gestures representing commun structures between the visual and sound parts. Consequently, these analyses are proposed as a basis to be completed with another series of elements. In our first approach of this method, the analyses were completed with the following series of analogies:

- Image oscillations: trills, oscillations notes
- Flashing pictures: tremolos, alternating high and low notes
- Visual accents: accentuation of a sound gesture
- Symmetries in the picture: reversal of sound gestures
- Image superposition: superposition of different sound materials
- Concatenative synthesis: creation of complex instrumental gestures

This way of proceeding, more intuitive, is completed with the use of the parameters obtained in the analysis. For example, the image oscillations and the flashing moments analyzed by the luminosity curve will give us a more or less regular curve (also due to an analysis resolution problem). The analysis will not be able to determine these oscillations in detail. Consequently, the luminosity analysis was completed in this case by the addition of trills or tremolos between two notes. Another element that we have not yet been able to determine in the luminosity analysis is the interpretation of symmetries and overlapping planes. This was also completed with motifs and musical gestures superimposed in a retrograde, inverted manner, etc.

Future Steps of Work

The analysis and study of common structures between image and musical composition using computer analysis is a complex process.

This is necessary to make a synthesis between the possible algorithms and must be used with different possibilities and the application of the analysis. The use of these analyses employing graphic elements (such as the luminosity curve explained above) can be equally complicated to interpret musically. These analyses present therefore different possibilities of progression for future stages of work that we can divide them into three different axes. First, the work and adaptation of other algorithms, such as those described in the third point of this analysis:

- Analysis of the action in the frame of the image: central / side / all frames ...
- Analysis of music harmonic fields
- Analysis of the action within the framework of the image
- Analysis of image symmetries
- Image intelligibility: recognizable geometric shapes in images
- Development of sound synthesis tools related to image analysis

A secondary axis would be to combine the algorithms used with various CAO tools such as the Open Music software[33] or the Bach library[34] in Max/MSP, which would allow to associate the results of the computer analysis to the use of musical intervals and rhythmic values. Another possibility is the application of the values obtained using real-time processing modules. For example, in Figure 8, a synthesizer programmed with the help of Max/MSP/Jitter works with the parameters obtained from the film analysis. In this case, the division of the screen into vertical

33 OpenMusic is a object programming langage based on CommonLisp created and developed at Ircam-Centre Pompidou. "OpenMusic," IRCAM, accessed November 19, 2022, https://forum.ircam.fr/projects/detail/openmusic/.

34 The Bach Library is a collection of Max objects that can be used in the Max/MSP software who work on computer-assisted composition in a real-time world. "Projects," Bach, accessed November 19, 2022, https://www.bachproject.net/#latest-news.

segments allows us to obtain a time line of values. Thanks to the adjustment of different parameters, such as the application of different filters, noise parameters, beats par loop, etc., we can obtain a sound result from the analysis performed.

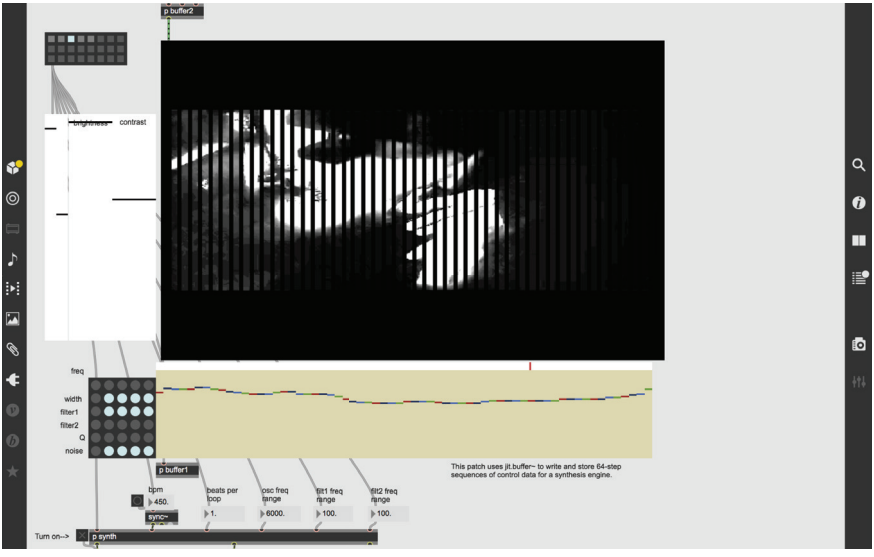


Figure 8: A Max/MSP synthesizer patch plays with the parameters obtained with the analyses, made by Carlo Laurenzi from Ircam.

The third axis would be the improvement of the graphical representation of the analyses used, which in the analyses shown was the luminosity curve represented by a waveform. This graphical representation could be improved by adding, for example, other analyses to this luminosity curve. For exemple the spatialisation in the picture or the rhythmic counterpoint proposition. The way to link the different types of analysis to the graphical representation would be for example to use different colors, or even to use a 3D representation in order to avoid confusion of the analysis curves used.

Conclusions

With this paper, we have shown an application of the concept of transcoding, a concept that runs through virtually the entire history of Western music, from antiquity to the present day. Transcoding remains of great importance today thanks to the different multimodal tools allowed by computer music.

Among the most representative applications of this approach is the alliance between musical composition and experimental cinema. At the other end of the modern spectrum, the work of artists such as Norbert Pfaffenbichler and

Bernard Lang continue this tradition of perpetual transcoding between sight and sound. In this case study, we have analyzed how this relationship materializes in the soundtrack of *Outer Space* taking into account many transcoding principles.

The computer analysis of the images of the film *Outer Space* allowed the composer to explore the different common structures between the visual and sound planes. The algorithms used allowed us to explore different parameters of the images. Among them, the most used was the luminosity curve, which allowed us to explore the same visual gesture with different prisms: on a vertical point of view, with the duplication of instrumental gestures, on a horizontal point of view, with the analysis of the general structure of the film. And finally, on an intermediate point of view, with the analysis of the energies between the two plans.

The luminosity analysis allowed us to represent these analyses in a single analysis curve. In this way, we were able to synthesize the analyses used in a graphic score. This graphical score could be enriched by adding other algorithms in the computer analysis. One way to be able to add the different algorithms in a single graphical score would be to make a 3D graphical score, thus having the different common parameters between the two planes in a single graphical representation.

References

Berry, David M. "The Computational Turn: Thinking About the Digital Humanities." *Culture Machine* 12 (2011): 1–22.

Bonnet, Antoine. "Ecriture and Perception: On *Messagesquisse* by Pierre Boulez." *Contemporary Music Review 2*, no. 1 (1987): 173–209.

Buelow, George J., and Hans Joachim Marx. *New Mattheson Studies*. Cambridge University Press, 2007.

Carpenter, Grégoire, Victor Cordero, and Éric Daubresse. "Cartographier le timbre." *Dissonance* 119 (2012): 48–63. Accessed June 2022. https://www.dissonance.ch/upload/pdf/diss119web_hb_daubresse_exemples.pdf.

Davis, Hannah, and Saif Mohammad. "Generating Music from Literature." Paper presented at *Proceedings of the 3rd Workshop on Computational Linguistics for Literature (CLFL 2014), Gotheburg, Sweden, April 27, 2014*, 1–10. DOI:10.3115/v1/W14-0901.

Edmonds, Ernest, Andrew Martin, and Sandra Pauletto. "Audio-Visual Interfaces in Digital Art." Paper presented at *Proceedings of the 2004 ACM SIGCHI International Conference on Advances in Computer Entertainment Technology (ACE 2004), Singapore*, 331–336. DOI:10.1145/1067343.1067392.

Elipe, Javier-Gimeno. "Outer Space." Unpublished edition. Paris, 2019.

Gall, Marina, and Nick Breeze. "Music Composition Lessons: The Multimodal Affordances of Technology." *Educational Review* 57, no. 4 (2005): 415–433.

Good, Michael. "MusicXML for Notation and Analysis." In *The Virtual Score: Representation, Retrieval, Restoration*, edited by Walter B. Hewlett and Eleanor Selfridge-Field, 113–124. Cambridge, MA: Mit Press, 2001.

Huron, David. "Humdrum and Kern: Selective Feature Encoding." In *Beyond MIDI: The Handbook of Musical Codes*, 375–401. Cambridge, Ma: MIT Press, 1997.

Huron, David. "Music Information Processing Using the Humdrum Toolkit: Concepts, Examples, and Lessons." *Computer Music Journal* 26, no. 2 (2002): 11–26.

Jacob, Bruce L. "Algorithmic Composition as a Model of Creativity." *Organized Sound* 1, no. 3 (1996): 157–165. DOI: 10.1017/S1355771896000222.

Kirchmeyer, Helmut. "On the Historical Constitution of a Rationalistic Music." *Die Reihe* 8 (1968): 11–24.

Lemi, Esther, Anastasia Georgaki, and James Whitney. "Reviewing the Transformation of Sound to Image in New Computer Music Software." Paper presented at *Proceedings of the 4th Sound and Music Computing Conference (SMC 2007)*. DOI:10.5281/zenodo.849384.

Levine, Matthew. "Controlled Chaos: The Cinematic Unconscious of Peter Tscherkassky." *Found Footage Magazine* 4 (2018).

Little, David. "Composing With Chaos: Applications of a New Science for Music." *Journal of New Music Research* 22, no. 1 (1993): 23–51.

Lockwood, Lewis. "Soggetto cavato." *New Grove Dictionary of Music and Musicians*, edited by Stanley Sadie. London: Macmillan, 1980. 17: 442–443.

López-Ortega, Omar, and Shani Ioana López-Popa. "Fractals, Fuzzy Logic and Expert Systems to Assist in the Construction of Musical Pieces." *Expert Systems with Applications* 39, no. 15 (2012): 11911–11923.

Macleod, Catriona. *Elective Affinities: Testing Word and Image Relationships*. Amsterdam: Rodopi, 2009.

Mattheson, Johann. *Der vollkommene Capellmeister*, edited by Friederike Ramm. Bärenreiter-Verlag, 1999.

Miranda, Eduardo. *Composing music with computers*. London: Routledge, 2001.

Müller, Meinard, Verena Konz, Michael Clausen, Sebastian Ewert, and Christian Fremerey. "A Multimodal Way of Experiencing and Exploring Music." *Interdisciplinary Science Reviews* 35, no. 2 (2010): 138–153.

Nierhaus, Gerhard. *Algorithmic Composition: Paradigms of Automated Music Generation*. Berlin: Springer Science & Business Media, 2009.

Palisca, Claude V., ed. *Hucbald, Guido, and John on Music: Three Medieval Treatises*. New Haven: Yale University Press, 1977.

Parra, Hèctor. *Pour une approche créatrice des interrelations structurelles entre les espaces acoustiques et visuels*. Mémoire de DEA, Université Paris 8 Vincennes – Saint Denis, 2005.

Polo, Antonio, and Xavier Sevillano. "Musical Vision: An Interactive Bio-Inspired Sonification Tool to Convert Images into Music." *Journal on Multimodal User Interfaces* 13, no. 3 (2019): 231–243.

Ribas, Luísa. "Sound and Image Relations: A History of Convergence and Divergence." *Divergence Press* 1, no. 2 (2014).

Roland, Perry. "The Music Encoding Initiative (MEI)." Paper presented at *MAX2002*: *Proceedings of the First International Conference on Musical Applications Using XML*, 55–59. http://xml.coverpages.org/MAX2002-PRoland.pdf.

Rosenbaum, Jonathan. "Lost Material and Found Footage: Peter Tscherkassky's Dark Room – and Ours." *Found Footage* 4 (2018). Published also at https://jonathanrosenbaum.net/2021/08/lost-material-and-found-footage-peter-tscherkasskys-dark-room-and-ours-tk/.

Schedel, Margaret. "Colour Is the Keyboard: Case Studies in Transcoding Visual to Sonic." *The Oxford Handbook of Algorithmic Music*, edited by Roger T. Dean and Alex McLean. Oxford Handbooks Online. Oxford: Oxford University Press, 2018. DOI:/10.1093/oxfordhb/9780190226992.013.8.

Shenton, Andrew. *Olivier Messiaen's System of Signs: Notes Towards Understanding His Music*. London: Taylor & Francis, 2017.

Stone, Kurt. "Reviews of Records: Xenakis: *Metastaseis* (1953–54); *Pithoprakta* (1955–56); *Eonta for Piano, Two Trumpets, and Three Trombones* (1963–64)." *The Musical Quarterly* 54, no. 3 (1968): 387–395. DOI:/10.1093/mq/LIV.3.387.

Studemann, Frederick. "The Sounds of the Financial Crisis." Interview with Julian Anderson. *The Financial Times*. Podcast Audio. December 21, 2010. https://www.ft.com/content/56f5a76f-bca1-4312-b234-0aebbea3eb19.

"What is Max?" *Cycling '74*. Accessed November 19, 2022. https://cycling74.com/products/max.

Wiggins, Geraint A. "Computer Representation of Music in the Research Environment." In *Modern Methods for Musicology: Prospects, Proposals, and Realities*, edited by Tim Crawford and Lorna Gibson, 27–42. London: Routledge, 2016.

Wöllner, Clemens. *Body, Sound and Space in Music and Beyond: Multimodal Explorations*. 1st Edition. London: Routledge, 2018.

Videography

"Cinémas de traverse (excerpt): Peter Tscherkassky Interview." YouTube video, 0:40. May 26, 2015. Accessed November 19, 2022. https://www.youtube.com/watch?v=aitaaM-ZmHU.

Dream Work, Index 8: Films From a Dark Room. DVD. Directed by Peter Tscherkassky. Vienna: Index Edition, 2006.

Outer Space, Index 8: Films From a Dark Room. DVD. Directed by Peter Tscherkassky. Vienna: Index Edition, 2006.

"Peter Tscherkassky – Outer Space." Vimeo Video, 9:22. January 30, 2019. In *Index 8: Films From a Dark Room*. DVD. Directed by Peter Tscherkassky. Vienna: Index Edition, 2006. https://vimeo.com/314251447.

The Entity. DVD. Directed by Sidney J. Furie. Los Angeles: Twentieth Century Fox, 1982.

POVZETEK

Prekodiranje kot paradigma komponiranja: Povezava kompozicijskih parametrov in računalniške analize gibljivih slik v skladbi *Outer Space* (*Vesolje*)

Novi oxfordski ameriški slovar definira »prekodiranje« kot »pretvorbo (jezika ali informacije) iz ene kodirane oblike v drugo.« Prekodiranje se nanaša na vrsto tehnik, ki se bodisi opirajo na zunajglasbene elemente bodisi iščejo določeno enotnost znotraj glasbene vsebine v enotnih strukturnih elementih glasbenega diskurza. Če je v preteklosti prekodiranje temeljilo na povezavi med glasbo, abecedno kodo in literaturo, pa v sodobnem obdobju skladatelji iščejo strukturne povezave na drugih področjih. Pri glasbi, ki spremlja sodobne eksperimentalne filme, lahko pristop prekodiranja omogoči raziskave, ki parametre glasbene kompozicije z računalniško analizo povežejo s podatki, pridobljenimi iz gibljivih slik (podatki, kot so relativni odstotek črnih in belih pik v posameznem kadru, razlika med položajem pik od enega kadra do drugega). Zgodovina glasbenih praks kaže, da glasba in prekodiranje tvorita pomemben binom, ki nam ponuja podrobnejši znanstveni pogled na glasbeno analizo. Prispevek se osredotoča na eno od avtorjevih skladb, *Outer Space* (*Vesolje*), zasnovano s tehnikami prekodiranja, ki povezujejo glasbo in eksperimentalni film. Uporabljeni algoritmi so nam omogočili raziskovanje različnih parametrov slik. Med njimi je bila najpogosteje uporabljena krivulja svetilnosti, ki nam je omogočila raziskovanje iste vizualne geste z različnimi prizmami: z vertikalnega zornega kota, s podvajanjem instrumentalnih linij, s horizontalnega gledišča, z analizo splošne kompozicije filma. In končno, z vmesnega vidika, z analizo energij med obema materialoma.

ABOUT THE AUTHORS

JAVIER ELIPE-GIMENO (elipe-gimeno@prism.cnrs.fr) is composer and author of a thesis entitled "Composing from Silent Cinema: A Theoretical and Practical Approach." Javier Elipe-Gimeno is regularly in charge of projects with music and image in collaboration with other artistic and scientific disciplines. He has also conducted research on sound composition and experimental cinema around the topic of "violence and society" and has participated in projects mixing new technologies and composition. His research is based on three axes: Sound composition and experimental cinema, musical composition and new technologies and computer assisted orchestration.

CHARLES DE PAIVA SANTANA (charles@prism.cnrs.fr) holds a PhD in music from the University of Campinas and in computer science from the University Pierre-et-Marie-Curie. His research focuses on the analysis, modeling and computer simulation of compositional strategies of contemporary repertoire, as well as their impact on perception. He teaches 20th century and computer music at the Aix Marseille University.

O AVTORJIH

JAVIER ELIPE-GIMENO (elipe-gimeno@prism.cnrs.fr) je skladatelj in avtor disertacije z naslovom »Skladanje iz nemega filma: Teoretični in praktični pristop.« Redno sodeluje v projektih, ki obravnavajo povezavo med glasbo in sliko ter z drugimi umetniškimi in znanstvenimi disciplinami. Izvajal je tudi raziskave o zvočni kompoziciji in eksperimentalnem filmu na temo »nasilje in družba« ter sodeloval pri projektih mešanja novih tehnologij in kompozicije. Njegove raziskave temeljijo na treh oseh: zvočna kompozicija in eksperimentalni film, glasbena kompozicija in nove tehnologije ter računalniško podprta orkestracija.

CHARLES DE PAIVA SANTANA (charles@prism.cnrs.fr) je doktoriral iz glasbe na Univerzi v Campinasu in iz računalništva na Univerzi Pierre-et-Marie-Curie, njegove raziskave pa se osredotočajo na analizo, modeliranje in računalniško simulacijo kompozicijskih strategij sodobnega repertoarja ter vpliva teh na recepcijo. Glasbo 20. stoletja in računalniško glasbo poučuje na Univerzi Aix Marseille.

DOI: 10.4312/mz.58.2.175-204
UDK 78(497.4)"1991-2021":061.2Muzina

»Svet čudovite lahkosti zvenenja sodobne glasbe«: Prizadevanja za sodobno glasbo v treh desetletjih po ustanovitvi društva Muzina

Matjaž Barbo

Univerza v Ljubljani

IZVLEČEK

Članek se posveča pregledu delovanja slovenskega društva za novo glasbo Muzina in ob tem obravnava pomen, ki ga je društvo imelo na oblikovanje zavesti o sodobni glasbi. Pri tem estetske koordinate društva povezuje s sočasnimi mednarodnimi trendi in hkrati vpenja delovanje društva v kontekst razvoja glasbe v tem obdobju na Slovenskem.

Ključne besede: slovenska glasba, sodobna glasba, recepcijska zgodovina, društvo Muzina, Brina Jež Brezavšček

ABSTRACT

The article examines the activities and influence that the Slovenian society for new music Muzina had on the perception of contemporary music. The aesthetic coordinates of the society are connected with the contemporary international trends. At the same time, the activities of the society are presented in the context of the development of music in Slovenia in recent decades.

Keywords: Slovenian music, contemporary music, history of musical reception, Muzina Society, Brina Jež Brezavšček

* Članek je nastal v okviru raziskovalnega programa Raziskave glasbene preteklosti na Slovenskem, P6-0004, in projekta Glasba mladih po 1945 in Glasbena mladina Slovenije, J6-3135, ki ju financira Javna agencija za raziskovalno dejavnost Republike Slovenije.

Odločitvi za članek je botrovala obletnica ustanovitve slovenskega društva za novo glasbo Muzina. Zunanja spodbuda je tako sprožila premislek, ki se je pokazal za potreben, saj se zdi, da ob siceršnji spodbudni širitvi literature o sodobni glasbi na Slovenskem nekako preseneča dejstvo, da stoji preučevanje fenomena skladateljskega združevanja pri nas še vedno nekoliko ob strani.[1] Poleg nekaterih posamičnih analiz vendarle starejših fenomenov, kot je skladateljska skupina Pro musica viva, obravnava širšega družbenega okvira, v katerem se oblikujejo posamične poetike in se začrtujejo tudi glavne estetske koordinate sodobne glasbe, ni v ospredju.[2] Tudi v pomembnejših in tehtnejših novejših delih, ki obravnavajo ustvarjanje zadnjih desetletij, je tovrstnega premisleka malo, še zlasti pa ne vezanega na društveno delovanje. Prav preučevanje društva Muzina se zdi zato možna pomembna spodbuda za širitev strokovnega zanimanja za fenomen, ki je neposredno spodbujal zavest o pomenu sodobne glasbe pri nas, ob tem pa opazno širil vedenje o sodobnih glasbenih tokovih v svetu, spodbujal sodobno glasbeno ustvarjalnost ter krepil zanimanje tako domačih kot tujih izvajalcev za sodobno slovensko glasbo, s čimer je temeljito zaznamoval tudi njeno recepcijo. Članek estetske koordinate društva in njegovih vodilnih članov povezuje s sočasnimi mednarodnimi trendi, na drugi strani pa vpenja delovanje društva v kontekst razvoja glasbe v tem obdobju na Slovenskem.

Iz analize programskih in estetskih zapisov osrednjih članov društva se v članku razgrinjajo osrednja navidez svobodno razprta in nepovezana vozlišča estetskega premisleka, pri čemer se vendarle nakazujejo tudi osnovne poteze idejne enovitosti, ki se lahko prepoznavajo v različnih projektih društva in društvenih članov ter kot nekakšna rdeča nit povezujejo v celoto njihova

1 Ivan Klemenčič, »Glasba in totalitarna država na Slovenskem,« v *Temna stran meseca*, ur. Drago Jančar (Ljubljana: Nova revija, 1998), 321–333; Matjaž Barbo, »Glasba kot trpno-tvorni del slovenske družbe,« *Muzikološki zbornik* 27 (1991): 77–85; Niall O'Loughlin, *Novejša glasba v Sloveniji* (Ljubljana: Slovenska matica, 2000); Jurij Snoj in Gregor Pompe, *Pisna podoba glasbe na Slovenskem / Music in Slovenia through the Aspetct of Notation* (Ljubljana: Založba ZRC, 2003); Gregor Pompe, »'Nove perspektive' v slovenski glasbi po letu 1945,« v Roger Sutherland, *Nove glasbene perspektive* (Ljubljana: LUD Šerpa in Slovensko muzikološko društvo, 2009), 247–262; Darja Koter, *Slovenska glasba 1918–1991* (Ljubljana: Študentska založba, 2012); Larisa Vrhunc, *Vplivi spektralne glasbe na slovensko kompozicijsko ustvarjalnost zadnjih desetletij* (Ljubljana: Znanstvena založba Filozofske fakultete, 2018); Gregor Pompe, *Zgodovina glasbe na Slovenskem IV: Glasba na Slovenskem med letoma 1918 in 2018* (Ljubljana: Znanstvena založba Filozofske fakultete in Založba ZRC, 2019); Gregor Pompe, *Skice za zgodovino slovenske glasbe 20. stoletja* (Ljubljana: Znanstvena založba Filozofske fakultete, 2019).

2 Matjaž Barbo, »Osnutek statuta skupine Pro musica viva kot poskus začrtanja njenih estetskih koordinat,« *Muzikološki zbornik* 32 (1996): 95–106; Matjaž Barbo, *Pro musica viva* (Ljubljana: Znanstveni inštitut Filozofske fakultete, 2001); Leon Stefanija, »Glasbena ustvarjalnost in poustvarjalnost na Slovenskem v 20. stoletju: Dosežki in poti naprej,« *De musica disserenda* 6, št. 1 (2010): 9–19; Tatjana Marković in Leon Stefanija, ur., *Ustanove, politika in glasba v Sloveniji in Srbiji 1945–1963* (Ljubljana: Znanstvena založba Filozofske fakultete, 2015); Leon Stefanija, *Prispevek k analizi institucij slovenske glasbe 20. stoletja* (Ljubljana: Znanstvena založba Filozofske fakultete, 2010).

prizadevanja zadnjih desetletij. Članek prek uvida v sočasne kritiške in esejistične zapise, komentarje in napovedi zasleduje zgodovino delovanja društva, pomembnejših glasbenih dogodkov, koncertov, festivalov in izvedb skladb osrednjih članov ter prek tega postavlja pomembnejše mejnike sodobne recepcijske zgodovine pri nas.

Presenetljiv in morda na prvi pogled paradoksalen se zdi vitalizem osrednjih modernističnih načel društva Muzina, ki je svoje estetske principe zavzemanja za »novo« in preseganje »starega« obranilo ne glede na čeri, ki so se v zgodovinskem toku estetskih idej vedno znova in nanovo postavljale pred umetnost ter hromile sorodne ideje, kompozicijske poetike in estetsko trdnost marsikaterega od ustvarjalcev. Prav tako nas lahko preseneča trdoživost samega društvenega združevanja, ki je uspelo preživeti različne družbene, kulturne, pa seveda tudi seveda finančne pretrese, ki so po vrsti prižigali in ugašali druga sorodna društva. Res je, da je tudi to doživljalo določene vzpone in padce, da se je deloma preoblikovalo, menjavalo svoje članstvo in vodstvo ter celo ime, a v osnovi vselej ostajalo trdno zavezano svojemu osnovnemu poslanstvu, tj. predstavitvi nove glasbe in njeni uveljavitvi v širšem kulturnem prostoru.

Vse to vendarle dokazuje ne le trdoživost nekega prepričanja samega po sebi, ampak posredno potrjuje njegovo upravičenost in smiselnost. Dejstvo, da estetski principi Muzine izpred treh desetletij ohranjajo isto svežino in vitalnost tudi še danes, je namreč mogoče le zaradi zanesenjaškega navdušenja, ki ga vodi ljubezen do (nove) glasbe.

Društvo Muzina je bilo ustanovljeno hkrati z nastankom nove države. Paralelo lahko v marsičem razumemo tudi simbolno. Kot se je država porajevala iz morda celo navidez utopičnih zanesenjaških idej, je Muzino spremljal podoben entuziazem, ki je presegal neke navidezne »realne« omejitve in se jih drzno namenil negirati, s tem odstirati sence dvoma in se vreči v neznane globine. O ustanovitvi društva je glasbena publicistka Mirjam Žgavec zapisala:

> *Zamisel o ustanovitvi novega društva, ki bi se zavzemalo za kompleksnejšo koncertno produkcijo sodobne glasbe z jedrom v mlajši srednji generaciji skladateljev, je vzniknila v času zaključevanja nekega obdobja in začetkov novega: med junijem 1991 in januarjem 1992, ko je EU uradno priznala Republiko Slovenijo, so se izkristalizirale tudi formalne in vsebinske tendence društva Muzina, oz. Društva za vzpodbujanje in napredek nove glasbe. Z dobršno mero ironije in tudi samoironije o »napredku« kot izrabljeni floskuli in čisto resno o vzpodbujanju nastanka novih del in izvajalskega spoprijema z njimi. In intimni naravnanosti glasbenih dogodkov. In tako se je – simbolično – prvi koncert zgodil prav na predvečer uradnega priznanja državne neodvisnosti, 14. januarja 1992.*[3]

3 Mirjam Žgavec, »O Muzini,« v *Muzina i. dr., tridesetletnici ob rob*, [ur. Brina Jež Brezavšček], (Ljubljana: Sozven, 2021), 4–6.

Besede Mirjam Žgavec plastično in tudi najbolj neposredno orišejo doživljanje ob ustanovitvi društva z zornega kota ene njegovih najbolj aktivnih članic. Sama se je namreč aktivno vključevala v delo društva ter bila ves čas med najbolj prodornimi in izpostavljenimi glasbenimi piskami. Poleg nje je bila vodilna članica društva in dejanska oblikovalka ter osrednja tvorka njegove estetike skladateljica Brina Jež Brezavšček. Slednja je bila ves čas tudi predsednica društva. Le v kratkem obdobju v letih 2000–2001 je društvo vodil Gregor Pompe. To so bila tudi zadnja leta, ko je društvo delovalo pod imenom Muzina. Pozneje se je preimenovalo v Sirius A B, nekaj let za tem pa v Sozven.

Prvo obdobje delovanja društva Muzina

Prvi koncert društva, ki je zaznamoval tudi začetek javnega delovanja Muzine, je bil koncert, pripravljen v gledališču Glej 14. januarja 1992. Koncertni list je bil oblikovan v skladu s celostno likovno podobo društva. Le-ta skupaj z izbiro koncertnega prostora v eksperimentalnem gledališču tako tudi posredno pričuje o premišljenem konceptualnem načrtu, s katerim so se člani društva lotili njegove ustanovitve in delovanja.

Poleg tega je že z izborom sodelujočih glasbenikov in predstavljenih skladb kot tudi s spremljajočimi zapisi društvo »za vzpodbujanje in napredek sodobne glasbe,« kot je bilo zapisano ob imenu Muzina, izpostavilo glavne idejne in vsebinske poudarke, ki so vodili k ustanovitvi društva in so predstavljali tudi osrednje programske cilje v desetletjih, ki so sledila. V koncertnem listu, ki ga je zasnovala Brina Jež Brezavšček, je tako poudarjeno, da naj bi njihov prvi koncert »nakazal smer gibanja tudi v prihodnje. To je in še bolj bo glasba domače in tuje mlajše skladateljske generacije in tudi tiste starejše, ki je ne bi smeli preslišati.«[4] Organizatorja prvega koncerta sta bila društvo Muzina in Gledališče Glej. Na koncertu so bila izvedena dela takrat mlajše in srednje generacije slovenskih skladateljev Igorja Štuheca in Brine Jež Brezavšček ter tudi s slovenskim prostorom povezanih Tržačana Fabia Niedra in avstrijskega skladatelja Franza Richterja Herfa.

Posebna zanimivost koncerta je bil nastop novega godalnega kvarteta, ki je s svojim imenom Muzina prav tako naznanjal intenzivnejše sodelovanje z društvenimi projekti. Dejansko so člani kvarteta Branko Brezavšček, Igor Grasselli, Matjaž Sekne in Igor Mitrović tudi v poznejših letih pogosto nastopali na koncertih društva.

Prvi koncert društva Muzina sta pospremili dve kritiški oceni. Prvo, ki je izšla v *Dnevniku*, je napisal izvrstni kritik Peter Kušar, ki je v naslednjih letih vse do svoje prezgodnje smrti redno spremljal delovanje Muzine in bil eden najbolj naklonjenih ocenjevalcev sodobne glasbe sploh. V oceni koncerta je

4 »Muzina, društvo za vzpodbujanje in napredek sodobne glasbe Ljubljana,« koncertni list (Ljubljana: Gledališče Glej, 14. 1. 1992).

Slika 1: Naslovnica prvega koncerta društva Muzina, 14. januar 1992.

pomenljivo izjavil, da gre za »napoved boljših časov, najprej predvsem v pogledu širše povezanosti ustvarjalnih interesov avtorjev in izvajalcev.«[5] Kušar je med vsemi deli posebej izpostavil Štuhečev godalni kvartet, ki je šele pet let po nastanku doživel prvo izvedbo, pri čemer je zapisal, da »se zdi že kar sramotno, da takšne muzike glasbeniki takoj ne zgrabijo z obema rokama. […] Njegovo selektivno in napeto tehtanje tonske poetike in igre je bolj zasledovanje usod in ne ustvarjalne volje, ki se meri tako rekoč s celom svetom. Pravzaprav bolj klasična avtoritativnost peresa, ki pa je na našem večeru doživela zgovorno zmago.«[6] Spodbudna je bila tudi ocena *Delovega* kritika Bogdana Učakarja,

5 Peter Kušar, »Godalni kvartet Muzina: Koncert v gledališču Glej,« *Dnevnik* (21. 1. 1992).

6 Prav tam.

ki je poudaril, da gre za »vsekakor zelo perspektiven začetek, ki obeta uspešen razvoj.«[7]

Društvo je že s programom prvega koncerta nakazovalo na eni strani odprtost do različnih generacijskih prispevkov, pa tudi različnih slogovnih usmeritev, pri čemer je zlasti izstopal tedaj posebej zanimiv ekmelični pristop Herfove glasbe. Po drugi strani pa je posebnega pomena bilo izrazito prizadevanje društva za odpiranje slovenske glasbe tudi navzven, tako z iskanjem priložnosti za njeno promocijo v mednarodnem prostoru kot s seznanjanjem slovenske javnosti o pomembnejših umetnostnih dogajanjih v svetu.

Že prej kot v pol leta, 30. junija 1992, je društvo izpeljalo prvo gostovanje glasbenikov iz tujine. Koncert so pripravili v dvorani Slovenskega mladinskega gledališča, znova torej v nekonvencionalnem koncertnem prostoru, ki je zagotavljal glasbi tudi širši kulturni odmev. Na gostovanju se je predstavil mednarodni center za glasbene raziskave CIRM iz Pariza s predstavitvijo eksperimentalnih difuzijskih sistemov in interaktivnih avdiovizualnih sistemov. Na sporedu so bila dela nekaterih vidnejših sodobnih skladateljev, kot so John Cage, Michel Redolfi, Michel Pascal in Pascal Dusapin, celo z nekaterimi prvimi izvedbami.

Da si je društvo prizadevalo za res široko promocijo sodobne glasbe, kaže tudi slavnostni koncert, ki so ga konec tega leta, 7. decembra 1992, pripravili v počastitev 90-letnice skladatelja Maksa Pirnika. Slednji je v več pogledih veljal za nekoliko zapostavljenega skladatelja in pedagoga. Poleg njegovih skladb so na koncertu v dvorani ljubljanskega Magistrata zazvenele še skladbe nekdanjega Pirnikovega učenca Alda Kumarja, pa Marija Kogoja ter znova Fabia Niedra in Brine Jež Brezavšček. Poleg godalnega kvarteta Muzina s solisti je nastopil tudi Moški komorni zbor Zorko Prelovec iz Idrije z dirigentom Aldom Kumarjem.

Naslednje leto, 18. marca 1993, se je na koncertu Muzine s performansom predstavila v širšem prostoru znana eksperimentalna glasbenica in skladateljica Limpe Fuchs. Njeno odprtost proti sodobni konceptualni umetnosti, ki presega tradicionalne zvrstne in idejne omejitve ter se spogleduje z glasbenim gledališčem, povzemajo besede, objavljene na koncertnem listu: »Moja glasba je igranje, je petje, je gibanje, je dihanje, je raziskovanje, iskanje vibracij sveta, je ena od možnosti neke še nezapisane kulture. […] Svojo glasbo iščem v povezavi med akustično realnostjo in različnimi zvočnimi materiali: metalnimi zvoki balastnih strun, kožnimi zveni cevnih bobnov in zvoki kamnov. Zanima me istočasnost fantazije in govora.«[8] Glasbo je izvajala na nekoliko nenavadne ali celo čudaške instrumente, ki jih je izdelal njen mož, kipar Paul Fuchs. Njena glasba ljubljanskega poslušalstva vsekakor ni zares ogrela. Celo prireditvam

7 Bogdan Učakar, »Nov brstič komorne glasbe,« *Delo* (20. 1. 1992): 3.

8 *Muzina, društvo za vzpodbujanje in napredek sodobne glasbe Ljubljana*, koncertni list (Ljubljana: Gledališče Glej, 18. 3. 1992).

Muzine običajno naklonjeni kritik Peter Kušar je bil precej neprizanesljiv do »kompozicijsko manj kot skromne« rabe instrumentov in odrskega »kroženja po prostoru« ter zapisal, »da smo dobili pač mačka v žaklju, da ne rečem žakelj brez mačka.«[9] Kritik *Republike*, antropolog Rajko Muršič, je bil morda za kanček bolj prizanesljiv do njenega nastopa, a je vendar v končni oceni sklenil, da je umetnica v svojem performansu »nekajkrat izgubila rdečo nit« in v celoti »pokazala le nekaj zares 'svetlih' zvočnih točk.«[10]

Prvo pomembnejšo predstavitev dela Muzine v mednarodnem prostoru je pomenilo sodelovanje pri izboru skladb za Zagrebški bienale sodobne glasbe leta 1993. Bienale je tedaj veljal za enega najvidnejših festivalov sodobne glasbe. Na njem se je z izborom pretežno slovenskih skladb predstavil Godalni kvartet Muzina s solisti, programsko selekcijo tega slovenskega projekta pa je za bienale opravilo društvo Muzina. V izbor so bili vključeni predvsem slovenski skladatelji mlajše generacije in skladba hrvaškega skladatelja Željka Brkanovića.

Muzina je programsko selekcijo za bienale predstavila na ponovitvi koncerta v Cankarjevem domu v Ljubljani, 26. maja 1993. Na koncertu z naslovom Postbienalni glasbeni portreti so bile torej predstavljene skladbe Uroša Rojka, Igorja Majcna, Brine Jež Brezavšček, Alda Kumarja in Željka Brkanovića. Med deli sta izstopala pozneje večkrat izvajana *Chain* za godalni kvartet Brine Jež Brezavšček ter s postmodernističnim slogom spogledujoč *Post art ali Glej, piše ti Wolfgang* Alda Kumarja. Nataša Kričevcov, še ena od rednih kritiških spremljevalk koncertov Muzine, je v *Republiki* poudarila, da je izbor avtorjev bienalskih skladb slonel na njihovi »generacijski pripadnosti,« ki jo je označila kot »mlajša srednja generacija.« Po njenem mnenju pa je program v celoti vendarle izkazoval »glasbeno zrelost in profiliranost« izbranih skladateljev.[11] Kušarjev komentar je bil zanj značilno piker v oceni splošnega kulturnega stanja, ob tem pa je pozdravljal prizadevanja Muzine. Tako je izzivalno primerjal Muzino z uveljavljenimi glasbenimi institucijami: »Ustanove so za zdaj še toliko zaščitene s svojim družbenim ugledom in podporo, da njihovo umiranje ne bo opazno, dokler ne bo mrhovina dovolj zoprno zaudarjala. Muzini pa naj rečem, da mora biti bolj napadalna in da se stvari loti s tako rekoč verujočim besom in trmoglavostjo.« Zdi se, da je s svojimi besedami natančno ujel poglavitne poteze delovanja društva in ga kar preroško zaznamoval, ko je zapisal, naj se »stvari [namreč zavzemanja za sodobno glasbo] loti [z] verujočim besom in trmoglavostjo.«[12]

9 Peter Kušar, »Moč in nemoč vztrajnosti: Glasbena dogodivščina v gledališču Glej,« *Dnevnik* (24. 3. 1993).

10 Rajko Muršič, »Limpe Fuchs med izzivalnostjo in iskanjem ritma: Koncert, ki je bil 18. 3. v gledališču Glej,« *Republika* (23. 3. 1993).

11 Nataša Kričevcov, »Zrelost in profiliranost,« *Republika* (3. 6. 1993).

12 Peter Kušar, »Postbienalni glasbeni portreti: Koncert v Kosovelovi dvorani,« *Dnevnik* (4. 6. 1993).

Nedvomno posebnega pomena je bil koncert del Giacinta Scelsija v organizaciji društva Muzina. Koncert, naslovljen kot *Magični zvok Giacinta Scelsija*, kaže, kako močno so si v društvu prizadevali ne le za promocijo del članov skupine ali slovenskih skladateljev, temveč tudi za predstavitev najpomembnejših sodobnih glasbenih tokov v najbolj kvalitetni luči. Prav ta koncert je gotovo močno prispeval k oživitvi zanimanja za Scelsijevo ustvarjanje tudi pri nas. Marijan Zlobec je v napovedniku v *Delu* koncert označil celo kot enega »izmed vrhuncev letošnje ponudbe koncertov s sodobnim programom ali predstavitvijo manj znanih skladateljev.«[13] K organizaciji koncerta, ki ga je društvo pripravilo s Cankarjevim domom, jim je uspelo pritegniti tudi avstrijsko veleposlaništvo. Na koncertu v Slovenski filharmoniji, 23. septembra 1993, so gostili eno vodilnih zasedb za sodobno glasbo, ansambel Klangforum Wien pod vodstvom Beata Furrerja. Koncertni list, ki ga je pripravila Mirjam Žgavec, je prinesel delni vpogled tudi v Scelsijev miselni svet.[14]

Društvo Muzina si ni prizadevalo le za vzpostavitev povezav s tujimi glasbenimi tokovi, ampak je iskalo stika tudi z drugimi umetnostmi. Eden posebej pomembnih dogodkov je tako bila »zvočno-likovna inštalacija,« kot so jo najavljale napovedi v častnikih, z naslovom *Paralelni svetovi*. Društvo jo je pripravilo v sodelovanju z Galerijo Škuc 12. in 13. oktobra 1993. V projektu so sodelovali skladatelji in slikarji oz. kiparji v posebnih parih: Brina Jež Brezavšček ter Nataša Pičman, Marijan Šijanec in Gordana Novaković, Neville Hall in Nika Špan, poleg tega pa še skladatelj Bor Turel. Pred začetkom programa se je predvajala skladba *Water Music* Marijana Šijanca, nato pa se je vrtela, kot piše v koncertnem listu, »ambientalna glasba s traku« omenjenih skladateljev.[15] Instalacijo je spremljala okrogla miza o elektronski glasbi, ki jo je moderirala Nataša Kričevcov.

Med tujimi skladatelji je bil v ospredju tudi Erik Satie. Društvo je 18. februarja 1994 pripravilo koncert, posvečen njegovi glasbi. Na njem sta nastopila pianist Bojan Gorišek in slovita sopranistka Jane Manning, ki jo je *Delo* pomotoma najavilo kot »pop avantgardno pevko.«[16] Lapsus se je izkazal v kontekstu poudarjenega Satiejevega smisla za humor pravzaprav prav zabaven. Koncertni list je bil ustrezno duhovito okrašen in pospremljen s Satiejevo karikaturo in napisom: »Naprošamo cenjene obiskovalce, da med koncertom ne kadijo. Hvala.«[17] Tudi recepcijski odziv je bil temu ustrezen. Kritik Peter Kušar je v svoji oceni izpostavil prav porogljiv značaj Satiejeve glasbe, koncert pa označil kot »široko in zadeto predstavitev osebnosti, ki je svojo glasbeniško zabavnost,

13 M.[arijan] Z.[lobec], »Magični zvok Giacinta Scelsija: Klangforum Wien v Ljubljani,« *Delo* (23. 9. 1993): 6.

14 Mirjam Žgavec, »Giacinto Scelsi: Brez naslova,« koncertni list za koncert *Magični zvok Giacinta Scelsija* (Ljubljana: Cankarjev dom, 23. 9. 1993).

15 *Paralelni svetovi*, koncertni list (Ljubljana: Galerija ŠKUC, 12. in 13. 10. 1993).

16 »Cankarjev dom danes,« *Delo* (18. 2. 1994): 12.

17 »Se spominjate, gospod Satie?,« koncertni list (Ljubljana: Cankarjev dom, 18. 2. 1994).

duhovitost živela z lirsko čistostjo in občutljivostjo.« In pri tem seveda z ironijo zapisal, da lahko »strogo podpiše« Satiejeve besede: »Publika časti dolgočasje, ker je dolgočasje skrivnostno in globoko.«[18] Poleg pohvalnih besed za Goriška kot »izjemnega interpreta skladateljeve klavirske glasbe« je Kušar izpostavil Jane Manning, ki si je po njegovih besedah »prisvojila prizorišče kot velika odrska muzikalna osebnost.«[19]

Slika 2: Karikatura Satieja na koncertnem programu, 18. februarja 1994.

18 Peter Kušar, »Se spominjate, gospod Satie? Vsekakor uspela in dobrodošla prireditev,« *Dnevnik* (22. 2. 1994).

19 Prav tam.

V Rdeči dvorani Magistrata v Ljubljani je v organizaciji društva 25. aprila 1994 znova nastopil godalni kvartet Muzina. Poleg skladb slovenskih skladateljev Brine Jež Brezavšček in Igorja Majcna se je predstavil na Muzininih koncertih prvič Neville Hall, novozelandski skladatelj, ki se je leta 1993 preselil v Slovenijo. Posebne pozornosti so bile deležne tudi prve slovenske izvedbe skladb Arva Pärta in Zygmunta Krauzeja. Godalni kvartet Muzina je del sporeda s skladbami Pärta, Halla, Jež Brezavščkove in Majcna ponovil na koncertu 22. junija 1994 pred Galerijo Škuc. Poleg tega so izvajali še dela Igorja Štuheca in Julijana Strajnarja. Na koncert, ki so ga naslovili *Zvoki 20. stoletja na Starem trgu*, »stare ulice, nova mehkoba,« je društvo vabilo z oznako: »večernice, kakršnih niste vajeni.«[20]

Poseben dosežek društva je pomenila tudi priprava in izvedba koncerta cenjene švicarske pianistke Marianne Schroeder. Poleg skladb Mortona Feldmana in Giacinta Scelsija je na koncertu 14. decembra 1994 v dvorani Društva slovenskih skladateljev predstavila dela, ki so jih prav zanjo napisali Mia Schmidt, Dieter Schnebel, Maurizio Pisati ter Brina Jež Brezavšček. Znova se je zgodil lapsus v *Delu*, kjer so pomotoma najavili, da bo gostujoča umetnica nastopila med drugim z deli »Ježa in Brezavščka.«[21]

V *Razgledih* je tokrat kritiko prispeval Igor Cvetko, ki je poudarjal »pianistične bravure,« ki da jih pianistki »ne manjka,« med deli pa posebej izpostavil *Pet vzdušij* Brine Jež Brezavšček. O skladbi je zapisal, da bi »lahko zaradi svežine, neposrednosti in humornosti ostala na sporedu pianistke […] in bi tako dostojno promovirala mlajšo slovensko skladateljsko ustvarjalnost v svetu.«[22]

Po začetnem intenzivnem nastopu je delovanje društva za krajše obdobje vsaj navidez zamrlo. Zato pa je uspelo na začetku leta 1996 izpeljati daljnosežen založniški projekt, s katerim so razširili krog svojega delovanja. Tega leta je tako izšla pomembna izdaja dvojne kasete s posnetki godalnega kvarteta in elektronsko glasbo. Na kasetah je zazvenela glasba Brine Jež Brezavšček, Igorja Štuheca, Igorja Majcna, Bora Turela in Marjana Šijanca. Poleg posnetka s koncerta je bil večji del materiala posnet studijsko. Oblikovno estetsko izčiščen ovitek je dopolnilo krajše besedilo s predstavitvijo skladb in njihovih avtorjev. V *Dnevniku* je izid dvojne kasete pospremil zapis Milana Dekleve, ki je v naslovu prispevka izpostavil, da Muzina »rešuje naš zvok.«[23] Ocena je izšla ob predstavitvi kasete v Bežigrajski galeriji, ki jo je Dekleva označil kot »eno redkih zatočišč naše sodobne zvočne ustvarjalnosti.«[24] V tem času so namreč prav

20 Vabilo na koncert *Zvoki 20. stoletja na Starem trgu*, osebni arhiv Brine Jež Brezavšček (Ljubljana, 22. 6. 1994).

21 »Marianne Schröder prvič v Ljubljani,« *Delo* (14. 12. 1994): 11.

22 Igor Cvetko, »Zvočnost klavirja,« *Razgledi* (6. 1. 1995).

23 Milan Dekleva, »Muzina rešuje naš zvok: Koncert in izid dvojne kasete s skladbami naših sodobnih komponistov,« *Dnevnik* (16. 1. 1996).

24 Prav tam.

v Bežigrajski galeriji razmeroma pogosto prirejali koncerte sodobne in zlasti eksperimentalne glasbe. Predstavitev kasete je tako spremljal koncert godalnega kvarteta ter odlomkov elektronske in elektroakustične glasbe, objavljene na kasetah. Dekleva je pozitivno ocenil prispevek kvarteta Muzina, o pomenu društva pa vzneseno zapisal: »Nepriznavanje dela Muzine je hkrati zaničevanje domače sodobne zvočne ustvarjalnosti. Slovenija ostaja na umetniškem zemljevidu nove glasbe čudna bela lisa: kolikor vem, ni noben evropski narod tako brezbrižen do sodobnih zvočnih iskanj! […] Šele ko bomo odločno […] podprli novo glasbo, bo mogoče izstopiti iz začaranega kroga vnaprejšnjega zavračanja sodobne zvočnosti, ki ga gojimo v šolah in javnem življenju.«[25] Tudi ocena Rajka Muršiča v *Glasbeni mladini* je bila izrazito naklonjena. V njej je zapisal, da predstavljena »elektronska dela […] prinašajo zrele kompozicijske rešitve, ki so zamenjale radikalno igračkanje z zvočnimi elementi, kar je bila značilnost prvega vala elektronske glasbe.«[26]

Slika 3: Naslovnica izdaje dvojne kasete iz leta 1996.

25 Prav tam.

26 Rajko Muršič, »Muzina,« *Glasbena mladina* 26, št. 4 (1995/96): 29.

Lahko rečemo, da je društvo Muzina s privabljanjem različnih umetnikov in predstavitvijo velikih skladateljskih imen tako že zgodaj močno vplivalo na ozaveščanje slovenske javnosti o pomenu sodobne glasbe, obenem pa je njeno delo naznanjalo in spremljalo postopno spreminjanje estetskih norm.

Med vidnejšimi gosti društva je bil tudi ansambel za novo glasbo Opera Nova iz Züricha, sestavljen iz članov orkestra Züriške opere, usmerjen v izvedbo sodobnih del. Glasbeniki so nastopili na koncertu, ki ga je društvo Muzina pripravilo skupaj s Cankarjevim domom 11. junija 1996. Pri nas je premierno predstavil skladbe še dveh velikih predstavnikov sodobne glasbe, Klausa Huberja in Jean-Jacquesa Dünkija. Poleg tega se je ansambel, ki je pogosto izvajal kompozicije skladateljev različnih narodov, soočil tudi s slovensko glasbo in predstavil krstne izvedbe del Brine Jež Brezavšček in Igorja Majcna.

Društvo Muzina se je vključilo tudi v praznovanje Evropskega meseca kulture v Ljubljani. Dogodek, ki je potekal med 15. majem in 5. julijem 1997, je bil zelo široko zasnovan in je pritegnil vrsto vidnih domačih ter tujih glasbenikov in umetnikov. Društvo je v tem okviru 16. maja pripravilo koncert sodobne glasbe tedaj srednje in mlajše skladateljske generacije z naslovom *Zrcaljenja*. Dogodek je uvedla »pot obiskovalcev mimo improvizacijskih skupin skozi elektroakustični predor«:[27] majhne skupine glasbenikov in plesalk, razporejene na hodnikih in pred Cankarjevim domom, so izvajale večinoma svobodne improvizacije. Ob tem pa je v zaprtem in zatemnjenem prostoru sejne dvorane zvenela elektroakustična glasba, ki je oblikovala nekakšen zvočni tunel, katerega avtor je bil Bor Turel. Koncertni list je napovedoval sproščujoč dogodek z besedami, ki se zdijo nekakšno ustvarjalno vodilo avtorjev koncerta: »Povabljeni ste v svet čudovite lahkosti zvenenja sodobne glasbe.«[28] Koncertni list nakazuje morda nekaj dvoma, ki se je v teh letih porajal tudi sodelavcem in sopotnikom društva Muzina oz. kar sodobne glasbe pri nas nasploh: »Morda se je tudi danes – ko je iskanje srži nove umetnosti tistim, ki s(m)o tu že nekaj časa, spet tako težko ulovljivo – mogoče vprašati: čemu, ali sploh, zakaj, zakaj pa ne, nova glasba tudi ZAME?«[29] In odgovor, se zdi, je kar nekako samoumevno pritrjeval odločitvi za sodobno glasbo tudi prek aktivnega zavzemanja zanjo, prek njenega izvajanja in razširjanja. Tokrat v obliki »zrcaljenj« v smeri različnih slogov in generacijskih pristopov. Zvočni predor na začetku programa koncerta je namreč vodil najprej na koncert slovenske komorne glasbe. Na njem so se predstavili prvič nekateri avtorji, ki so pozneje postali najvidnejši skladatelji svoje generacije. Poleg Alda Kumarja in Igorja Majcna so tako nastopili skladatelji tudi tedaj najmlajšega rodu: Damijan Močnik, Dušan Bavdek in Larisa Vrhunc. V poznem večernem koncertnem terminu pa je v Ljubljani na povabilo društva

27 *Zrcaljenja: Koncert Društva Muzina s programom sodobne glasbe: Evropski mesec kulture v Cankarjevem domu; Ljubljana 15. maj – 5. julij 1997*, koncertni list (Ljubljana: Cankarjev dom, 1997).

28 Prav tam.

29 Prav tam.

Muzina znova nastopila pianistka Marianne Schroeder, tokrat ob znanem angleškem violončelistu indijskega rodu Rohanu de Saramu. Spet sta predstavila skladbe nekaterih velikanov (sodobne) glasbe – poleg Beethovna tudi Iannisa Xenakisa, Galine Ustwolskaje, Zoltána Kodályja in Benjamina Brittna, ob njih pa tudi noviteto Brine Jež Brezavšček in Urške Pompe.

Uroš Rojko je v kritiki dogodka v *Delu* izpostavil, da so bili trem dogodkom priča »maloštevilni zavezanci, prijatelji«[30] sodobne glasbe. Ob prizadevanju za trezno presojo predstavljenih del je med drugim zapisal: »Iskanja, premišljevanja, zrcaljenja, ki so temeljni pogoj umetniškemu ustvarjanju, so pri nas zapostavljeni na račun provincialnih potreb po 'povprečni, razumljivi' umetnosti, ne meneč se za silne premike, ki jih je medtem doživela Evropa. Vendar prav ta brezpogojna stremljenja po najvišjem atributu vodijo v osvobajajoči horizont družbene nadgradnje.«[31]

Že dober mesec za tem, 26. junija 1997, je sledil še en koncert Muzine v okviru Evropskega meseca kulture. Tokrat so ob sodelovanju RTV Slovenija, Francoskega inštituta (Institut Français) in Društva slovenskih skladateljev pripravili koncert elektroakustične glasbe, naslovljen kot *Glasovi, obrazi / Voix, Visages*. Na sporedu koncerta, ki je bil v Studiu 2 Televizije Slovenija, so bila dela Brine Jež Brezavšček, Bora Turela in Marijana Šijanca, poleg tega pa še skladbe argentinskega skladatelja Daniela Teruggija, ki je tedaj deloval v studiju GRM v Parizu, kjer se je med drugim izpopolnjevala tudi Brina Jež Brezavšček. Tudi tokrat je koncertni list postregel z vabilom: »Vabljeni ste v uposluh zvočne alkimije in vaša ušesa naj bodo v izvrstnem stanju.«[32] Posnetke s koncerta so pozneje predvajali tudi v televizijskem sporedu.

V letu 1998 je društvo Muzina obeležilo 70-letnico skladatelja Jakob Ježa z izvedbo njegovih samospevov na koncertu 25. novembra v Veliki dvorani Slovenske filharmonije. Na koncertu je med drugim nastopila priznana avstrijska mezzosopranistka Waltraud Hoffmann Mucher s pianistom Frankom Bernardom, ob njima pa vrsta uglednih slovenskih glasbenikov, kot so Branko Brezavšček, Stanko Arnold, Andrej Petrač, Eva Novšak Houška, Barbara Jernejčič Fürst in drugi. Kar nekaj skladb je doživelo krstno izvedbo ali pa prvo integralno koncertno izvedbo. V obsežnem koncertnem listu je bilo med drugim objavljeno tudi skladateljevo razmišljanje, ki je načelo nekaj značilnih poetoloških vprašanj. Koncert je tako imenoval kar »razgledna točka,« prek katere naj bi vpogled v njegovo delo predstavljal »preizkus umetniške vzdržljivosti in prepričljivosti, ki jo je pač prav od časa do časa 'na ogled postaviti,' da se utrjujemo v vrednotenju kot najvišji stopnji umetniško estetskega doživljanja.«[33]

30 Uroš Rojko, »Iskanja, premišljevanja: Multikulturna 'zrcaljenja',« *Delo* (23. 5. 1997): 8.

31 Prav tam.

32 *Glasovi, obrazi / voix, visages: Koncert društva MUZINA s programom elektroakustične glasbe*, koncertni list (Ljubljana: Radiotelevizija Slovenija, 26. 6. 1997).

33 *Večer samospevov Jakoba Ježa: Ob 70-letnici skladatelja in izidu zbirke Deset samospevov / Evening of*

Dejansko je tako Muzina uspela pripraviti enkraten glasbeni dogodek s pregledno koncertno antologijo skladateljevih samospevov, kakršne dotlej kljub bogati samospevni tradiciji pri nas še ni bilo. Pohvalno jo je ocenil tudi *Delov* kritik Bogdan Učakar, ki je koncert označil kot »odlično sestavljen avtorski večer z umetniško retrospektivnim pregledom« ter svojo oceno sklenil slavnosti primerno: »poslušali smo zares odlično glasbo slavljenca. Ad multos annos!«[34]

Konec istega leta je društvo Muzina pripravilo še poseben koncertni večer, na katerem so se sploh prvič pri nas na sporedu predstavila izključno dela skladateljic sodobne glasbe. Na sporedu koncerta, ki je potekal v Rdeči dvorani Mestne hiše 5. decembra 1998, so bila dela Larise Vrhunc, Brine Jež Brezavšček in Urške Pompe. Poleg tega so bile predstavljene še nekatere tuje avtorice: Jacqueline Fontyn, Yvonne Desportes, Violetta Dinescu, Betsy Jolas, Cathy Berberian, Karen Ervin in Eva Schorr. Nastopil je ansambel Artemis iz Stuttgarta, v katerem je bilo združenih devet instrumentalistk in dve pevki, ob domači glasbenici, Barbari Kresnik, ter edinem moškem na sporedu, »nepogrešljivemu« sopotniku prizadevanj društva, violinistu Branku Brezavščku.

Ambiciozni načrti in izjemen zagon sodelavcev društva je pripeljal do izpeljave prvega festivala sodobne glasbe, ki so ga poimenovali Muzifest. Festival je potekal med 29. novembrom in 2. decembrom 1999 v dvorani OŠ Prežihov Voranc. Program je bil izjemno široko zasnovan ter tako izvajalsko kot avtorsko raznolik. Na prvem koncertu je z deli ukrajinskih sodobnih skladateljev nastopil ukrajinski komorni ansambel Cluster. Predstavili so se ukrajinski skladatelji, med katerimi so nekateri že bili deležni precejšnjega mednarodnega priznanja: Ivan Nebesni, Virko Balej, Boguslav Schaeffer, Sergej Piljutikov in Leonid Hrabovski.

Drugi dan so se na koncertu komorne glasbe s svojimi deli predstavili najbolj »klasični« avtorji tega prvega obdobja Muzine: Igor Štuhec, Uroš Rojko, Igor Majcen, Brina Jež Brezavšček, Aldo Kumar in Neville Hall. Naslednji dan je bilo na sporedu predavanje skladatelja Igorja Majcna *O ritmu* s koncertom tolkalista Leeja Forresta Fergusona. Na sporedu so bila dela uveljavljenih skladateljev Miltona Babbitta, Davida Langa, Vinka Globokarja in Igorja Majcna.

Zadnji dan je prinesel še eno predavanje, tokrat priznanega muzikologa Rudolfa Frisiusa z naslovom *Humor v elektronski glasbi*. Zvečer je sledil še koncert izbranih sodobnih skladb v izvedbi violinista Wilhelma Walza in pianista Jean-Jacquesa Dünkija, ki ga je Muzina že gostila. Predstavljeni skladatelji so sodili že med klasike sodobne glasbe: Anton Webern, Igor Stravinski, Luciano Berio, poleg tega pa so bila izvedena dela Jean-Jacquesa Dünkija, Lukasa Langlotza in Heinza Holligerja. Festivalu na pot sta v obsežni programski knjižici spregovorili Mirjam Žgavec in Brina Jež Brezavšček, dejansko »gonilni sili«

Songs by Jakob Jež, koncertni list (Ljubljana: Muzina, 25. 11. 1998).

34 Bogdan Učakar, »Umetniški portret Jakoba Ježa,« *Delo* (4. 12. 1998): 8.

društva.[35] Prva z »željo, da bi zadihali v razširjenem prostoru […] Z idejami in vsebinami, ki niso v navadi.«[36] Predsednica pa z upanjem, da bi »obsežnejši dogodek […] Muzino le popeljal na pot večje zunanje videnosti, ki bo mogla za nekoliko enot le povečati krog poslušalcev sodobne glasbe. Odprtost, sproščenost, ustvarjalnost so tri dobre vile, ki naj pomagajo še temu detetu na pot, da bi raslo in se dalje razvijalo.« Mirjam Žgavec je začrtala znova estetske koordinate Muzine, ki »da se zaveda, kako pomembna je umetniška iskrenost, tista, ki jo danes še žene močna notranja potreba. Zato intenzivno išče tudi sama. Išče nove prostore, nove oblike in nove vsebine koncertov.«[37]

Slika 4: Naslovnica programske knjižice Muzifesta.

35 *Mednarodni festival nove glasbe: Muzifest*, koncertni list (Ljubljana: Muzina, 1999).
36 Prav tam.
37 Prav tam.

Festival je pospremila obsežnejša ocena v reviji *Dialogi* izpod peresa Franca Križnarja. Ta je v sklepu kritike poudaril, da so »večino slišanega (in videnega) davno pred LJUBLJANO 1999 prikazali številni festivali pri nas in v tujini« ter ošvrknil izbor del, v katerem je pogrešal najmlajšo »ustvarjalno in poustvarjalno generacijo.«[38] Oglasil se je Peter Kušar v *Dnevniku*, ki pa je vzneseno pisal predvsem o tretjem večeru festivala, na katerem je bil v ospredju ritem. Podrobneje se je posvetil predstavitvi izbranih del ter zapisal da so bile »vse štiri točke […] izvrstne.«[39]

Novo tisočletje je prineslo tudi nekaj večjih sprememb v delovanju društva, katerega vodenje je leta 2000 prevzel mladi muzikolog Gregor Pompe. Kljub zamenjavi vodstva je društvo naslednje leto pripravilo tokrat drugi festival Muzifest. Potekal je od 15. novembra do 12. decembra 2000 v Studiu 14 Radia Slovenija, ki je omogočal tudi arhivska snemanja, deloma pa še neposredne prenose koncertov na programu Ars. Programsko se je festival usmeril v predstavitev pomembnejših evropskih skladateljev druge polovice dvajsetega stoletja, ki v Sloveniji praviloma še niso bili predstavljeni, poleg tega pa seveda tudi sodobno slovensko ustvarjalnost. Prav tako je bil izvedbeno široko zastavljen, na njem so sodelovali med drugim Komorni zbor RTV Slovenija s solisti in komornimi glasbeniki. Na sporedu prvega koncerta so bila dela Larise Vrhunc in Brine Jež Brezavšček ter klasikov dvajsetega stoletja Alfreda Schnittkeja in Sofije Gubajduline. Na drugem koncertu so se predstavili sodobni kosovski skladatelji: Zequirija Ballata, Akil Koci, Rafet Rudi, Bashkim Shehu, Gjon Gjevelekaj in Mehdu Mengjiqi v izvedbi kosovskega ansambla Vivendi. Tretji koncert je bil posvečen avstrijski glasbi, med drugim s predstavitvijo del slovitega skladatelja Romana Haubenstock-Ramatija v izvedbi graškega Austrian Art Ensemble. Festivalsko dogajanje je prvič zaokrožala prireditev z naslovom Noč mladih slovenskih skladateljev z deli Gregorja Pirša, Klemna Vebra, Žige Staniča, Črta Sojarja Voglarja, Bojane Šaljič, Davida Beovića, Brine Zupančič, Gregorja Pompeta, Tadeje Vulc, Mihaela Paša in Vita Žuraja.

V *Delu* se je naklonjeno oglasil Jure Dobovišek, ki je poudaril pomen izpostavljenega cilja društva: »spodbujanja domače skladateljske produktivnosti, vendar individualne, dvigajoče se nad epigonsko podaljševanje izpraznjenih slogovnih usmeritev.«[40] V *Dnevniku* je svojo oceno znova objavil Peter Kušar in pohvalil Muzifest z opazko (razumljivo morda ne vsem bralcem), da program »vendarle presega kakšna podonavska sotočja tretjerazrednih ustvarjalnih potenc.«[41]

38 Franc Križnar, »Po prvem mednarodnem festivalu 'nove' glasbe Muzifest '99 Društva za vzpodbudo in napredek nove glasbe Muzina: (Drugi) Poskus diagnoze sodobne slovenske glasbene umetnosti,« *Dialogi* 35, št. 11-12 (1999): 109.

39 Peter Kušar, »Za ritem in o ritmu: Mednarodni festival nove glasbe,« *Dnevnik* (3. 12. 1999).

40 Jure Dobovišek, »Zoper izpraznjene slogovne usmeritve: Muzina – 2. mednarodni festival nove glasbe,« *Delo* (17. 11. 2000).

41 Peter Kušar, »Nekaj razmaha Muzifesta,« *Dnevnik* (18. 11. 2000).

Društvo je festival pripravilo tudi še naslednje leto. Njegovo izpeljavo je pospremila bogata programska knjižica. Bistvena programska novost je bila v tem, da je bil festival zasnovan »monotematsko,« kot je to imenoval predsednik Gregor Pompe.[42] V središču festivalskega dogajanja je bil namreč tokrat le en avtor, nemški skladatelj indijskega porekla, Clarence Barlow, ki sicer velja za enega vodilnih pionirjev računalniške glasbe. Festival je ponudil tri njegova predavanja, tri njegove nove skladbe, zvočno-vizualni projekt in ob koncu še okroglo mizo o vlogi sodobne glasbe v današnji družbi. Kot je bilo zapisano v programskem listu, v katerem je bilo objavljenih tudi nekaj esejističnih razmislekov samega Barlowa, razprava ob festivalu ni bila »namenjena temu, da bi dala dokončne odgovore […] Vendar pa želimo že s samim odpiranjem žgoče diskusije opozoriti na to, da je problematika resna in da zagnani ustvarjalci, ki se še nismo predali kapitalistično-liberalističnemu malodušju, še obstajamo. Zato mečemo v svet kost. Vabljeni ste, da jo zagrebite, glodate, ali tudi izvržete – vsakršno mnenje bo dobrodošlo.«[43]

Društvo Sirius A B

Z letom 2001 se je festival Muzifest sklenil, prav tako je zastalo tudi delo društva Muzina. Po izjemno aktivnih devetdesetih letih je postalo delovanje društva konec stoletja vse manj intenzivno. Postopoma zaradi različnih obveznosti njegovih članov, najverjetneje tudi zaradi spremenjenih pogojev za delovanje, drugih in drugačnih možnosti posameznih članov za uveljavitev in promocijo, morda pa tudi zaradi čisto preprostih razlogov osebne narave društvo ni več našlo poti za nadaljnje delovanje. Zaradi daljše prekinitve je postalo vprašljivo tudi referenčno navezovanje na nekdanje ime društva.

Zdelo se je smiselno, da tudi s spremembo imena društvo, ki ga je vodila (znova oz. še vedno) Brina Jež Brezavšček, v nekih novih razmerah in drugačnih družbenih konstelacijah, deloma pa tudi s prenovljenim članstvom dobi nov zagon in poživi svoje delovanje. Tako kot je dejstvo, da je novo poimenovanje označilo določeno prekinitev in nov začetek, pa je na drugi strani društvo tudi prek osrednjih članov ohranjalo enako zavzetost za sorodna, če že morda ne za enaka estetska načela, za odpiranje glasbe novemu, sodobnemu in izzivalnemu. S tem pa je ohranjalo temeljno rdečo nit, ki smiselno povezuje prizadevanja obeh društev in pozneje tudi društva Sozven v enovito celoto.

Nekdanji »gonilni sili« društva Muzina, Brina Jež Brezavšček in Mirjam Žgavec, sta se povezali v društvu z imenom Sirius A B. V letu 2003 je tako že v novem okviru, v založništvu društva Sirius A B, izšla zgoščenka *Pesmi in skladbe za otroke*, ki jih je izbrala, nekaj napisala, nekaj pa priredila Brina Jež Brezavšček. Na njej nastopa cela vrsta odličnih glasbenikov, ki so z Muzino

42 *Muzifest: Festival nove glasbe 2001*, koncertni list (Ljubljana: Muzina, 2001).

43 Prav tam.

deloma sodelovali tudi že v preteklih letih. Simpatičen je ovitek zgoščenke, za katerega je ilustracijo prispevala tedaj 7-letna Maruša Brezavšček, pozneje ena od stalnih sodelujočih glasbenic v projektih, ki jih je vodila njena mama, skladateljica Brina Jež Brezavšček. Na plošči sta se od družinskih članov poleg očeta Branka predstavila še brat Andrej in sestra Anja. Komentar je napisala Mirjam Žgavec, ki je glasbo označila kot »en sam zvočni objem, v katerem bo otroku varno in lepo. Tako je rahel, da zrahlja tudi najhujši pritisk in tako nežen, da pomiri drget.«[44] Na ploščo je v naklonjeni oceni v *Delu* opozoril Marijan Zlobec.[45]

Slika 5: *Pesmi in skladbe za otroke*, naslovnica.

44 Mirjam Žgavec, komentar k *Pesmi in skladbe za otroke*, Brina Jež Brezavšček, CD ([s. l.]: Sirius A B, 2003).

45 Marijan Zlobec, »Kako se piše glasbene pesmice za otroke,« *Delo* (23. 12. 2003).

Društvo Sirius A B je 19. decembra 2004 pripravilo koncert v Galeriji Equrna. Brina Jež Brezavšček, osrednje neumorno gibalo društva, je ostajala tudi odslej neomajna v zavzemanju za novo in neznano glasbo, za predstavitev njenih tokov, utiranje novih poti ter soočenja poslušalcev z oddaljenim in nepreizkušenim. Glasba se je na tem koncertu znova povezala z likovno umetnostjo ter hkrati s plesom, igro in sceno v ponujanju »zatočišč,« kot je bil naslovljen tokratni dogodek. V spremnem komentarju h »glasbeni predstavi« je osrednja avtorica projekta Brina Jež Brezavšček zapisala: »S predstavo 'zatočišča' želim podati izkustveno polje zatočišč, ki jih večina ljudi išče, da bi v njih našla zadovoljstvo, mir počitek. […] Predstavo vodijo doživljanja teh zatočišč skozi spremembe človeške družbe, ki se odražajo tudi v kulturni nadstavbi človeka skozi otroštvo, odraslost in zrelost.«[46] Pri izvedbi dela se je spet povezala z mezzosopranistko Barbaro Jernejčič, tolkalistom Francijem Krevhom, koreografinjo Jasno Knez, igralko Astrid Roenig ter scenografinjo in kostumografko Egle Leban. Tako se »glasbene prvine stapljajo z vizualnimi in gibnimi ter oblikujejo izrazno polje, ki je vodeno, čeprav vključuje elemente improvizacije in izbire izvajalcev.«[47]

Delo je bilo v predelani obliki z naslovom *Sanctuaries* kot »glasba s scenskimi elementi« predstavljeno tudi na zagrebškem Biennalu sodobne glasbe, 22. aprila 2007. Kritik Ognjen Tvrtković je v *Delu* o tokratni predstavitvi dela zapisal: »Izvedba v desetih slikah spada s svojo natančnostjo in doslednostjo v zgornjo kategorijo scenskih del, ki jih je ponudil letošnji bienale.«[48]

Tudi društvo Sirius A B je nadaljevalo s predstavitvijo tujih glasbenikov. Novembra 2005 je tako v organizaciji društva v Sloveniji gostoval ameriški flavtist Jeffrey Cohan, ki je pred tem v Washingtonu pripravil festival slovenske glasbe z naslovom Zvoki Slovenije. Že pred njegovim prihodom je bil v *Delu* obljavljen z njim pogovor. V njem je flavtist med drugim predstavil program washingtonskega festivala s slovenskimi deli. V intervjuju je izpostavil, da je bila zanj slovenska glasba »tako pomenljiva kot vse drugo, kar sem igral. Bilo je fantastično delati s slovenskimi glasbeniki.«[49] Po vrsti je tako naštel kvalitete posameznih slovenskih skladateljev, ki jih je izvajal v Washingtonu. Za glasbo Brine Jež Brezavšček zapisal, da je »najbolj rahločutna glasba, kar sem jih kdaj igral.«[50] Prelet po kvalitetah posameznih slovenskih skladateljev je sklenil z besedami: »Ali je vsa ta lepota povezana s slovenskim soncem? Zame je bilo veliko zadovoljstvo stati pod tem soncem in si ga pomagati deliti z drugimi.

46 *Zatočišča: Glasbena predstava*, koncertni list (Ljubljana: Galerija Equrna, 19. 12. 2004).

47 Prav tam.

48 Ognjen Tvrtković, »Glasbeni poligon: Štiriindvajseti glasbeni bienale v Zagrebu,« *Delo* (4. 5. 2007).

49 Jela Krečič, »Pod slovenskim glasbenim soncem: Pogovor z Jeffreyjem Cohanom,« *Delo* (25. 9. 2005).

50 Prav tam.

[…] Zelo sem bil počaščen, ko so me povabili v Ljubljano.«[51] Njegovo gostovanje v Sloveniji med 19. in 28. novembrom, katerega uresničitev se je po besedah *Delove* poročevalke Luise Antoni za marsikoga pred tem zdela »prej blaga želja kot pa pravi načrt,«[52] je bilo naslovljeno *Srečanja v glasbi.* Na njih je nastopil s petimi koncerti stare in nove glasbe. Flavtist je bil v središču »glasbenih srečanj« tako z mladimi flavtisti kot tudi na koncertu s profesionalnimi glasbeniki. »Srečanja« pa so hkrati predstavljala soočenja slovenske glasbe z ameriško. Po koncertu, na katerem je predstavil dela Alojza Ajdiča, Janija Goloba, Brine Ježˇ Brezavšček, Petra Kopača, Iva Petrića in Črta Sojarja Voglarja, je nastala tudi priložnostna fotografija solista z nekaterimi slovenskimi skladatelji.

Slika 6: Fotografija slovenskih skladateljev z Jeffreyjem Cohanom.

Društvo Sirius A B je leta 2008 pripravil festival Odstiranja. V okviru festivala je bila posebna pozornost posvečena delom Brine Ježˇ Brezavšček, ki je praznovala tridesetletnico svoje ustvarjalnosti. V tem okviru so bili med 3. in 22. septembrom pripravljeni štirje mednarodni komorni koncerti, na katerih so zvenela skladateljičina dela, ki v Sloveniji še niso bila izvedena. Na prvem koncertu v Studiu 14 RTV Slovenija se je predstavil nemški trio Camerata 21 z nekoliko nenavadno zasedbo: mezzosopran, flavta, mandolina. Na sporedu so bila poleg skladb slavljenke še dela različnih zlasti nemških skladateljev.

51 Prav tam.

52 Luisa Antoni, »Flavtist širokih obzorij: Jeffrey Cohan,« *Delo* (26. 11. 2005).

Na drugem koncertu v Jakopičevi dvorani ZZZS se je znova predstavil flavtist Jeffrey Cohan, tokrat s harfistko Tino Žerdin. Cohan je imel v letu 2007 tudi odmeven koncert s slovenskimi deli ob odprtju nove lokacije slovenskega veleposlaništva v Washingtonu. Tudi na koncertu v Ljubljani so največji del sporeda predstavljale slovenske skladbe Alda Kumarja, Primoža Ramovša, Aleša Strajnarja, Tomaža Bajžlja, Igorja Dekleve, Jaka Puciharja in Brine Jež Brezavšček. Tretji koncert, ki je bil v Kozinovi dvorani Slovenske filharmonije, sta oblikovala violinčelist Rohan de Saram in pianistka Marriane Schroeder, ki sta znova prišla v goste v Ljubljano. Poleg skladbe Brine Jež Brezavšček so bila na sporedu dela svetovnih sodobnih klasikov, Arthurja Honeggerja, Marianne Schroeder, Heinza Holligerja in Giacinta Scelsija. Zadnji koncert, pripravljen v Studiu 14 RTV Slovenija, je bil posvečen elektroakustični glasbi ob sodelovanju nemške pianistke Susanne Geiger. Poleg glasbe slavljenke so zazvenele še skladbe Bora Turela, Marijana Šijanca, nemških skladateljic Siegrid Ernst in Barbare Heller ter slovitega pionirja konkretne glasbe Pierra Schaefferja. Festival je bil široko predstavljen s številnimi napovedmi v dnevnem časopisju in na spletnih straneh SIGIC-a. V *Delu* je izšla ocena Jureta Dobovišека, ki je posebej izpostavil pomen Brine Jež Brezavšček v sodobni glasbi ter poudaril njeno vlogo organizatorke, »ki pomaga širiti življenjski prostor sodobni glasbi.«[53]

Posebej velja izpostaviti tudi koncert v okviru Glasbenega foruma v Münchnu 16. februarja 2009, saj ga je vsaj posredno vzpodbudil isti krog slovenskih navdušencev za sodobno glasbo. Na koncertu slovenskih glasbenikov je bil predstavljen precej obsežen izbor del slovenskih skladateljev, in sicer Marija Kogoja, Igorja Štuheca, Brine Jež Brezavšček, Urške Pompe, Larise Vrhunc, Jakoba Ježa in Tadeje Vulc. Kritičarka Gertrud Firnkees je v oceni koncerta, objavljeni v *Neue Musikzeitung*, poudarila, da je šlo celo za »enega najboljših koncertov v tej vrsti.«[54]

Društvo Sozven

Po letu 2008 se je tudi delovanje društva Sirius A B prekinilo. Nekdanji festival Odstiranja se je v novi izvedbi leta 2011 poimenoval Sozven. Tako se je odslej imenovalo tudi društvo, ki je z novim imenom, a starim organizacijskim jedrom, v katerem je bila osrednja osebnost znova Brina Jež Brezavšček, nadaljevalo prizadevanja prejšnjih društev in ga zato lahko upravičeno imamo za neposrednega dediča društev Muzine in Sirius A B. Z njima je bil povezan tudi prek podobnih estetskih usmeritev, zavzemanja za sodobno glasbo, prizadevanja za informiranje slovenske javnosti s svetovnimi tokovi ter predstavitev slovenskih glasbenih ustvarjalcev in poustvarjalcev.

53 Jure Dobovišek, »Kriki, šepeti in še kaj,« *Delo* (26. 9. 2008).

54 Gertrud Firnkees, »Stimmungsbilder und Seelenschilderungen: Musik Forum München im Februar mit slowenischen Musikern,« *Neue Musikzeitung* 58, št. 5 (2009): 51.

Ne nazadnje so bila vsem trem društvom skupna tudi sorodna organizacijska načela. Festival Sozven se je tako v koncertnem listu značilno predstavil kot »cikel koncertov s sodobno glasbo, ki prinaša vznemirljiva srečanja z abstraktnimi svetovi nove glasbe. Nastopali bodo vrhunski izvajalci in mladi slovenski interpreti ter predstavili izbor del svetovne literature. Zazvenela bodo dela slovenskih mladih ustvarjalk in ustvarjalcev, napisana posebej za Sozven.«[55]

Na prvem koncertu, 11. maja 2011, se je v Studiu 14 Radia Slovenija predstavila flavtistka Carine Levine. Kot uvod v koncert je bil z njo in skladateljem Jessem Ronneaujem pripravljen tudi predkoncertni pogovor. Flavtistka, ki redno sodeluje z nekaterimi najbolj zvenečimi imeni sodobne glasbe (Younghi Pagh-Paan, Brian Ferneyough), je prispevala nekaj premiernih slovenskih predstavitev skladb ter nekaj prvih izvedb tujih avtorjev, na njenem sporedu pa je bilo tudi delo Brine Jež Brezavšček. Sledil je koncert mladih skladateljev in skladateljic v izvedbi komorne glasbene skupine. Spored koncerta opozarja na to, kako si je tudi društvo Sozven močno prizadevalo za uveljavitev najmlajših skladateljev. Poleg Mortona Feldmana in Isabelle Mundry so se tako predstavili skladatelji Matej Bonin, Petra Strahovnik, Vasja Progar in Matthias Kranebitter. Jure Dobovišek je v spremni kritiki duhovito zapisal besede, ki bi lahko v veliki meri posrečeno opisale prizadevanje obravnavanih društev tudi v širšem časovnem obdobju: »V tem primeru se kaže, da je 'produkcija' […] mogoča tudi ob takih kazalcih materialne podpore, ki bi jih praktično lahko orisali s stavkom Pomagaj si sam in nihče ti ne bo pomagal, vsaj kaj dosti ne. Ampak zmeraj znova, čeprav ne redno in povsem kontinuirano, se vendar dogajajo krajši programski cikli, se sliši ugleden tuj gost in kaj naprednega, neznanega, novega, nastajajo povezovalne pobude, najsi se jim reče Muzina ali Sozven.«[56] Prizadevanje, ki je morda kljub majhni širši podpori in prepoznanju vendarle počasi in vztrajno premikalo meje našega spoznavnega umetnostnega sveta.

Nekoliko ob robu je bil kot tretji dogodek festivala Sozven pripravljen še koncert, ki je posrečeno povezal staro in sodobno glasbo. Na koncertu 25. junija 2011 v cerkvi sv. Florijana v Ljubljani so nastopili Domen Marinčič, Tomaž Sevšek in Maruša Brezavšček. Poleg del starih mojstrov (Giovanni Bassano, Riccardo Rognoni, Vincenzo Bonizzi, Arcangelo Corelli, Georg Muffat, Georg Friedrich Händel in Francesco Mancini) je bila na spored uvrščena tudi prva izvedba dela japonskega sodobnega skladatelja Fumihara Yoshimine v Sloveniji.

Društvo Sozven je v sodelovanju z RTV Slovenija 10. julija 2013 pripravilo koncert profesorja Klausa Langa z Umetniške univerze v Gradcu, ki je v

55 *Sozven*, koncertni list (Ljubljana: Sozven, 11.5. – 12. 5. 2011).

56 Jure Dobovišek, »Pomagaj si sam!« *Delo* (17. 5. 2011).

Ljubljani gostoval s svojimi študenti. Na koncertu komorne glasbe, ki ga je radio posnel in nato 30. oktobra 2012 v oddaji Arsov art atelje tudi predvajal, so predstavili skladbe profesorja Langa in nekaterih njegovih študentov. Poleg tega je bila na sporedu tudi skladba Brine Jež Brezavšček kot gostiteljice in hkrati gostje koncerta.

Dejansko se je v naslednjih letih delovanje društva Sozven postopoma nekoliko razredčilo, poleg tega pa je postalo vse izraziteje navezano neposredno na ustvarjanje skladateljice Brine Jež Brezavšček.

V letu 2017 je skladateljičin oče Jakob Jež prejel Župančičevo nagrado mesta Ljubljana. Ob tej priložnosti sta Maruša Brezavšček in Friederike Klek, obe študentki kljunaste flavte na salzburškem Mozarteumu, pripravili v Rdeči dvorani ljubljanskega Magistrata 27. junija koncert in ga posvetili slavljencu. Na sporedu koncerta dua Arai suono, kot sta se poimenovali, je ob stari glasbi (Georg Philipp Telemann, Hildegarda iz Bingna, Nathaniel Giles, Michel Pignolet de Monteclair, Jacques-Martin Hotteterre in François Couperin) znova zazvenelo tudi novejše glasbeno ustvarjanje: deli Jakoba Ježa in Brine Jež Brezavšček ter skladbi Giorgia Teddeja in Franca Donatonija. Koncert dua Arai suono je bil naslednji dan ponovljen še v sklopu Poletnih glasbenih srečanj v Muzeju občine Šenčur.

V istem letu je praznovala 60 let tudi skladateljica Brina Jež Brezavšček in svoj življenjski jubilej obeležila s koncertom v Rdeči dvorani Magistrata, 11. oktobra 2017. Kot poustvarjalci so nastopili družinski člani, flavtistka Anja Clift, izvajalka na kljunastih flavtah Maruša Brezavšček ter violinist Branko Brezavšček. Pridružili so se jim še harfistka Tina Žerdin, mezzosopranistka Barbara Jernejčič Fürst, izvajalka na kljunasti flavti Friederike Klek in člani godalnega kvarteta Dissonance. Tudi ta koncert, na katerem so bila izvedena samo dela slavljenke, je nastal v okviru društva Sozven. Koncertni list je poleg običajnih predstavitev skladb prinesel tudi precej izčrpen portret skladateljice s seznamom njenih najpomembnejših del ter diskografijo.[57]

Društvo Sozven je 7. julija 2018 pripravilo koncert flavtistke Anje Clift in harfistke Estelle Costanzo z naslovom *Prepleti*. Na sporedu koncerta so bila dela Ivana Fedela, Johanna Sebastiana Bacha, Jeana Crasa, Salvatorja Sciarrina, Astorja Piazzole in Brine Jež Brezavšček.

Društvo se je leta 2018 poklonilo devetdesetletnici skladatelja Jakoba Ježa z dvema koncertoma v novembru. Na prvem je bil predstavljen izbor Ježevih komornih skladb. Koncertni list je prinesel poleg predstavitve izvajalcev in skladb tudi dragocene življenjsko pristne in sočne skladateljeve avtobiografske skice.[58]

57 *Brina Jež Brezavšček: Koncert ob šestdesetem življenjskem jubileju skladateljice*, koncertni list (Ljubljana: Sozven, 11. 10. 2017).

58 *Jakobu Ježu ob 90. jubileju: Večer njegovih del*, koncertni list (Ljubljana: Sozven, 18. 11. 2018).

Posebnost pa je bil drugi skladateljski večer le dan pozneje, prav tako v Rdeči dvorani Magistrata v Ljubljani. Na njem so zazvenele krstne izvedbe skladateljev, ki so svoja nova dela posvetili slavljencu: Aldo Kumar, Uroš Rojko, Igor Štuhec, Brina Jež Brezavšček, Paul Clift, Marjan Šijanec, Bor Turel in Lojze Lebič. Poleg teh so zazvenela še dela Giorgia Nettija in Francesca La Licate. Osrednji izvajalec večera je bil cenjeni virtuoz na kljunastih flavtah, Antonio Politano, ob njem pa še vrsta slovenskih glasbenikov.

Društvo Sozven je znova pripravilo koncert iz cikla *Prepleti* 3. februarja 2019, spet v Rdeči dvorani ljubljanske Mestne hiše. Nastopili so trije mladi glasbeniki, Maruša Brezavšček, Anna Kiskachi in André Lislevand, združeni v Ansambel Stil-moderno. Zanimivo je, da je to pravzaprav prvi koncert Sozvena, v katerem ne najdemo sodobne glasbe. Na sporedu je bila tako glasba skladateljev, ki jih je tako ali drugače povezoval italijanski zgodnji barok. Mladi glasbeniki so predstavili dela Daria Castella, Giovannija Paola Cime, Bartolomea de Selma y Salaverde, Francesca Mancinija, Domenica Scarlattija, Johanna Sebastiana Bacha, Francesca Saveria Geminianija in Jean-Marie Leclaira.

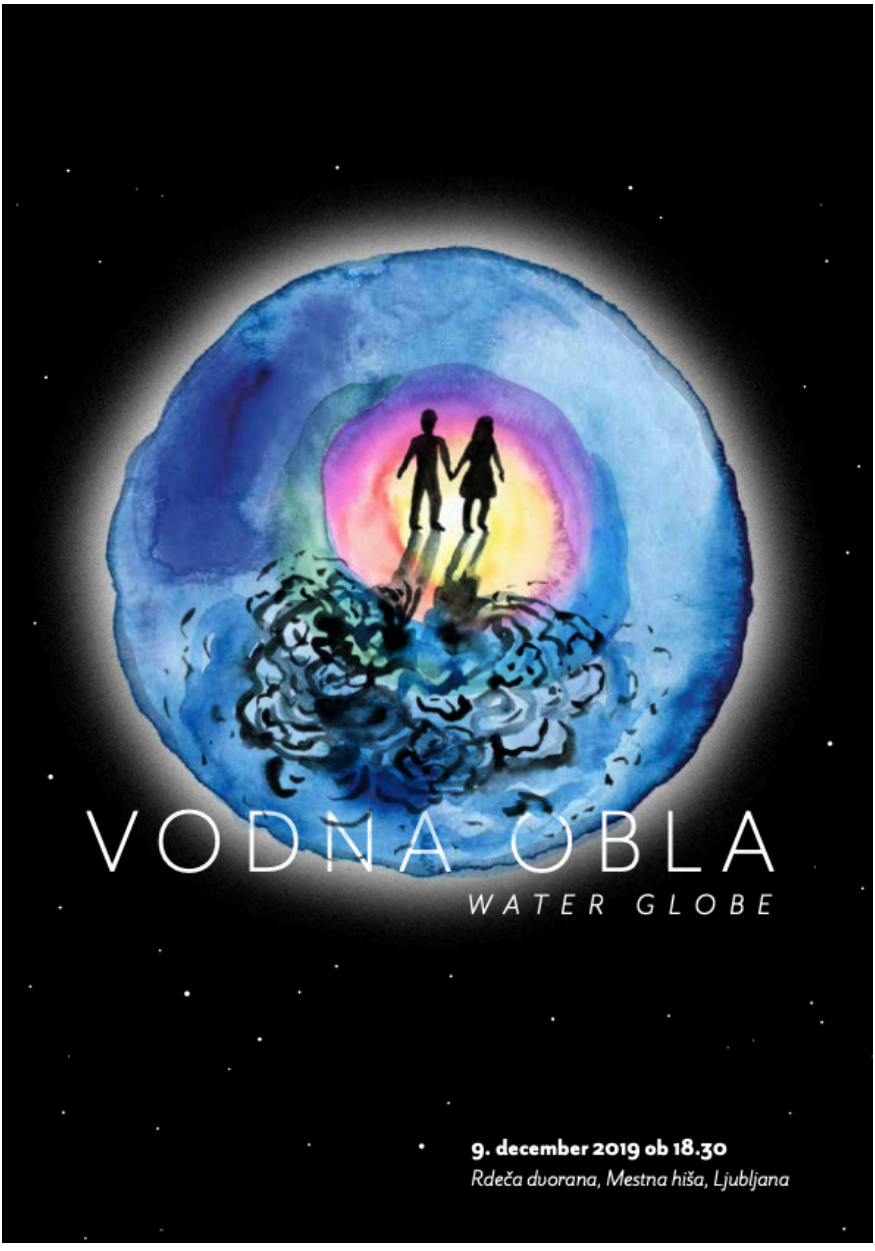
Maruša Brezavšček in Anna Kiskachi sta se kot Duo Spiritus movens v organizaciji društva Sozven predstavili tudi na koncertu v cerkvi sv. Jakoba 30. junija istega leta, tudi tokrat samo s programom stare glasbe. Na sporedu so bila dela skladateljev Francesca Saveria Geminianija, Johanna Sebastiana Bacha, Bartolomea de Selma y Salaverde, Antoina Forquerayja, Pierra Danicana Philidorja in Françoisa Couperina.

Konec leta 2019, 9. decembra, je bilo na ljubljanskem Magistratu predstavljeno novo glasbenoscensko delo Brine Jež Brezavšček z naslovom *Vodna obla*. Predstavo, namenjeno starejšim otrokom in odraslim, je soustvarilo več slovenskih glasbenikov pod vodstvom dirigenta Stevena Loyja. Predstava je vključevala »vizualni kontrapunkt« z umetniškimi akvareli Ane Baraga in vizualnimi dinamičnimi projekcijami Stelle Ivšek. Delo, ki ima poteze nekakšnega »sodobnega Gesamtkunstwerka,«[59] označujejo navzkriž povezani vodilni motivi, na katerih sloni glasbena večplastna slika. Besedilo, glasba in vizualni elementi se povezujejo po skladateljičinih besedah v »organsko celoto, ki nas resnično popelje v magični svet raziskovanja lastnih globin.«[60] Glasbeno-scensko kompleksno predstavo, namenjeno »starejšim otrokom, okvirno od desetega leta starosti dalje in odraslemu občinstvu,«[61] je uvedel pogovor njenih avtorjev z muzikologinjo Ivano Maričić.

59 *Vodna obla*, koncertni list (Ljubljana: Sozven, 9. 12. 2019).

60 Prav tam.

61 Prav tam.



Slika 7: Naslovnica koncertnega lista *Vodna obla*, 9. 12. 2019.

Naslednjega leta, natančneje 11. julija 2020, je društvo Sozven pripravilo koncert flavtistke Anje Clift in nemške akordeonistke Olivie Steimel. Koncert je znova prinesel soočenje »starejših in novejših del.«Poleg skladb Carlosa Seixasa in Franza Schuberta sta umetnici izvedli skladbe Keïke Harada, Johna Cagea in Brine Jež Brezavšček. Ivana Maričić je koncert pospremila s kritiko, objavljeno v spletnem *Odzvenu*. Koncert, ki je zazvenel že v pandemičnih pogojih, je ocenjevalka označila kot »svet zvočnih impresij različnih časov in prostorov« ter ga primerjala z »umetnostno oazo« sredi »materializiranih in mentalnih ograj,« ko se »peščica ljudi lahko (skoraj na skrivaj) dobi v majhni sobi, da bi poslušala koncert, ki navidezno ustvarja zatočišče in izpolnjuje duha.«[62] Marina B. Žlender pa je v reviji *Glasna* zapisala, da je večer »pomenil pravo pokoronsko osvežitev v družbi izrednih interpretk, polnih mladostnega elana in izvajalskega znanja.«[63]

Ob tridesetletnici ustanovitve društva Muzina je bil v Mestni hiši v Ljubljani 29. novembra 2021 pripravljen posebni dogodek s predavanjem, razstavo in slavnostnim koncertom komornih glasbenih del, prepletenih vizualno z živo projekcijo, ki jo je sooblikovala intermedijska umetnica Stella Ivšek. Na sporedu so bile predstavljene skladbe Giorgia Nettija, Luciana Beria, Franca Donatonija, Uroša Rojka in (seveda) Brine Jež Brezavšček. Slednja je tudi tokrat ob sodelovanju Mirjam Žgavec, zveste sodelavke pri društvenih prizadevanjih vse od začetkov Muzine, potrdila, kako živa je pravzaprav ideja povezovanja sodobne glasbe z drugimi umetnostmi, predvsem pa, kako pomembna in hkrati vitalna je potreba po predstavitvi in oživitvi sodobne glasbe v kontekstu stalno spreminjajoče se družbe. Prav ta prizadevanja so namreč na eni strani del teh sprememb in njihov odzven, na drugi strani pa v muzični tenkočutnosti hkrati kot ozvočevalec širšega kulturnega prostora njegova dragocena obogatitev in oplemenitev.

Viri in literatura

Antoni, Luisa. »Flavtist širokih obzorij: Jeffrey Cohan.« *Delo* (26. 11. 2005).

Barbo, Matjaž. »Glasba kot trpno-tvorni del slovenske družbe.« *Muzikološki zbornik* 27 (1991): 77–85.

Barbo, Matjaž. »Osnutek statuta skupine Pro musica viva kot poskus začrtanja njenih estetskih koordinat.« *Muzikološki zbornik* 32 (1996): 95–106.

Barbo, Matjaž. *Pro musica viva*. Ljubljana: Znanstveni inštitut Filozofske fakultete, 2001.

Brina Jež Brezavšček: Koncert ob šestdesetem življenjskem jubileju skladateljice. Koncertni list. Ljubljana: Sozven, 11. 10. 2017.

»Cankarjev dom danes,« *Delo* (18. 2. 1994): 12.

Cvetko, Igor. »Zvočnost klavirja.« *Razgledi* (6. 1. 1995).

62 Ivana Maričić, »Časovnosti,« *Odzven*, 16. 7. 2020, https://www.sigic.si/casovnosti.html.

63 Marina B. Žlender, »V časovnem zarisu: Anja Clift, flavta; Olivia Steimel, akordeon,« *Glasna* 51, št. 3 (2020): 47.

Dekleva, Milan. »Muzina rešuje naš zvok. Koncert in izid dvojne kasete s skladbami naših sodobnih komponistov.« *Dnevnik* (16. 1. 1996).
Dobovišek, Jure. »Kriki, šepeti in še kaj.« *Delo* (26. 9. 2008).
Dobovišek, Jure. »Pomagaj si sam!« *Delo* (17. 5. 2011).
Dobovišek, Jure. »Zoper izpraznjene slogovne usmeritve: Muzina – 2. mednarodni festival nove glasbe.« *Delo* (17. 11. 2000).
Firnkees, Gertrud. »Stimmungsbilder und Seelenschilderungen: Musik Forum München im Februar mit slowenischen Musikern.« *Neue Musikzeitung* 58, št. 5 (2009): 51.
Glasovi, obrazi / Voix, Visages: Koncert društva MUZINA s programom elektroakustične glasbe. Koncertni list. Ljubljana: Radiotelevizija Slovenija, 26. 6. 1997.
Jakobu Ježu ob 90. jubileju: Večer njegovih del. Koncertni list. Ljubljana: Sozven, 18. 11. 2018.
Klemenčič, Ivan. »Glasba in totalitarna država na Slovenskem.« V *Temna stran meseca*, ur. Drago Jančar, 321–333. Ljubljana: Nova revija, 1998.
Koter, Darja. *Slovenska glasba 1918–1991*. Ljubljana: Študentska založba, 2012.
Krečič, Jela. »Pod slovenskim glasbenim soncem: Pogovor z Jeffreyjem Cohanom.« *Delo* (25. 9. 2005).
Kričevcov, Nataša. »Zrelost in profiliranost.« *Republika* (3. 6. 1993).
Križnar, Franc. »Po prvem mednarodnem festivalu 'nove' glasbe Muzifest '99 Društva za vzpodbudo in napredek nove glasbe Muzina: (Drugi) Poskus diagnoze sodobne slovenske glasbene umetnosti.« *Dialogi* 35, št. 11–12 (1999): 106–109.
Kušar, Peter. »Godalni kvartet Muzina: Koncert v gledališču Glej.« *Dnevnik* (21. 1. 1992).
Kušar, Peter. »Moč in nemoč vztrajnosti: Glasbena dogodivščina v gledališču Glej.« *Dnevnik* (24. 3. 1993).
Kušar, Peter. »Nekaj razmaha Muzifesta.« *Dnevnik* (18. 11. 2000).
Kušar, Peter. »Postbienalni glasbeni portreti: Koncert v Kosovelovi dvorani.« *Dnevnik* (4. 6. 1993).
Kušar, Peter. »Se spominjate, gospod Satie? Vsekakor uspela in dobrodošla prireditev.« *Dnevnik* (22. 2. 1994).
Kušar, Peter. »Za ritem in o ritmu: Mednarodni festival nove glasbe.« *Dnevnik* (3. 12. 1999).
Maričić, Ivana. »Časovnosti.« *Odzven* (16. 7. 2020). https://www.sigic.si/casovnosti.html.
Marković, Tatjana, in Leon Stefanija, ur. *Ustanove, politika in glasba v Sloveniji in Srbiji 1945–1963*. Ljubljana: Znanstvena založba Filozofske fakultete, 2015.
Mednarodni festival nove glasbe: Muzifest. Koncertni list. Ljubljana: Muzina, 1999.
Muršič, Rajko. »Limpe Fuchs med izzivalnostjo in iskanjem ritma: Koncert, ki je bil 18. 3. v gledališču Glej.« *Republika*, 23. 3. 1993.
Muršič, Rajko. »Muzina.« *Glasbena mladina* 26, št. 4 (1995/96): 29.
Muzifest: Festival nove glasbe 2001. Koncertni list. Ljubljana: Muzina, 2001.
Muzina, društvo za vzpodbujanje in napredek sodobne glasbe Ljubljana. Koncertni list. Ljubljana: Gledališče Glej, 14. 1. 1992.
Muzina, društvo za vzpodbujanje in napredek sodobne glasbe Ljubljana. Koncertni list. Ljubljana: Gledališče Glej, 18. 3. 1992.
O'Loughlin, Niall. *Novejša glasba v Sloveniji*. Ljubljana: Slovenska matica, 2000.
Paralelni svetovi. Koncertni list. Ljubljana: Galerija ŠKUC, 12. in 13. 10. 1993.
Pompe, Gregor. *Zgodovina glasbe na Slovenskem IV*: *Glasba na Slovenskem med letoma 1918 in 2018*. Ljubljana: Znanstvena založba Filozofske fakultete in Založba ZRC, 2019.
Pompe, Gregor. »'Nove perspektive' v slovenski glasbi po letu 1945.« V Roger Sutherland, *Nove glasbene perspektive*, 247–262. Ljubljana: LUD Šerpa in Slovensko muzikološko društvo, 2009.

Pompe, Gregor. *Skice za zgodovino slovenske glasbe 20. stoletja*. Ljubljana: Znanstvena založba Filozofske fakultete, 2019.
Rojko, Uroš. »Iskanja, premišljevanja: Multikulturna 'zrcaljenja'.« *Delo* (23. 5. 1997).
Se spominjate, gospod Satie? Koncertni list. Ljubljana: Cankarjev dom, 18. 2. 1994.
Snoj, Jurij, in Gregor Pompe. *Pisna podoba glasbe na slovenskem / Music in Slovenia through the Aspect of Notation*. Ljubljana: Založba ZRC, 2003.
Sozven. Koncertni list. Ljubljana: Sozven, 11. – 12. 5. 2011.
Stefanija, Leon. »Glasbena ustvarjalnost in poustvarjalnost na Slovenskem v 20. stoletju: Dosežki in poti naprej.« *De musica disserenda* 6, št. 1 (2010): 9–19.
Stefanija, Leon. *Prispevek k analizi institucij slovenske glasbe 20. stoletja*. Ljubljana: Znanstvena založba Filozofske fakultete, 2010.
Tvrtković, Ognjen. »Glasbeni poligon: Štiriindvajseti glasbeni bienale v Zagrebu.« *Delo* (4. 5. 2007).
Učakar, Bogdan. »Nov brstič komorne glasbe.« *Delo* (20. 1. 1992).
Učakar, Bogdan. »Umetniški portret Jakoba Ježa.« *Delo* (4. 12. 1998).
Večer samospevov Jakoba Ježa: Ob 70-letnici skladatelja in izidu zbirke Deset samospevov / Evening of Songs by Jakob Jež. Koncertni list. Ljubljana: Muzina, 25. 11. 1998.
Vodna obla. Koncertni list. Ljubljana: Sozven, 9. 12. 2019.
Vrhunc, Larisa. *Vplivi spektralne glasbe na slovensko kompozicijsko ustvarjalnost zadnjih desetletij*. Ljubljana: Znanstvena založba Filozofske fakultete, 2018.
Zatočišča: *Glasbena predstava*. Koncertni list. Ljubljana: Galerija Equrna, 19. 12. 2004.
Zlobec, Marijan. »Kako se piše glasbene pesmice za otroke.« *Delo* (23. 12. 2003).
Z.[lobec], M.[arijan]. »Magični zvok Giacinta Scelsija: Klangforum Wien v Ljubljani.« *Delo* (23. 9. 1993).
Zrcaljenja: Koncert Društva Muzina s programom sodobne glasbe; Evropski mesec kulture v Cankarjevem domu; Ljubljana 15. maj – 5. julij 1997. Koncertni list. Ljubljana: Cankarjev dom, 1997.
Žgavec, Mirjam. »Giacinto Scelsi: Brez naslova.« Koncertni list za *Magični zvok Giacinta Scelsija*. Ljubljana: Cankarjev dom, 23. 9. 1993.
Žgavec, Mirjam. »O Muzini.« V *Muzina i. dr., tridesetletnici ob rob*, [ur. Brina Jež Brezavšček], 4–6. Ljubljana: Sozven, 2021.
Žlender, Marina B. »V časovnem zarisu: Anja Clift, flavta; Olivia Steimel, akordeon.« *Glasna* 51, št. 3 (2020): 47.

SUMMARY

"A World of Wonderful Lightness of Sound of Contemporary Music": Contemporary Music Efforts in the Three Decades since the Founding of the Muzina Society

The article examines the activities and influence that the Slovenian society for new music Muzina had on the perception of contemporary music. The aesthetic coordinates of the society are connected with the contemporary international trends. At the same time, the activities of the society are presented in the context of the development of music in Slovenia in recent decades.

It may come as a surprise that the study of the phenomenon of composers' associations is rather marginal, given the growing literature on contemporary music in Slovenia. The treatment of the Muzina Society, therefore, seems to be an opportunity to broaden musicological interest in a phenomenon that directly promoted awareness of the importance of contemporary music in Slovenia and, at the same time, significantly expanded knowledge of contemporary music abroad, promoted contemporary music creation, and strengthened performers' interest in contemporary Slovenian music, thus leaving a lasting mark on its reception. On the one hand, the article connects the aesthetic coordinates of the Muzina Society and its leading members with contemporary international trends; on the other hand, it places the Society's activities in the context of the development of music in Slovenia in recent decades. Through an insight into contemporary critical and essayistic writings, commentaries and forecasts, the article traces the history of the Society, important musical events, concerts, festivals and performances of compositions by its leading members, thus setting important milestones in the modern history of reception.

The first concert of the Muzina Society was held in January 1992, followed by a series of concerts and festivals lasting several days, to which foreign artists were invited and Slovenian and foreign composers were presented. The Society organized solo concerts with works by composers Makso Pirnik, Giacinto Scelsi, Erik Satie, Jakob Jež, Clarence Barlow and Brina Jež Brezavšček. In addition, there is music by many Slovenian composers, Igor Štuhec, Aldo Kumar, Marija Kogoj, Uroš Rojko, Igor Majcen, Damijan Močnik, Dušan Bavdek, Larisa Vrhunc, Urška Pompe, Gregor Pirš, Klemen Veber, Žiga Stanič, Črt Sojar Voglar, Bojana Šaljič, David Beović, Brina Zupančič, Gregor Pompe, Tadeja Vulc, Mihael Paš, Vito Žuraj, and others. They have performed works by many foreign composers, including Fabio Nieder, Franz Richter Herf, John Cage, Michel Redolfi, Michel Pascal, Pascal Dusapin, Željko Brkanović, Morton Feldman, Klaus Huber, Jean-Jacques Dünki, Iannis Xenakis, Galina Ustwolskaya, Zoltán Kodály, Benjamin Britten, Jacqueline Fontyn, Yvonne Desportes, Violetta Dinescu, Betsy Jolas, Cathy Berberian, Karen Ervin, Eva Schorr, Milton Babbitt, David Lang, Anton Webern, Igor Stravinsky, Luciano Berio, Heinz Holliger, Alfred Schnittke, Roman Haubenstock - Ramati, Franco Donatoni, Arvo Pärt, Zygmunt Krauze, etc. Numerous foreign artists also performed at the concerts: the CIRM Center from Paris, the Ensemble Klangforum Wien, the Ensemble Opera Nova from Zurich, the Ensemble Artemis from Stuttgart, the Austrian Art Ensemble from Graz, the soprano Jane Manning, the pianist Marianne Schroeder, the mezzo-soprano Waltraud Mucher Hoffmann, the flutists Jeffrey Cohan and Carine Levine, etc.

The Muzina Society was led by composer Brina Jež Brezavšček, except for a short period in 2000–2001, when the Society was led by Gregor Pompe. Later, the Society was renamed Sirius A B, and a few years later Sozven, with the help of its central members, maintaining the basic aesthetic principles of commitment to the new, modern and challenging in music.

O AVTORJU

MATJAŽ BARBO (matjaz.barbo@ff.uni-lj.si) je profesor za muzikologijo na Oddelku za muzikologijo Filozofske fakultete Univerze v Ljubljani. Raziskovalno se posveča glasbi od 18. stoletja do danes ter različnim glasbenoestetskim temam. Objavil je več knjižnih del, znanstvenih člankov, poljudnih besedil in prevodov s področja muzikologije.

ABOUT THE AUTHOR

MATJAŽ BARBO (matjaz.barbo@ff.uni-lj.si) is Professor of Musicology at the Department of Musicology, Faculty of Arts, University of Ljubljana. He conducts research on music from the 18th century onwards and on various music-aesthetic topics. He has published several books, scientific papers, articles, popular texts, and translations in the field of musicology.

Jurij Snoj, ur.
Aleš Nagode in Nataša Cigoj Krstulović, ur.
Gregor Pompe, ur.

Zgodovina glasbe na Slovenskem, knjige 1, 3 in 4

Zgodovina glasbe na Slovenskem 1: *Glasba na Slovenskem do konca šestnajstega stoletja*, uredil Jurij Snoj. Ljubljana: Založba ZRC, ZRC SAZU, 2012. 570 strani. 33,30 €. ISBN: 978-961-254-432-4.

Zgodovina glasbe na Slovenskem 3: *Glasba na Slovenskem med letoma 1800 in 1918*, uredila Aleš Nagode in Nataša Cigoj Krstulović. Ljubljana: Znanstvena založba Filozofske fakultete in Založba ZRC, 2021. 602 strani. 29,90 €. ISBN: 978-961-06-0529-4.

Zgodovina glasbe na Slovenskem 4: *Glasba na Slovenskem med letoma 1918 in 2018* [*Music in Slovenia from the year 1918 to 2018*], uredil Gregor Pompe. Ljubljana: Znanstvena založba Filozofske fakultete in Založba ZRC, 2019. 680 strani. 29,90 €. ISBN: 978-961-06-0289-7.

Nove izdaje *Zgodovine glasbe na Slovenskem* predstavljajo mogočen dosežek slovenskih muzikologov več generacij. Ti so nove edicije marljivo ustvarjali več kot desetletje. Prva knjiga, ki jo je uredil Jurij Snoj in zajema obdobje pred koncem šestnajstega stoletja, torej do »nedvoumne preusmeritve slovenskih dežel h katoliškemu jugu« (str. xi), je izšla leta 2012. Leta 2019 ji je z vsebinskim sklopom o glasbi dvajsetega in enaindvajsetega stoletja sledila četrta knjiga, ki jo je uredil Gregor Pompe. Tretja knjiga je izšla leta 2021 pod uredniškim vodstvom Aleša Nagodeta in Nataše Cigoj Krstulović in zajema obdobje od ustanovitve ljubljanske Filharmonične družbe (1794) do razpada avstro-ogrske monarhije. Izdaja je dostopna tako v tiskani kot v elektronski obliki (DOI:/10.4312/9789610605270). Zadnja izdaja, ki obravnava glasbo sedemnajstega in osemnajstega stoletja, od prihoda jezuitov v Ljubljano do ustanovitve Filharmonične družbe, pa bo izšla predvidoma čez leto dni. »Vrzelim« dveh stoletij navkljub menimo, da je še pred dopolnitvijo prihajajoče druge knjige možno pri treh knjižnih izdajah izpostaviti obseg, cilje in predviden vpliv te nove zgodovine.

Vsako od teh obsežnih knjig z več kot 500 stranmi odlikuje podrobno raziskana vsebina z izčrpnimi prvotnimi viri, opremljenimi s podrobno bibliografijo in kazalom. Prva izdaja, ki zajema najzgodnejša glasbena obdobja pod

uredniškim peresom Jurija Snoja, sicer izstopa po oblikovni plati, saj je nastajala v začetnem obdobju, ko je uredniška ekipa še postavljala ustrezne smernice in preizkušala metodologijo, ki bo veljala za celotno zbirko in sledeče avtorje. Slednje pa nikakor ne zmanjšuje kakovosti prve knjige, ki zajema zgodovino glasbe v današnji Sloveniji od prazgodovine do konca šestnajstega stoletja. V tej izdaji Snoj deluje v dvojni vlogi urednika in glavnega sodelavca, saj je avtor približno polovice besedil, medtem ko so preostala besedila napisali Aleš Nagode, Katarina Šter, Darja Koter, Metoda Kokole, Marc Desmet, Klemen Grabnar, Alenka Bagarič in Marko Motnik.

Uvodoma Snoj primerno naslavlja izziv, s katerim se je srečala ekipa piscev pri pripravljanju tovrstne zgodovine. Ujeta je bila med dvema skrajnostma – na eni strani je bilo namreč treba zajeti obsežno časovno obdobje tisočletij in na drugi osredotočiti se na skrajno omejeno geografsko območje. Snoj sprva izpostavlja pomembno vprašanje, povezano s samim pojmom glasbe: »Če pojmujemo zgodovino glasbe po merilih devetnajstega stoletja in prve polovice dvajsetega stoletja, le-ta obsega zgolj komponirana glasbena dela ali vsaj z glasbenim zapisom fiksirana dela individualnih poimensko znanih (ali poimensko neznanih) skladateljev, med katerimi so nekateri bolj pomembni, drugi manj« (str. xi–xii). Če pa bi ubrali tak pristop, bi bilo treba celotno glasbeno ustvarjanje zavreči, torej obravnavati »bodisi kot predstopnjo kompozicijskega ustvarjanja ali pa kot nekaj, kar je v posameznih časovnih obdobjih obstajalo sočasno s kompozicijskim snovanjem« (str. xii).

Snoj poudarja, da so avtorska glasbena dela le vrh veliko večje ledene gore. V starem in srednjem veku namreč skladatelj ni obstajal kot pojem, ki ga poznamo od šestnajstega stoletja dalje. Če upoštevamo arheološke ostanke, ki pričajo o navzočnosti glasbe, potem »rekonstruirane raznovrstne zvočne dogodke razumemo kot glasbo«; to so »zvoki ob delu, zvočna sporočila, zvoki, povzročeni z določenim namenom, npr. za vzbujanje strahu. Podobno se pri vpogledu v vsakdanje življenje (ljudi) določene srednjeveške dežele […] razkrijejo različne plasti glasbenega: petje nešolanega in nepismenega prebivalstva, instrumentalna igra za ples, petje latinskih obrednih besedil« (str. xii). Zato Snoj izpostavlja, da so skoraj v vseh obdobjih glasbene zgodovine »obstajale različne zvrsti glasbe, ki so imele v realnem vsakdanjem življenju svoje mesto in svojo funkcijo, vezano na ustroj družbe. Glasbena zgodovina se tako kaže kot sočasni splet raznovrstnih glasbenih zvrsti, plasti, praks, tokov, ki so se iz obdobja v obdobje razvijali, spreminjali in preobražali, pri čemer za nobenega od njih ni mogoče reči, da bi bil načeloma pomembnejši od drugih« (str. xiii).

Posledično so se uredniki te zgodovine odločili pisati o vseh glasbah, ki so skozi zgodovino obstajale na ozemlju današnje Slovenije, ter o družbenih in kulturnih okoliščinah, ki so botrovale nastanku določenih zvrsti, stilov in trendov. Kar zadeva geografske meje, so uredniki zavrnili zastarelo pojmovanje narodne umetnosti, saj bi v obratnem primeru kot del slovenske glasbene

zgodovine npr. do konca osemnajstega stoletja »lahko obravnavali zgolj peščico pisnih omemb slovenskega petja ter ducat pesmaric s preprostimi slovenskimi pesmimi, namenjenimi udeležbi slovensko govorečega življa pri bogoslužju, in nič več kot to. Vse ostalo bi bilo treba razumeti kot tuje: tako petje latinskih liturgičnih besedil znotraj gregorijanskega korala, italijansko opero v Ljubljani, repertoar kompozicij ljubljanske stolnice itd. Te vrste zgodovina bi spregledala domala vse, kar je obstajalo pred drugo polovico devetnajstega stoletja, in s tem bi spregledala tudi tisto osnovno, ki se je v drugi polovici devetnajstega stoletja razvila v slovensko nacionalno glasbeno kulturo« (str. xiv). Pisci so zato zaobjeli vse, kar je obstajalo v slovenskem kulturnem prostoru, in pri tem upoštevali, da so bile vse glasbene zvrsti in prakse del mnogo širših evropskih tokov. Ti so se širili in dosegali Slovenijo onkraj njenih etničnih in jezikovnih predpostavk.

Prvo poglavje prve knjige vsebuje Snojev pregled glasbenih zvrsti na Slovenskem do konca šestnajstega stoletja, med drugim (po vrstnem redu pojavljanja) ljudske plese, gregorijanski koral, *minnesang*, glasbo mestnega plemstva, polifonijo, »glagoljaško« petje, pesmi slovenske reformacije, »lahko« italijansko glasbo in reprezentančno glasbo. Naslednje poglavje, »Arheološka pričevanja o glasbi« Aleša Nagodeta, pa nas popelje v veliko bolj oddaljeno preteklost, k najstarejšim virom glasbe na slovenskem ozemlju. Nagode razkriva dokaze o obstoju glasbe, ki izvirajo iz starejše in srednje kamene dobe, mlajše kamene dobe, časa velikih antičnih kultur, poganske antike in končno krščanske antike. Obenem Nagode na podlagi preučevanja haploskupin in zgodovinskih zapisov o selitvah, osvajanjih in asimilacijah razpravlja o izvoru današnjega slovenskega ljudstva, kakršno je obstajalo vse do prihoda slovanskih plemen v sedmem stoletju našega štetja. Ta so si podredila domače prebivalstvo in vzpostavila svojo kulturo in jezik kot prevladujoča. Kljub temu so nekaj stoletij zametki staroselske kulture še preživeli v oddaljenih regijah.

Naslednje poglavje, katerega glavnino je napisal Jurij Snoj, raziskuje gregorijanski koral in enoglasje. Snoj odpira razpravo z obsežnim pregledom vpliva gregorijanskega korala v evropski zgodovini in nato preide na slovenske vire. Snoj opozarja, da se je gregorijanski koral na Slovenskem širil sočasno s krščanstvom in krščansko liturgijo, nato opredeli štiri vrste virov: 1. koralni rokopisi in druga zapisana glasba, 2. zapiski (marginalije) v koralni liturgiji, 3. literarni viri, in 4. tiskani korali. Snojev izčrpni vpogled v ohranjene vire navaja tudi njihova trenutna nahajališča. Avtor nadaljuje obravnavo bogoslužnega petja na podlagi rokopisov adiastematskega obdobja, pri čemer podaja vzporedni pregled pokristjanjevanja Slovanov, nato pa se osredotoči na bogoslužno petje v župnijskih cerkvah do konca štirinajstega stoletja. Čeprav odlomkom adiastematskih nevm pogosto ni mogoče določiti mesta uporabe in nastanka, obstajajo izjeme, med njimi t. i. Kamniški gradual, najverjetneje iz druge polovice štirinajstega stoletja. Gradual vsebuje dvajset folijev, od tega štiri hranijo v Ljubljani, štiri v frančiškanskem samostanu v Nazarjah, dvanajst pa v kamniškem

frančiškanskem samostanu. Naslednje podpoglavje, posvečeno koralnim rokopisom, najdenim v slovenskih samostanih, odlikuje celovit pregled samostanov na Slovenskem in v njih ohranjenih rokopisov.

Katarina Šter s pregledom verskih skupnosti v srednjeveški Sloveniji odpre obsežno obravnavo koralnih rokopisov slovenskih kartuzijanov. Izvemo, da benediktinci na slovenskem ozemlju niso pustili močnejšega pečata in da sta bila na Slovenskem najpomembnejša monastična reda dvanajstega stoletja cistercijanski in kartuzijanski, medtem ko so se v trinajstem stoletju pojavili frančiškani, dominikanci in avguštinci. Avtorica najprej opiše različne liturgične tradicije teh redov in se nato osredotoči na izrazito kontemplativno naravnanost kartuzije in njene liturgije z mašnimi in drugimi obredi. Ob tem poudarja, da so »kartuzijani vedno gojili izključno in samo gregorijanski koral. Ta je bil in do danes ostal eden glavnih temeljev kartuzijanske liturgije, ki na poseben način osmišlja življenje menihov« (str. 149). Poglavje o gregorijanskem koralu in enoglasnem petju zaključuje Snojev esej o liturgičnem petju diastematskih rokopisov v obdobju, ki sega od srednjega veka do šestnajstega stoletja. Tudi tokrat avtor podaja podrobne podatke o razpoložljivih rokopisih in krajih, kjer so hranjeni. Poglobljeno analizo najpomembnejših rokopisov dopolnjuje še izbor pisnih pričevanj o cerkvenem zborovskem petju.

Drugo polovico prve knjige zaznamuje interdisciplinarnost. Darja Koter piše o likovnih upodobitvah glasbil in glasbenih prizorov ter išče vizualne upodobitve partitur, glasbil, ansamblov in drugih izvajalcev, medtem ko Jurij Snoj navaja podatke o ustnem izročilu v pisnih pričevanjih o glasbi, pri čemer izraz »ustno izročilo« zajema štiri sklope, katerih meje se venomer prepletajo, in katerih zvrsti si lahko razlagamo na različne načine: 1. slovenska ljudska glasba; 2. petje in igranje v neslovenskih skupnostih (nemški, italijanski, judovski); 3. glasba višjih slojev, zlasti mestnega plemstva; in 4. dejavnost poklicnih mestnih glasbenikov. V naslednjem poglavju Metoda Kokole išče pričevanja o plesu in skuša na podlagi razpoložljivih umetniških in literarnih virov, ki segajo v trinajsto in štirinajsto stoletje, rekonstruirati zgodovino plesa na Slovenskem. Kokole poudarja, da je zgodovina plesa na Slovenskem neločljiva od zgodovine sosednjih držav, od koder so pronicali številni vplivi.

Naslednje poglavje Jurija Snoja je posvečeno trem stoletjem polifonije (od štirinajstega do šestnajstega stoletja). Med različnimi viri, ki jih je Snoj preučil, so ohranjeni glasbeni primeri srednjeveške polifonije, pa tudi podatki o večglasnih sestavih ter o pričevanjih o izvedbah večglasne glasbe, pa tudi omembe obstoja večglasnih skladb in glasbenih zbirk. Avtor podaja informacije tako o katoliški kot protestantski (reformistični) večglasni tradiciji. V naslednjem poglavju so obravnavani nekateri vodilni skladatelji polifone glasbe šestnajstega stoletja: tako Marko Motnik piše o Georgu Prennerju, Marc Desmet pa o Jacobusu Handlu Gallusu, »biseru evropskega glasbenega humanizma« (str. 391). Nato Klemen Grabnar ponudi svoj pregled pričevanj o glasbi v izobraževalnih ustanovah od konca osmega stoletja dalje, Alenka Bagarič pa iz skladateljskih

posvetil razbira, katere glasbene zvrsti so se izvajale v plemiških salonih v dobi humanizma. Večplastni sliki srednjeveške glasbene kulture Darja Koter doda še raziskovanje konstrukcije glasbil, kar ji je bistveno otežilo dejstvo, da je »cerkev skladno z antično tradicijo glasbila označila kot medij poganstva in jih proglasila za satanove sle« (str. 443); toda kljub odklonilnemu odnosu Cerkve, ki je zavrl razvoj instrumentov in hkrati sprožil vzpon vokalne glasbe, se je instrumentalna glasba le uspela obdržati.

V zadnjem poglavju Jurij Snoj obravnava glasbo slovenske reformirane cerkve. V šestnajstem stoletju je bilo Sveto pismo v skladu s cilji protestantov namreč prevedeno v slovenski jezik, v želji narediti svetopisemsko besedilo dostopno in razumljivo vsem vernikom. Snoj podaja podrobne sezname slovenskih pesmaric in obravnava vlogo glasbe protestantskega obredja, ki jih slikovito ponazarjajo posamezni primeri.

Tretjo knjigo, *Glasba na Slovenskem od 1800 do 1918*, sta uredila Aleš Nagode in Nataša Cigoj Krstulović. Med avtorji prispevkov so Primož Kuret, Špela Lah, Darja Koter, Nejc Sukljan, Lidija Podlesnik Tomášiková, Jernej Weiss, Gregor Pompe, Matjaž Barbo, Urša Šivic, Vesna Venišnik Peternelj, Maruša Zupančič in Simona Moličnik, ki so to izdajo oblikovali v heterogen zbornik s širokim naborom tem in pristopov, kar jo razlikuje od prve izdaje. Uredniki si namreč niso prizadevali za enotno razmišljanje, saj so avtorjem dopuščali raznovrstna mnenja in tudi različne interpretacije istih virov.

Aleš Nagode uvodoma poudarja, da je dolgo devetnajsto stoletje, uokvirjeno z Napoleonovim osvajanjem Evrope na eni strani in prvo svetovno vojno na drugi, predstavljalo »prelomni čas, v katerem so se temeljito preoblikovale osnovne družbene ureditve […], ki sodoločajo tudi našo sedanjost« (str. xi). Takrat je bila Slovenija del habsburškega cesarstva, katerega politična ureditev je temeljila na monarhičnem absolutizmu, ki je pospeševal centralizacijo države in postopoma odpravljal vse sledove nekdanje deželne avtonomije; močan vpliv je imela tudi avstrijska katoliška cerkev. Kljub temu so Slovenci poskušali ohraniti lastno regionalno kulturo in značilnosti: »Splošno sprejeta diglosija, pri kateri je bila na slovenskem etničnem ozemlju slovenščina vsakdanji sporazumevalni jezik, nemščina pa jezik izobraženstva in višjih ravni sporazumevanja, […] je omogočala premoščanje omejenosti na (pre)majhno govorno območje slovenskega jezika. Prebivalstvo se je čutilo povezano z različno razvitim hierarhičnim sistemom identitet, ki je segal od lokalne (vas, fara ali mesto ipd.), prek razvite pokrajinske zavesti (Kranjci, Štajerci, Korošci ipd.), do zavesti o pripadnosti cesarstvu, kar se je odražalo predvsem v spoštovanju vladarjeve osebe iz habsburške rodbine, pa najsi je bil cesar Svetega rimskega cesarstva ali pozneje avstrijskega oz. avstro-ogrskega cesarstva« (str. xii). Nagode poda skozi dolgo devetnajsto stoletje podroben pregled političnih in družbenih sprememb, vključno z industrijsko revolucijo, pojavom nacionalizma in političnim programom Zedinjene Slovenije.

Namen urednikov je bil ustvariti celovito sliko glasbenega življenja v političnem, gospodarskem in kulturnem kontekstu tistega časa, pri tem pa se aktivno izogniti zastarelemu konceptu nacionalnosti v kulturi, ki je negativno zaznamoval starejše zapise o zgodovini slovenske glasbe. Avtorji tretje izdaje zato poudarijo, da se je glasbeno življenje na Slovenskem v devetnajstem stoletju odvijalo na kompleksnem ozadju pogosto med seboj sprtih kulturnih identitet: »Mnoga dela devetnajstega stoletja na 'slovenska' besedila so ustvarili avtorji, ki so se imeli za Kranjce in v nadrejeni identiteti Avstrijce ali celo 'Nemce' (npr. Blaž Potočnik, Gregor Rihar, Kamilo Mašek). Mnoga najpomembnejša glasbena dela so ustvarili priseljeni glasbeniki iz drugih dežel monarhije, zlasti Češke, ki jih je slovensko glasbeno zgodovinopisje brez posebne utemeljitve naturaliziralo (npr. Gašper Mašek, Anton Nedvěd, Anton Foerster). Na drugi strani so mnogi skladatelji, ki so se izoblikovali v okolju slovenskih dežel, s skladbami na nemška besedila dejavno prispevali izključno k nemški glasbeni kulturi (npr. že omenjeni Hugo Wolf)« (str. xvi).

Tretja knjiga se razprostira v sedemnajstih različno dolgih poglavjih, ki zajemajo zelo raznolike teme: »Ljubljanska *Filharmonična družba* 1794–1919« (Primož Kuret), »Ljubljanska *Glasbena matica*« (Nataša Cigoj Krstulović), »Glasbeno-gledališka poustvarjalnost v Ljubljani v devetnajstem stoletju« (Špela Lah), »Pevski zbori in glasbena društva« (Darja Koter), »Glasbeno življenje v Trstu in Gorici« (Nejc Sukljan), »Od *contredansa* in *Deutscherja* do salonskega kola in četvorke: skupinski družabni plesi, plesne prireditve in glasba za ples« (Lidija Podlesnik Tomášiková), »Učenje glasbe in institucionalizacija glasbenega pouka« (Nataša Cigoj Krstulović), »Češki glasbeniki na Slovenskem« (Jernej Weiss), »Slovenska operna ustvarjalnost v devetnajstem stoletju« (Gregor Pompe), »Katoliška cerkvena glasba v devetnajstem stoletju na Slovenskem« (Aleš Nagode), »Slovenska večglasna ansambelska in zborovska pesem v devetnajstem stoletju« (Matjaž Barbo), »Pesem za glas in klavir v devetnajstem stoletju na Slovenskem« (Aleš Nagode), »Ljudska in ponarodela pesem« (Urša Šivic), »Orkestralna glasba na Slovenskem od ustanovitve *Filharmonične družbe* do 1. svetovne vojne« (Vesna Venišnik Peternelj), »Razvoj komorne glasbe na Slovenskem« (Maruša Zupančič), »Klavirska glasba« (Nataša Cigoj Krstulović) in »Pomen glasbene revije *Novi akordi*« (Simona Moličnik).

Vsi ti avtorji nazorno izrisujejo izrazito večplastno sliko glasbenega življenja Slovenije v tem burnem zgodovinskem obdobju, ko so Slovenci stremeli k narodnemu združevanju in kulturnemu priznanju. Čeprav nam omejen obseg pričujoče recenzije ne omogoča, da bi natančneje opisali vso obilico zanimivih in pogosto razsvetljujočih dejstev, ki izhajajo iz tretje knjige, je vredno izpostaviti nekatera izstopajoča poglavja. Mednje vključujemo izčrpen prispevek Lidije Podlesnik Tomášikove o različnih vrstah plesov širšega evropskega prostora, ki so se izvajali v Sloveniji; poglavje zajema opise najbolj običajnih plesov, raziskavo o plesnih šolah, številnih zvrsteh plesnih predstav in prizoriščih,

kjer so se te odvijale, ter pregled prvih učbenikov za ples v slovenskem jeziku *Slovenski plesalec* in *Moderni plesalec* avtorja Ivana Umeka. Primerljivo, vendar krajše poglavje Jerneja Weissa o čeških glasbenikih na Slovenskem vsebuje obširne opise kulturnih in političnih izmenjav med češkimi in slovenskimi deželami v devetnajstem stoletju, ter podatke o prihodih čeških glasbenikov v Slovenijo, njihovem poklicnem in organizacijskem delovanju ter njihovem skladateljskem, izvajalskem, pedagoškem in publicističnem delovanju, pri čemer avtor ugotavlja, da so »češki glasbeniki na vseh področjih glasbenega dela odločilno zaznamovali glasbeno kulturo na Slovenskem. Ne le, da je bil njihov prispevek primerjalno z drugimi glasbenimi migranti daleč najštevilčnejši in upoštevajoč dosežke najpomembnejši, temveč je bila njihova vloga v glasbeni kulturi na Slovenskem tako dominantna, da bi bilo v devetnajstem in začetku dvajsetega stoletja brez njih delovanje prenekaterih glasbenih ustanov oteženo, če že ne nemogoče« (str. 231). Enako poučna in niansirana je razprava Gregorja Pompeta o genezi slovenske nacionalne opere z začetki v vzponu slovenskih provincialnih meščanskih gledališč, prek nastanka »nacionalnih« tem, postopnega vključevanja različnih opernih žanrov in razvojnega loka od koncepta »nacionalne opere« do glasbene drame.

Za razliko od razvejane in slikovito raznovrstne tretje izdaje se v četrti izdaji, ki je izšla leta 2019, torej dve leti prej, pod glavnino besedil podpisuje avtor in urednik Gregor Pompe. Četrta knjiga je tudi zajetnejša, saj obsega skoraj 700 strani. Dolžina knjige zrcali močno povečano intenziteto skladateljske ustvarjalnosti, ki je na Slovenskem nastopila ob vključitvi v Kraljevino SHS ter se po koncu prve svetovne vojne nadaljuje vse do sodobnega časa, ko je Slovenija postala članica Evropske unije. Knjiga zajema sedem obsežnih poglavij s številnimi podpoglavji. Skoraj vsa poglavja so Pompetovo delo, z izjemo tretjega poglavja, posvečenega katoliški cerkveni glasbi od začetka dvajsetega stoletja do drugega vatikanskega koncila, ki ga je napisal Aleš Nagode, in podpoglavja o elektroakustični in eksperimentalni glasbi, katerega podpisuje avtor Primož Trdan.

Za razliko od tretje knjige, ki se je ubadala z vrsto zgodovinskih, političnih in sociooloških vprašanj, da bi naslikala celovito podobo slovenskega glasbenega življenja v dolgem devetnajstem stoletju, se četrta knjiga bolj osredotoča na glasbo samo, na sosledje glasbenih stilov, vključno z njihovo tehnično in interpretativno platjo. Pompetov pristop temelji na že objavljeni razpravi o slovenski sodobni glasbi, začenši s pionirskimi deli Dragotina Cvetka, ki jim sledijo knjige in študije Nialla O'Loughlina, Darje Koter, Leona Stefanije, Ivana Klemenčiča, Lojzeta Lebiča, Andreja Rijavca, Franca Križnarja, Marijana Lipovška, Vesne Venišnik, Jožeta Sivca, Špele Lah in številnih drugih. Čeprav zapisi teh avtorjev ne sežejo tako daleč v vseobsegajoč domet Pompetove prostrane publikacije, pa so bili pomembni pri zagotavljanju trdnih temeljev, na katerih se je gradilo dalje. Še več, študija vseh dosedanjih zapisov o slovenski glasbi dvajsetega stoletja je igrala ključno vlogo pri ustanovitvi »kanona« slovenske kompozicije. Pompe združuje

metodologiji, ki sta ju vzpostavili dve osrednji osebnosti muzikologije dvajsetega stoletja, Carl Dahlhaus (1928–1989) in Richard Taruskin (1945–2022), kar mu omogoča, da s kritične distance objektivno analizira skladbe, nastale v prejšnjem stoletju. Pompe tudi potrjuje ugotovitev Leona Stefanije, da je bil glavni preobrat v slovenski muzikologiji dvajsetega stoletja »prehod od čitalniških glasbenih navad k ozaveščanju glasbe kot lepe, ne več samo uporabne, na strokovnih temeljih zasnovane kulturne prakse« – z drugimi besedami, obrat k »avtonomizaciji glasbe« (str. xv). Pompe pravilno ugotavlja, da je treba »avtonomnost glasbe v dvajsetem stoletju vendarle opazovati kot del spremenljivega nihanja […] v zadnjih desetletjih ideja popolne avtonomnosti vse hitreje ugaša ob vsesplošni prevladi neoliberalistične kapitalistične, torej marketinške logike, ki vse bolj prežema vse vidike družbenega in kulturnega življenja« (str. xvi).

Sedem poglavij četrte knjige sledi kronološkemu sosledju, z izjemo tretjega poglavja, ki prinaša celovit pregled in problematiko cerkvene glasbe na Slovenskem. Prvo poglavje »1918–1926: Podaljševanje moderne« predstavi prelomno leto 1918 kot nov začetek, ki pa ni bil ravno »nov«, temveč predvsem podaljšek predvojnih tendenc. Pompe obravnava modernizem kot regionalni pojem in ponudi periodizacijo slovenske moderne, nato pa se posveti delom prvih pomembnih protagonistov slovenske nacionalne operne, zborovske in simfonične glasbe. Drugo poglavje z naslovom »1927–1941: *Nova glasba*« analizira razvojne tirnice, ki so v slovenski kulturni prostor pripeljale tako imenovano »novo glasbo« (ta se je takrat že »starala«), ter zapoznelo prevzemanje ekspresionizma v Sloveniji z močnim lokalnim pridihom. Osredotoči se na pomembni osebnosti Marija Kogoja in Slavka Osterca, nato pa preide na razpravo o slogovnem pluralizmu pred izbruhom druge svetovne vojne, od »novega folklorizma« Matije Bravničarja do pojava dodekafonije. Po Nagodetovi poglobljeni razpravi o katoliški cerkveni glasbi Pompe v četrtem poglavju »1941–1960 V primežu politike – vojne in povojne vihre« poda slikovit prikaz slovenske glasbe med drugo svetovno vojno in po njej. Še zlasti zanimivo je podpoglavje »V iskanju socialističnega realizma«, kjer Pompe podrobneje obravnava navzkrižje »utilitarne« in »avtonomne« glasbe, tradicionalizma in inovativnosti, pri čemer se osredotoča na tradicionalno usmerjene osebnosti, kot so Lucijan Marija Škerjanc in njegova učenca Zvonimir Ciglič in Janez Matičič. Pompe presodi, da sta obstajala le dva izhoda iz te situacije: prvi je bila »poroka« med nacionalno in folklorno kulturo, drugi pa je bil neprogramski, a razumljiv neoklasicizem.

Naslednje poglavje, ki osredotočeno zajema leta 1961–1976, nam predoči drugi preboj modernizma v Sloveniji (in celotni Socialistični federativni republiki Jugoslaviji), ki napoči po ustanovitvi prelomnega zagrebškega festivala Glasbeni bienale in se odvija v glavnem mestu sosednje države, Republike Hrvaške. Pompe piše o najpomembnejših skladateljih drugega vala slovenske moderne, kot so Alojz Srebotnjak, Milan Stibilj, Jakob Jež, Ivo Petrić, Igor Štuhec, Lojze Lebič in Darijan Božič, ter o dveh Slovencih, ki sta si ustvarila uspešno

kariero v tujini, Janezu Matičiču in Vinku Globokarju. Vendar Pompe poudari, da je kljub modernizmu Uroša Kreka in Marijana Lipovška vztrajal tudi alternativni zmernejši tok sodobne glasbe. V obdobju med letoma 1977 in 1990 zaznamo postopen odmik od modernizma, ki je že izgubil stik s svojimi koreninami, čeprav so bile premene teh še žive v »spektralističnih« delih Božidarja Kosa in intuitivni improvizacijski glasbi Uroša Rojka. Obenem pa se je pojav postmodernizma različno kanaliziral skozi ustvarjalnost več skladateljev; nekdanjih modernistov, kot sta Lojze Lebič ali Alojz Srebotnjak, neoklasicistov, kot sta Pavle Merkù in Marijan Lipovšek, ter predstavnikov neomodernizma, neoromantike in nove enostavnosti, kot sta Marko Mihevc in Alojz Ajdič.

Pompe opredeljuje postjugoslovansko obdobje (od leta 1991 naprej) kot pluralistično in razmišlja o smereh, kot so ahistoričnost, nova duhovnost in metamodernizem. Pojav teh teženj namreč sovpada s še enim politično pomembnim obdobjem, v katerem je Slovenija po izstopu iz Jugoslavije hitro in odločno zakorakala v širšo evropsko skupnost, kjer je poiskala svoje mesto v novo globaliziranem svetu. Primož Trdan dopolnjuje Pompetovo razmišljanje s pregledom različnih tendenc elektroakustične in eksperimentalne glasbe, Pompe pa zbornik zaključuje z vprašanjem, ki ga zastavlja sebi in bralcu hkrati: ali je »izenačitev skrajnosti« privedla do končne pluralne globalnosti (za katero je značilna demokratična dostopnost glasbe, enak status različnih praks in tehnik) ali do metafizičnega nihilizma (za katerega je značilna izguba meja in relativizacija vseh vrednot). Eden njegovih glavnih pomislekov se vrti okoli problematike umetniške glasbe, ki je v zadnjih desetletjih postala sicer bolj »dostopna« in prijetnejša za uho (v primerjavi z modernističnim obdobjem), vendar še vedno ne zmore doseči večjih množic poslušalcev, ki jih privlačijo globalni potrošniški družbi imanentni popularni žanri.

Nova serija monografij o zgodovini glasbe v Sloveniji je neizogibno retrospektivna, vendar je vsekakor obrnjena v prihodnost. Avtorje besedil skozi celotno zbirko vodi raziskovanje doslej premalo znanih področij slovenskega glasbenega življenja. Čeprav se opirajo na delo svojih predhodnikov, odpirajo obilje svežih perspektiv in vpogledov ter ponujajo posodobljeno ovrednotenje starih predpostavk in resnic. Da se doslej objavljeni trije sklopi med seboj precej razlikujejo, ne zmanjšuje vpliva zbirke kot celote: pravzaprav bi uredniki učinkovitost bistveno okrnili, če bi avtorjem, ki pišejo o tako zelo različnih glasbenih področjih, izhajajočih iz neskladnih kontekstov, poskušali vsiliti enotno metodologijo. Nazadnje so avtorji ob zavedanju, da pišejo prav »slovensko« glasbeno zgodovino, ovrednotili tudi tuja ljudstva, tradicije, dediščine in vplive, ki so se v različnih zgodovinskih obdobjih dotikali tega geografskega prostora in mu pustili pečat.

Ivana Medić (ivana.medic@music.sanu.ac.rs)
Muzikološki inštitut, Srbska akademija znanosti in umetnosti

Jurij Snoj, ed.
Aleš Nagode and Nataša Cigoj Krstulović, eds.
Gregor Pompe, ed.

Zgodovina glasbe na Slovenskem, knjige 1, 3 in 4 [*History of Music in the Slovenian Lands*, vols. 1, 3, and 4]

Zgodovina glasbe na Slovenskem 1: Glasba na Slovenskem do konca 16. stoletja [*History of Music in the Slovenian Lands 1: Music in the Slovenian Lands until the End of the Sixteenth Century*], edited by Jurij Snoj. Ljubljana: Založba ZRC, ZRC SAZU, 2012. 570 pages. €33,30. ISBN: 978-961-254-432-4.

Zgodovina glasbe na Slovenskem 3: Glasba na Slovenskem med letoma 1800 in 1918 [*History of Music in the Slovenian Lands 3: Music in the Slovenian Lands from the Year 1800 to 1918*], edited by Aleš Nagode and Nataša Cigoj Krstulović. Ljubljana: Znanstvena založba Filozofske fakultete and Založba ZRC, 2021. 602 pages. €29,90. ISBN: 978-961-06-0529-4.

Zgodovina glasbe na Slovenskem 4: Glasba na Slovenskem med letoma 1918 in 2018 [*History of Music in the Slovenian Lands 4: Music in the Slovenian Lands from the Year 1918 to 2018*], edited by Gregor Pompe. Ljubljana: Znanstvena založba Filozofske fakultete and Založba ZRC, 2019. 680 pages. €29,90. ISBN: 978-961-06-0289-7.

The new history of music in the Slovenian lands is a towering achievement of Slovenian musicologists of several generations, who have worked diligently on this edition for more than a decade. The first volume, edited by Jurij Snoj and covering the period before the end of the sixteenth century, i.e. until the unequivocal re-direction of the Slovenian lands to Catholicism, was published in 2012. It was followed by the fourth volume in 2019, edited by Gregor Pompe and dedicated to the music of the twentieth and twenty-first centuries. In 2021 the third volume, edited by Aleš Nagode and Nataša Cigoj Krstulović and covering the period from the founding of the Ljubljana Philharmonic Society (1794) until the dissolution of the Austro-Hungarian monarchy was released, both in print and as an electronic publication (DOI:/10.4312/9789610605270). The final volume, dedicated to music in the seventeenth and eighteenth centuries,

i.e. from the arrival of Jesuits to Ljubljana until the founding of the Philharmonic Society, will be published approximately in a year. In spite of this "gap" of two centuries, to be filled by the forthcoming second volume, it is already possible to review the three completed volumes, and to highlight the scope, goals and future impact of this history.

Each one of these hefty, over 500 pages-long books is meticulously researched, offering plenty of information on primary sources, and supplied with extensive bibliographies and indexes. Being the first volume to be initiated and completed, and also the one that covered the earliest period, the book edited by Jurij Snoj is somewhat different from the remaining two, because at that point the editorial team was still in the process of establishing methodology for the entire collection, creating the guidelines for contributors and trying to envisage the task ahead of them. This does not diminish the quality of the first volume, which encompasses the history of music in the present-day Slovenia from the prehistoric times to the end of the sixteenth century. In the dual role of the editor and chief contributor, Snoj authored about a half of the essays in the first volume, while the remaining texts were written by Aleš Nagode, Katarina Šter, Darja Koter, Metoda Kokole, Marc Desmet, Klemen Grabnar, Alenka Bagarič, and Marko Motnik.

In his "Introduction," Snoj aptly commented on the challenges faced by the team in preparing the history of this kind, whilst caught between the two extremes – on the one hand, the millennia-long stretch of time that needed to be covered, and on the other, the restriction to a very small territory. For Snoj as the editor and contributor, the first pressing question was related to the very concept of music: "If we understand the history of music according to the standards of the nineteenth century and the first half of the twentieth century, it only consists of composed musical works, or at least the works fixed by musical notation, by composers known by their name (or anonymous), among whom some are more important, others less so" (pp. xi–xii). However, if one should take such an approach, then the whole swathes of music would have to be discarded, i.e. "considered either as a precursor to composition of creation or as something that existed in individual periods of time simultaneously with proper composition" (p. xii). Snoj highlights that the sole-authored musical compositions are just a tip of the much bigger iceberg, because in ancient and medieval times, there was no concept of composer akin to that from the sixteenth century onwards. If one considers the archaeological remnants which attest to the presence of music, then "various sound events can be understood as music […] sounds that accompanied work, sound messages, sounds made with a specific purpose, e.g. as warnings. Similarly, a look into the daily life of medieval people […] reveals different layers of music: singing of the uneducated and illiterate population, instrumental music for dancing, singing spiritual texts in Latin" (p. xiii). Hence Snoj points out that, in almost all epochs of music history "there existed different

genres of music that had their own role in everyday life and whose function was linked to the structure of society. Music history thus appears as a simultaneous network of various musical genres, layers, practices, currents that developed, changed and transformed from period to period, and none of them can be said to have been more important in principle than others" (p. xiii). In accordance with this pronouncement, the editors of this history decided to write about all musics that have existed in the territory of the present-day Slovenia, as well as the social and cultural contexts that fostered the emergence of certain genres, styles and trends. As to geographical borders, the editors decided to discard the dated concept of national art, because "in the case of Slovenian musical history, this concept would mean that until the end of the eighteenth century we could only deal with a handful of written mentions of Slovene singing and a dozen songbooks with simple Slovenian songs intended for the participation of Slovenian-speaking people in worship, and nothing more than that. Everything else would have to be considered foreign: the chanting of Latin liturgical texts within Gregorian chorale, Italian opera in Ljubljana, repertoire of Ljubljana cathedrals etc. Such a history would have to overlook almost everything that existed before Slovenian national musical culture developed in the second half of the nineteenth century" (p. xiv). The contributors have thus decided to encompass everything that has ever existed in the present-day Slovenian cultural space, bearing in mind that all musical genres and practices were parts of much broader European currents, which spread and reached Slovenia irrespective of ethnic and linguistic boundaries.

The first chapter in the first monograph of the series presents Snoj's overview of musical genres in the Slovenian lands until the end of the sixteenth century, including (in the order of appearance) folk dance, Gregorian chant, *minnesang*, music of urban nobility, polyphony, "glagoljaško" (Glagolitic) singing, songs of the Slovenian reformation, "light" Italian music and representative music. However, the next chapter "Archaeological evidence of music" by Aleš Nagode takes us to a much more distant past, to the oldest remnants of music in the Slovenian territory. Nagode presents the evidence of the existence of music since the early and middle Stone Age, followed by younger Stone Age, then, the time of great ancient cultures, pagan antiquity, and finally the Christianisation of the people. At the same time, Nagode discusses the origins of the present-day Slovenian people, based on the study of haplotypes and the historical records on migrations, conquests and assimilations, until the arrival of Slavic tribes in the seventh century A.D., who subjugated the local population and established their culture and language as the dominant one, although the rudiments of indigenous culture survived for another few centuries in remote regions.

The next chapter is dedicated to Gregorian chant and singing in unison, and mainly written by Jurij Snoj, who begins his discussion with a broader overview of the role of Gregorian chant in European history, before moving on to

Slovenian sources. Snoj points out that Gregorian chant spread to the Slovenian lands simultaneously with Christianity and the Christian liturgy, and then overviews four types of sources: 1. manuscripts of chants and other written music, 2. notes (marginalia) in chanted liturgy, 3. literary references, and 4. printed chants. Snoj provides detailed insight into all these sources, listing the surviving material and indicating where it has been preserved. The author continues with the discussion of liturgical singing based on the manuscripts of the adiastematic period, providing a parallel overview of the Christianisation of the Slavs, and then focuses on the liturgical singing in parish churches until the end of the fourteenth century. Although fragments in adiastematic neumes often cannot be assigned a place of use, there are exceptions, including the so-called "Kamniški gradual" (gradual fragment from Kamnik), most likely from the second half of the fourteenth century, which comprises twenty folios, four of which are kept in Ljubljana, four in the Franciscan monastery in Nazarje, and twelve in the Kamnik Franciscan monastery. The next subchapter is dedicated to chant manuscripts found in Slovenian monasteries, with a comprehensive overview of monasteries in the Slovenian lands and the manuscripts preserved in them.

Katarina Šter begins her extensive discussion of choral manuscripts of the Slovenian Carthusians by overviewing religious communities in medieval Slovenia. Whereas the Benedictines did not leave a strong mark on Slovenian territory, the two most important orders of the twelfth century were Cistercians and Carthusians, while the thirteenth century saw the emergence of Franciscans, Dominicans and Augustinians. Šter outlines the different liturgical traditions that existed among these orders, and then focuses on the Carthusian order, with its distinctive contemplative orientation, and its specific liturgy, mass and other rites. The author highlights that "the Carthusians have always cherished exclusively and only Gregorian coral, which has remained to this day one of the main foundations of the Carthusian liturgy, which gives meaning to the life of monks in a special way" (p. 149). The chapter on Gregorian chant and singing in unison concludes with Jurij Snoj's essay on liturgical singing in sacred churches during the period of diastematic manuscripts, covering the period from the Middle Ages to the sixteenth century. Again, Snoj provides detailed information on the available manuscripts and the places where they have been preserved, and offers an in-depth analysis of the most important manuscripts, supplemented with a selection of written testimonies about choral singing in churches.

The second half of the first book is more interdisciplinary. Darja Koter writes about artistic representations of musical instruments and musical scenes, searching for visual representations of musical scores, musical instruments, ensembles and other performers. Jurij Snoj looks for information about the oral tradition in written testimonials about music, whereas the term "oral tradition" encompasses four strands, whose boundaries are nevertheless fluid and the genres themselves interpretable: 1. ethnic Slovenian folk music; 2. singing and

playing in non-Slovene communities (German, Italian, Jewish); 3. music of the upper classes, especially urban nobility, and 4. activities of professional urban musicians. In the ensuing chapter, Metoda Kokole searches for testimonies about dance, attempting to reconstruct the history of dance in the Slovenian lands based on the available artistic and literary sources, which date back to the thirteenth and fourteenth centuries. Kokole points out that the history of dance in the Slovenian lands is inseparable from that of the neighbouring countries, from which many influences were absorbed.

Jurij Snoj's next chapter is dedicated to polyphonic music, roughly spanning three centuries (from the fourteenth to the sixteenth century). Snoj has studied a variety of sources, including preserved musical examples of medieval polyphony, but also data on groups who performed polyphonic music, then, testimonies about the events during which polyphonic music was performed, as well as mentions of the existence of polyphonic compositions and music collections. The author provides information on both Catholic and Protestant (Reformist) polyphonic traditions. In the ensuing chapter, some of the leading composers of sixteenth-century polyphonic music are discussed: thus, Marko Motnik writes about Georg Prenner, while Marc Desmet writes about Jacobus Handl Gallus, "a gem of European musical humanism" (p. 391). Afterwards, Klemen Grabnar overviews testimonies about music in educational institutions, from the end of the eighth century onwards, whereas Alenka Bagarič uses the composers' dedications as sources to reconstruct the types of music performed in noble salons in the age of humanism. Darja Koter adds another layer to the multifaceted picture of the musical culture in the Middle Ages, by exploring the construction of musical instruments, which was somewhat stunted by the fact that "the Church characterized musical instruments as a medium of paganism and declared them to be satanic" (p. 443); but although such negative attitude towards the instruments stifled their development and triggered the rise of vocal music, instrumental music still managed to survive.

The final chapter, written by Jurij Snoj, deals with the music of the Slovenian reformed church. In the sixteenth century, the Bible was translated to Slovenian language, in accordance with the protestants' aims to make the holy scriptures accessible and understandable to all worshippers. Snoj provides detailed lists of Slovenian songbooks, and then discusses the role of music in the reformed (protestant) rite, stating numerous illustrative examples.

The third volume in the series, *Music in the Slovenian Lands from 1800 to 1918* was edited by Aleš Nagode and Nataša Cigoj Krstulović, and the list of contributors also includes Primož Kuret, Špela Lah, Darja Koter, Nejc Sukljan, Lidija Podlesnik Tomášiková, Jernej Weiss, Gregor Pompe, Matjaž Barbo, Urša Šivic, Vesna Venišnik Peternelj, Maruša Zupančič, and Simona Moličnik, resulting in a more heterogenous volume than the first one, with a broad range of topics and approaches. The editors did not attempt to impose uniform

thinking, allowing their contributors to present sometimes differing opinions and interpretations of the same sources.

In the "Introduction," Aleš Nagode highlights that the long nineteenth century, framed by Napoleon's conquests on the one end and the First World War on the other, was "a turning point in which the core of social organisation and cultural life, which also determines our present-day situation, was fundamentally transformed" (p. xi). At that time Slovenia was part of the Habsburg Empire, whose political system was based on monarchical absolutism, which fostered centralisation of the state and gradually abolished all traces of the former provincial autonomy; moreover, Austrian Catholic church exerted a strong influence. Nevertheless, the Slovenians attempted to preserve their own regional cultures and flavours: "A generally accepted diglossia in which Slovenian was the everyday language of communication, while German was the language of education and higher levels of communication, […] made it possible to overcome the limitations of the (too) small speaking area of Slovenian language. The population felt connected to the variously developed hierarchical systems of identities that ranged from the local (village, parish or town, etc.) to the developed regional consciousness (Kranjci, Štajerci, Korošci, etc.), to the consciousness of belonging to the empire, which was mainly reflected in the respect for the person of the ruling Habsburg family, whether he was emperor of the Holy Roman Empire or later of Austria or of the Austro-Hungarian Empire" (p. xi). Nagode provides a detailed overview of political and social changes and upheavals during the long nineteenth century, including the industrial revolution, the emergence of nationalism and the political programme of United Slovenia.

The editors' aim was to create a comprehensive picture of musical life within political, economic and cultural contexts of that time, whilst actively avoiding the dated concept of national culture, which has negatively affected previous histories of Slovenian music. The authors of the third volume thus show that musical life in the Slovenian lands in the nineteenth century unfolded on the complex background of often mutually clashing cultural identities: "Many works of the nineteenth century with 'Slovenian' texts were created by authors who considered themselves to be 'Kranjci' [from the region of Carniola – Kranjska, n. b. I. Medić] and, in a superimposed identity, Austrians, or even 'Germans' (e.g. Blaž Potočnik, Gregor Rihar, Kamilo Mašek). Many of the most important musical works were created by immigrant musicians from other parts of the empire, especially the Czech Republic, who were then naturalised by Slovenian musical historiography without special mention (e.g. Gašper Mašek, Anton Nedvěd, Anton Foerster). On the other hand, there are many composers who were formed in the Slovenian lands, but whose compositions, based on German texts, actively contributed exclusively to German musical culture (e.g. the already mentioned Hugo Wolf)" (p. xvi).

The third book unfolds in seventeen chapters of various lengths and covering very diverse topics: "The Ljubljana *Philharmonic Society* 1794–1919" (Primož Kuret), "The Ljubljana *Glasbena matica* Music Society" (Nataša Cigoj Krstulović), "Music-Theatrical Performances in Ljubljana in the Nineteenth Century" (Špela Lah), "Choirs and Music Societies" (Darja Koter), "Musical Life in Trieste and Gorica" (Nejc Sukljan), "From *Contredans* and *Deutscher* to Ballroom *Kolo* [Round Dance] and *Četvorka* [Foursome]: Group Dances, Dance Events and Dance Music" (Lidija Podlesnik Tomášiková), "Learning Music and the Institutionalisation of Teaching Music" (Nataša Cigoj Krstulović), "Czech Musicians in Slovenia" (Jernej Weiss), "Slovenian Opera Output in the Nineteenth Century" (Gregor Pompe), "Catholic Church Music in the Nineteenth Century in Slovenia" (Aleš Nagode), "Slovenian Multipart Ensembles and Choral Song of the Nineteenth Century" (Matjaž Barbo), "Songs for Voice and Piano in Slovenia in the Nineteenth Century" (Aleš Nagode), "Folk and Folk-Like Songs" (Urša Šivic), "Orchestral Music in Slovenia from the Foundation of the *Philharmonic Society* until the First World War" (Vesna Venišnik Peternelj), "The Development of Chamber Music in Slovenia" (Maruša Zupančič), "Piano Music" (Nataša Cigoj Krstulović), and "The Importance of the Music Journal *Novi akordi* [*New Chords*]" (Simona Moličnik). All of these authors paint a very vivid and multi-layered picture of the musical life of the Slovenian lands during this turbulent historical period, when Slovenian people were aiming towards their national unification and recognition. While the limited scope of this review does not permit us to describe at length the plethora of interesting and often illuminating information found in the third book, we should just mention that some of the standout chapters include Lidija Podlesnik Tomášiková's comprehensive discussion of the various types of dances, originating from a wide European space, which were performed in the Slovenian lands; the chapter includes descriptions of the most common dances, an investigation on the dancing schools, numerous types of dance performances and the venues where they took place, as well as an overview of the first textbooks for dance in Slovenian language, *Slovenski plesalec* [*Slovenian Dancer*] and *Moderni plesalec* [*Modern Dancer*], written by Ivan Umek. Although Jernej Weiss's chapter on Czech musicians in Slovenia is comparatively shorter, it still provides plenty of information on the cultural and political exchanges between Czech and Slovenian lands in the nineteenth century, the arrival of Czech musicians to Slovenia, their professional and organisational activities, as well as their work as composers, performers, teachers and writers on music, concluding that "Czech musicians have made a decisive mark in all areas of musical culture in Slovenia. Not only that their contribution was by far the most numerous in comparison to that of other musical immigrants […] but even importantly, their role in the musical culture in Slovenia was so dominant that in the nineteenth and twentieth centuries

many musical institutions would not have been able to function without them" (p. 229). Equally informative and nuanced is Gregor Pompe's discussion of the genesis of Slovenian national opera, starting from the ascent of Slovenian provincial bourgeois theatres, through the emergence of "national" themes, the gradual inclusion of various operatic genres, as well as the journey from the concept of "national opera" to music drama.

Unlike the vivid and heterogenous third volume, the forth volume (published two years previously, in 2019) is almost sole-authored by its editor Gregor Pompe. The fourth book is the longest one, consisting of almost 700 pages. This length reflects the massively increased intensity of compositional creativity in Slovenia, from the moment of its integration into the Kingdom of Serbs, Croats and Slovenes after the end of the First World War, to the present day, when Slovenia is a member of the European Union. The book is divided into seven major chapters, with numerous subchapters. Almost all of them have been written by Pompe, with the exception of the third chapter dedicated to catholic church music from the beginning of the twentieth century to the Second Vatican council, written by Aleš Nagode, and a subchapter on electroacoustic and experimental music, written by Primož Trdan.

Unlike the third book, which dealt with a variety of historical, political and sociological issues in order to paint a comprehensive picture of Slovenian musical life in the long nineteenth century, the fourth book is more focused on music itself, on the succession of musical styles, as well as their technical and interpretative facets. In his approach, Pompe relies on the previously published discussions of Slovenian contemporary music, starting from the pioneering works by Dragotin Cvetko, followed by books and studies by Niall O'Loughlin, Darja Koter, Leon Stefanija, Ivan Klemenčič, Lojze Lebič, Andrej Rijavec, Franc Križnar, Marijan Lipovšek, Vesna Venišnik, Jože Sivec, Špela Lah and many others. While their works do not have the all-encompassing scope and breadth of Pompe's volume, they were nevertheless important in providing the solid foundations to build upon. Moreover, a study of all previously written accounts on Slovenian twentieth century music is important for the sake of establishing a "canon" of Slovenian musical works. Pompe combines methodologies established by the two luminaries of twentieth century musicology, Carl Dahlhaus (1928–1989) and Richard Taruskin (1945–2022), which enables him to establish a critical distance, necessary for an objective analysis of the music written during the previous one hundred years. Pompe also confirms Leon Stefanija's observation that the main turn in Slovenian musicology of the twentieth century was "the change from studying musical habits to the awareness of music as a beautiful, no longer only useful, professionally founded cultural practice" – in other words, the turn towards "the autonomisation of music" (p. xv). Pompe correctly observes that "the autonomy of music in the twentieth century must be observed as part of a changing landscape […] in the last decades the idea of complete autonomy fades

away more and more quickly in the face of the overwhelming dominance of the neoliberal-capitalist, i.e. market logic, which increasingly permeates all aspects of social and cultural life" (p. xvi).

The seven chapters of the fourth book unfold chronologically, with the exception of the third chapter, which provides a comprehensive overview and problems of church music in the Slovenian lands. The first chapter, "1918–1926: Prolongation of Modernism" deals with the year 1918 as a turning point for a new beginning, although it was not exactly "new," but rather a continuation of the pre-war tendencies. Pompe discusses modernism as a regional notion, offers a periodisation of Slovenian modernism, and then discusses the works of the first important protagonists of Slovenian national opera, choral and symphonic music. The second chapter, entitled "1927–1941: *New Music*" analyses the paths of Slovenian cultural scene towards the so-called "new music" (which, at that point, had already "aged"), as well as a belated adoption of expressionism in Slovenia, with a strong local flavour. Pompe focuses on the important figures of Marij Kogoj and Slavko Osterc, before moving on to discuss the pluralism of styles before the outbreak of the Second World War, ranging from the "new folklorism" of Matija Bravničar to the emergence of dodecaphony. After Nagode's profound discussion of the catholic church music, Pompe's fourth chapter, "1941–1960: In the Grip of Politics – Wartime and Post-War Storms" paints a vivid picture of Slovenian music during and after the end of the Second World War. Especially interesting is a subchapter "Searching for Socialist Realism," where Pompe elaborates on the clashes between "utilitarian" and "autonomous" music, between traditionalism and innovativeness, focusing on the traditionalist figures such as Lucijan Marija Škerjanc and his students Zvonimir Ciglič and Janez Matičič. According to Pompe, there were two ways out of this situation: the first one was a "marriage" between national and folklore cultures, and the other was a non-programmatic, yet comprehensible neoclassicism.

The following chapter, focusing on the years 1961–1976, deals with the second breakthrough of modernism in Slovenia (and the entire Socialist Federal Republic of Yugoslavia), after the establishment of the landmark festival Music Biennale in Zagreb, the capital city of the neighbouring republic of Croatia. Pompe writes about the most important figures of Slovenian second modernism such as Alojz Srebotnjak, Milan Stibilj, Jakob Jež, Ivo Petrić, Igor Štuhec, Lojze Lebič, and Darijan Božič, as well as two Slovenians who established successful careers abroad, Janez Matičič and Vinko Globokar. However, Pompe also shows that there persisted a more moderate stream of contemporary music as an alternative to modernism, represented by the likes of Uroš Krek and Marijan Lipovšek. The period from 1977 to 1990 is marked by a gradual move from modernism, which by that time has lost its steam – although its offshoots were still visible in the "spectralist" works by Božidar Kos and the intuitive

improvisational music of Uroš Rojko. On the other hand, the emergence of postmodernism was manifested differently in the works of former modernists, such as Lojze Lebič or Alojz Srebotnjak, the neo-classicists such as Pavle Merkù and Marijan Lipovšek, and the representatives of neo-modernism, neo-romanticism and the new simplicity, such as Marko Mihevc and Alojz Ajdič.

Pompe defines the post-Yugoslav period (from 1991 onwards) as pluralistic and reflects on the tendencies such as ahistoricity, new spirituality and metamodernism. The emergence of these tendencies conceded with yet another politically important period, during which, after leaving Yugoslavia, Slovenia has taken prompt and decisive steps to integrate itself into a wider European community and to find its place in the newly globalised world. Primož Trdan complements Pompe's discussion by reviewing various tendencies of electroacoustic and experimental music, and Pompe concludes the volume by asking himself and the readers whether the "equalisation of extremes" has led to the ultimate plural globality (characterised by a democratic accessibility of music, equal status of various practices and techniques) or a metaphysical nihilism (characterised by the loss of boundaries and relativization of all values). One of his main concerns is that, although art music has become more "accessible" and ear-pleasing in the recent decades (in comparison to the modernist period), it is still unable to reach a greater number of listeners, who by far prefer popular genres, which are part of the global consumerist society.

While this new series on history of music in Slovenia is inevitably retrospective, it is certainly turned towards future. The authors of chapters in all volumes have made great efforts to give attention to hitherto insufficiently researched areas of Slovenian musical life throughout the centuries. Whilst relying on the work of their predecessors, they nevertheless offer a plethora of new information, fresh insights and reassessments of old assumptions and truisms. The fact that the three volumes published thus far are mutually quite different does not diminish the impact of the whole: in fact, it would have probably been much less effective if the editors had attempted to impose uniform methodologies to authors who were to write about very different musics, created in very different contexts. Finally, whilst aware that they were writing a music history that is inherently "Slovenian," the authors have acknowledged all the other peoples, traditions, legacies and influences that left their mark on this geographic area at different periods of its history.

Ivana Medić (ivana.medic@music.sanu.ac.rs)
The Institute of Musicology, Serbian Academy of Sciences and Arts

Helena Filipčič Gardina, ur.

V zrcalu glasbene iskrenosti: Vladimir Lovec (1922–1992)

Koper: Zavod lepih umetnosti, 2022. 84 strani. 19 €. ISBN: 978-961-95887-0-3.

Monografija *V zrcalu glasbene iskrenosti: Vladimir Lovec (1922–1992)*, ki jo je uredila muzikologinja Helena Filipčič Gardina, je nastala ob obeležitvi 100-letnice rojstva skladatelja, dirigenta, glasbenega pedagoga, publicista in vsestranskega glasbenega organizatorja Vladimirja Lovca (1922–1992).

Vsebina, ki osvetljuje različne vidike Lovčeve osebnosti, je smiselno razdeljena v tri osrednje sklope. Prvi obsega poglavje Helene Filipčič Gardina »Življenjske postaje in razvejano delovanje Vladimirja Lovca.« Lovčevi glasbeni poti sledimo prek osrednjih mejnikov: zgodnja leta, glasbeno izobraževanje in skladateljski začetki, prve glasbene zaposlitve, delovanje na Glasbeni šoli Koper, glasbenopublicistično in glasbenoorganizacijsko delovanje, kratek oris skladateljskega opusa in navedba nekaterih pomembnejših izvedb. Prispevek, ki prinaša najpomembnejše poudarke iz Lovčevega življenja, je napisan sistematično in pregledno ter temelji na ustrezno navedenih relevantnih primarnih (arhivskih) virih in razpoložljivi sekundarni literaturi; bibliografski seznam ob koncu prispevka nedvomno ponuja ustrezno izhodišče za morebitne nadaljnje raziskave Lovčevega življenja in glasbenega delovanja.

V drugem obsežnejšem sklopu se Vladimirja Lovca v pogovorih s Heleno Filipčič Gardina in Marijo Gombač spominjajo njegovi nekdanji učenci, sodelavci in prijatelji, večina katerih še danes na tak ali drugačen način pomembno sooblikuje glasbeno (in kulturno) življenje na Koprskem in širše; nekatere izmed njih je k poklicnemu ukvarjanju z glasbo vzpodbudil prav Lovec. Vprašanja, ki sta jih postavljali avtorici, so premišljena in široko zastavljena: medtem ko so nekatera bolj informativnega značaja, druga sprašujejo o Lovčevih pedagoških pristopih, osebnih pogledih, razumevanju njegovega skladateljskega opusa in navsezadnje o vplivu, ki ga je imel na življenjske poti intervjuvancev. Skozi odgovore spoznavamo Vladimirja Lovca kot precej kompleksno in razgledano osebnost mnogih zanimanj, tako na glasbenem kot širšem humanističnem področju. Med drugim se kaže kot predan pedagog, ki mu je uspelo poiskati poti do učencev, pri katerih ni poudarjal le tehničnih vidikov igranja na instrument, temveč je z njimi o glasbi tudi veliko razpravljal in jim na ta način pomagal razumeti, kaj v resnici igrajo. Tovrstno odkrivanje skladateljeve

osebnosti, načina razmišljanja, miselnih obzorij in pristopov h glasbi je nedvomno pomembno tudi pri celoviti presoji njegovega kompozicijskega delovanja. Sklop zaključuje priložnostni prispevek Anne Fink, muzikologinje in nekdanje glasbene urednice Radia Koper, ki se Lovca spominja predvsem prek sodelovanja pri pripravi radijskih oddaj, v katerih je obravnavala njegova dela.

Zadnji vsebinski sklop prinaša nekatere podatke o Lovčevem skladateljskem opusu in je nepogrešljivo izhodišče za vse, ki se bodo v prihodnje ukvarjali s tem področjem njegovega glasbenega delovanja. V prvem delu je navedenih nekaj skladateljevih pričevanj o lastnih skladbah, ki ponujajo vpogled v njegovo skladateljsko poetiko. Temu sledita zelo uporabna podroben seznam Lovčevih skladb, ki ga je pripravila muzikologinja iz Glasbene zbirke NUK Lidija Podlesnik Tomášiková, in predstavitev Lovčevih posnetkov v zvočnem arhivu RTV Slovenija, ki jo je pripravila Lea Hedžet, muzikologinja in glasbena urednica na Radiu Koper.

Besedilo je ustrezno dopolnjeno z bogatim in premišljeno izbranim slikovnim gradivom, priložena pa je tudi zgoščenka z Lovčevo glasbo. Posebno vrednost monografiji dajejo povezave do digitalnih vsebin, objavljenih na spletu.

Tako zasnovana monografija osvetljuje Vladimirja Lovca in njegovo delo na različne načine, prek vključevanja digitalnih vsebin pa bo morda zanimiva tudi za mlajšo generacijo bralcev, ki jim je tak dostop do informacij bližji. Ob dejstvu, da Lovec do sedaj v strokovni in znanstveni muzikološki literaturi (z izjemo ene diplomske naloge in nekaterih omemb v preglednih besedilih) še ni bil ustrezno poglobljeno obravnavan, je monografija *V zrcalu glasbene iskrenosti: Vladimir Lovec (1922–1992)* nedvomno pomemben prispevek in izhodišče za nadaljnjo obravnavo Lovčevega življenja in glasbenega delovanja.

Nejc Sukljan (nejc.sukljan@ff.uni-lj.si)
Filozofska fakulteta, Univerza v Ljubljani

Helena Filipčič Gardina, editor

V zrcalu glasbene iskrenosti: Vladimir Lovec (1922–1992) [*In the Mirror of Musical Sincerity: Vladimir Lovec (1922–1992)*]

Koper: Zavod lepih umetnosti, 2022. 84 pages. €19. ISBN: 978-961-95887-0-3.

The monograph *In the Mirror of Musical Sincerity: Vladimir Lovec (1922–1992)*, edited by musicologist Helena Filipčič Gardina, commemorates the 100th anniversary of the birth of Vladimir Lovec (1922–1992), a composer, conductor, music pedagogue, publicist and all-round producer of music.

The content of the monograph sheds light on various aspects of Lovec's personality and is thematically divided into three main parts. The first part of the monograph includes a chapter by Helena Filipčič Gardina titled "Life Stations and Diverse Activities of Vladimir Lovec." We follow Lovec's musical path through his central milestones: early years, music education and his beginnings as a composer, first jobs in the field of music, activities at the Koper Music School, music publishing and production activities, a brief outline of the composer's oeuvre and a list of some important performances. The contribution, which brings to the fore the most important highlights from Lovec's life, is written in a systematic and transparent manner and is based on the relevant and properly cited primary (archival) sources and available secondary literature; the bibliographic list at the end of the article undoubtedly offers a suitable starting point for possible further research into Lovec's life and musical activity.

In the second, more extensive part, Vladimir Lovec is remembered, in conversations with Helena Filipčič Gardina and Marija Gombač, by his former students, colleagues and friends, most of whom still play an important part in shaping musical (and cultural) life in Koper and beyond in one way or another; some of them were encouraged to pursue music professionally by Lovec. The two authors ask thoughtful and broad questions: while some of them are more informative, the others focus on Lovec's pedagogical approaches, personal views, the understanding of his compositional oeuvre and, ultimately, the impact he had on the life path of the interviewees. Through the answers,

we get to know Vladimir Lovec as a rather complex and well-versed personality of many interests, both in music as well as in the humanities in general. He, for instance, shows himself to be a dedicated educator who successfully found a way to reach his students; he not only emphasized the technical aspects of playing an instrument, but also extensively debated music with them, thus helping them understand what they were actually playing. This kind of discovery of the composer's personality, his way of thinking, mental horizons and approaches to music is undoubtedly important also in the comprehensive assessment of his compositional activity. This part concludes with the contribution by Anna Fink, a musicologist and former music editor of Radio Koper, who remembers Lovec mainly through her cooperation in radio broadcasts in which she discussed his works.

The last thematic section provides insight into the compositional oeuvre of Lovec and is an indispensable starting point for further exploration of his musical output. We first gain knowledge of the composer's testimony about his own compositions, offering insight into his creative musical poetics. This is followed by a very useful detailed list of his compositions, prepared by Lidija Podlesnik Tomášiková, a musicologist from the NUK Music Collection, and a presentation of Lovec's recordings in the audio-visual archive of RTV Slovenia, prepared by Lea Hedžet, musicologist and music editor at Radio Koper.

The text is appropriately supplemented with abundant and thoughtfully selected visual material, including a CD with Lovec's music. Links to digital content published online give the monograph special value.

The monograph thus sheds light on Vladimir Lovec and his work in a myriad of ways, and through the inclusion of digital content, it may prove to be interesting for the younger generation of readers, who are more inclined to use digital means of accessing information. Given the fact that Lovec has not yet been properly discussed in depth in professional and scientific musicological literature (with the exception of a single diploma thesis and some mentions in review texts), the monograph *In the Mirror of Musical Sincerity: Vladimir Lovec (1922–1992)* is undoubtedly an important contribution and a meaningful starting point for further discussion of Lovec's life and musical activity.

Nejc Sukljan (nejc.sukljan@ff.uni-lj.si)
Faculty of Arts, University of Ljubljana