

# MUSICAL SILENCES *and* SONIC VISUALISER

## AN INTRODUCTION TO COMPUTER-ASSISTED PERFORMANCE ANALYSIS IN TWENTIETH-CENTURY MUSIC

Formen- und Strukturanalyse, 2<sup>nd</sup> Semester 2019/2020

Universität für Musik und darstellende Kunst Wien

University of Music and Performing Arts Vienna

Lecture date: June 10, 2020, 1:00–2:30 pm

Language of instruction: English

Professor in charge of the course: Lukas Haselböck [haselboeck@mdw.ac.at](mailto:haselboeck@mdw.ac.at)

Guest Professor: Bohdan Syroyid Syroyid [bohdan.syroyid@uclm.es](mailto:bohdan.syroyid@uclm.es)

### LECTURE OVERVIEW

This lecture is aimed at introducing music students to the free open-source software Sonic Visualiser<sup>1</sup> developed in the Centre for Digital Music at Queen Mary, University of London. Sonic Visualiser is a powerful tool for analyzing audio recordings, allowing to conduct a deeper musical analysis

You don't need special techniques to analyse recordings: important work has been done using nothing more complicated than a CD player and a pencil to mark up a score, or a stopwatch to measure the duration of movements or sections of them. But it's possible to make your observations more precise, to sharpen your hearing, and to explore the detail of recordings by using simple computer-based techniques. (Cook & Leech-Wilkinson, 2009, para. 3)

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<sup>1</sup> Sonic Visualiser can be downloaded from the official developer's website <https://www.sonicvisualiser.org/>

Sonic Lineup is another free application that belongs to the Sonic Visualiser family and it facilitates the process of comparing different performances of a single musical piece. According to its developers “It's useful for comparing different recordings of the same performance; recordings of different performances of the same work; different "takes" of parts in a recording session or mix” (Sonic Visualiser, 2020).

The analytical scope of the present lecture is focused on examining the constructive functions of musical silences in a selected corpus of 20<sup>th</sup> century music. For this target, a couple of key definitions should be provided:

**Musical Silence.** Silence is the temporal absence of sound(s), a pause, within the span of a musical work, including its edges: pre- & post-performance.

**Notated Silence (NS).** NS is the written sign that musicians might interpret as an abstention from the production of sounds in scores. Most commonly it takes the form of a music rest. [...]

**Acoustic Silence (AS).** AS is the refraining of a musician from the production of sound, as registered in an audio file. Most times, this is associated with a region during which the amplitude level is below a determined dB threshold.

**Perceived Silence (PS).** PS is the impression or perception that a listener has of the absence of sound or presence of silence. There can be significant deviations between the perceived silences of each listener. (Syroyid Syroyid, 2020, p. 10)

Musical silences are often times relegated to a background and their importance is downplayed.

Nonetheless, silences are integral element of music and can manifest a wide range of functions.

For one, silence is a necessary constituent part of music: silence is a musical canvas or background on top of which sounds are laid out (Lissa, 1964; Dougherty, 1979; Littlefield, 1996; Alepin, 2001). Second, silence can be presented simultaneously in all instrumental parts by means of a synchronized withholding of performers from the production of sounds. Third, this withholding can affect only certain parts or voices which implies that no total silence occurs as such but rather a partial silence (Braman, 1956). Fourth, silences can occur in the registral space, as Clifton (1976) and Littlefield (1996) have suggested pointing towards the notion of vertical silences. Fifth, silence can be the generator of other musical elements, beyond pitch (vertical silence), e.g.: rhythm, texture, timbre, articulations, etc. (Lissa, 1964). Sixth, silences might be introduced in a metaphorical or pictorial way by being referenced with sounds or sung words that deliver a silent or quiet mood, which can vary in character from peacefulness to suspense (Lissa, 1964; Clifton, 1976; Littlefield, 1996; Lo, 2015) (Syroyid Syroyid, 2020, p. 161)

This lecture is aimed at raising aural awareness on the musicality of pauses and acoustic silences by facilitating analytical discussion by means of computer-assisted tools such as Sonic Visualiser and Sonic Lineup.

## SETTING UP

Link for Downloading Sonic Lineup

<https://code.soundsoftware.ac.uk/projects/sonic-lineup/files>

Link for Downloading Sonic Visualiser

<https://www.sonicvisualiser.org/download.html>

Instructions for Downloading and Installing Sonic Visualiser

1. Go to the [Sonic Visualiser website](#). There you will find the latest version of the program, together with information about the program and documentation.
2. From the [download page](#), download the Windows version of the program to a temporary location such as your desktop.
3. Click on the downloaded folder and then on 'Extract all files' to open the Extraction Wizard. Create the following directory and unzip the files to there: C:\Program Files\Sonic Visualiser.
4. Now go to the [VAMP plugins download page](#). Download the Windows versions of the Vamp Audio plugins and MATCH Vamp plugins to a temporary location and unzip to the following directory which you will need to create: C:\Program Files\Vamp plugins. If the individual plugin libraries are in subdirectories, move the .dll and .cat files into the main C:\Program Files\Vamp plugins directory.
5. From the [VAMP plugins download page](#), download the Mazurka plugins by clicking on [mazurka-plugins.dll](#). As it is not zipped, you can save it directly to C:\Program Files\Vamp plugins.
6. Next, create a link icon on the Desktop (or Task Manager) for Sonic Visualiser. To do so, right-click with the mouse somewhere on the desktop. Select the menu option New and then select Shortcut from the list that appears. In the box entitled *Type the location of the item:*, type the following: C:\Program Files\Sonic Visualiser\sonic-visualiser.exe. Then click *Next*, and finally click *Finish*. (Cook & Leech-Wilkinson, 2009, para. 4–9)

## GUIDES AND MANUALS FOR SONIC VISUALISER

Cannam, C. (2019). *Reference manual for Sonic Visualiser 4.0.1*.

<https://www.sonicvisualiser.org/doc/reference/4.0.1/en/>

Cannam, C., Landone, C., Sandler, M. (2010). *Sonic Visualiser: An Open Source Application for Viewing, Analysing, and Annotating Music Audio Files*, in Proceedings of the ACM Multimedia 2010 International Conference <https://www.sonicvisualiser.org/sv2010.pdf>

Centre for the History and Analysis of Recorded Music [CHARM] (2020). *Sonic Visualiser: Getting started* [https://www.charm.rhul.ac.uk/analysing/p9\\_3.html](https://www.charm.rhul.ac.uk/analysing/p9_3.html)

Cook, N., & Leech-Wilkinson (2009). *A musicologist's guide to Sonic Visualiser*. Centre for the History and Analysis of Recorded Music [CHARM]  
[https://charm.cch.kcl.ac.uk/redist/pdf/analysing\\_recordings.pdf](https://charm.cch.kcl.ac.uk/redist/pdf/analysing_recordings.pdf)

Leech-Wilkinson, D., Stowell, D., Mauch, M., & Cannam, C. (2020). Videos about Sonic Visualiser  
<http://sonicvisualiser.org/videos.html>

Queen Mary, University of London (2019). *Reference Manual for Sonic Lineup 1.0*.  
<https://www.sonicvisualiser.org/sonic-lineup/doc/reference/1.0.1/en/index.html>

## STUDY WORKS

- Symphony No. 5 in (1902) by Gustav Mahler (1860–1911)
- Symphony No. 2 in D Major, Op. 45 (1902) by Jean Sibelius (1865–1957)
- 3 Little Pieces, Op.11/iii (1914) by Anton Webern (1883–1945)
- Tango (1940) by Igor Stravinsky (1882–1971)
- *Density 21.5* (1946) by Edgard Varèse (1883–1965)
- *April in Paris* [The Solo Sessions] (1963) by Bill Evans (1929–1980)
- Piano and String Quartet (1985) by Morton Feldman (1926–1987)

## LINK TO LISTENING EXPERIMENT (PERCEIVED SILENCES)

Short link:

<https://bit.ly/3hfEc0n>

Full link:

<https://forms.office.com/Pages/ResponsePage.aspx?id=5rosxPRhjEmRB2qM9fAeVlqTtPrjQZZEIrw9Yrv-1rpUMThVRII3S0YwRTAwNkhWTTRVN1JDNIIYUC4u>

## SELECTED LITERATURE ON MUSICAL SILENCE

- Beeman, W. O. (2006). "Silence in Music". In M. L. Achino-Loeb (Ed.), *Silence: The Currency of Power* (pp. 23-34). New York: Berghahn Books.
- Braman, W. D. (1956). *The Use of Silence in the Instrumental Works of Representative Composers: Baroque, Classic, Romantic* (PhD Dissertation, Uni. Rochester) – recommended pp. 1-40
- Clifton, T. (1976). The Poetics of Musical Silence. *The Musical Quarterly*, 62(2), 163-181.
- Cooper, B. (2011). Beethoven's uses of silence. *The Musical Times*, 152(1914), 25-43.
- Dougherty, W. P. (1979). The significance of silence in the string quartets of Beethoven (Doctoral dissertation, The Ohio State University, Graduate School of Music, Department of Music). – recommended reading 1-39
- Harris, E. T. (2005). Silence as sound: Handel's sublime pauses. *The Journal of Musicology*, 22(4), 521-558.
- Gaudibert, E. (1995). Essai sur les différentes catégories du silence musical. *Dissonance/Dissonanz* (45), 15–17.
- Kim, Y. (2013). "The Voice in Silence": Hugo Riemann's Pausenlehre and its psychological implications. *Journal of Musicological Research*, 32(4), 287-313.
- Judkins, J. (1997). The aesthetics of silence in live musical performance. *Journal of Aesthetic Education*, 31(3), 39.
- Lissa, Z. (1964). Aesthetic Functions of Silence and Rests in Music. *The Journal of Aesthetics and Art Criticism*, 22(4), 443-454.
- Littlefield, R. (1996). The silence of the frames. *Music Theory Online*, 2(1).

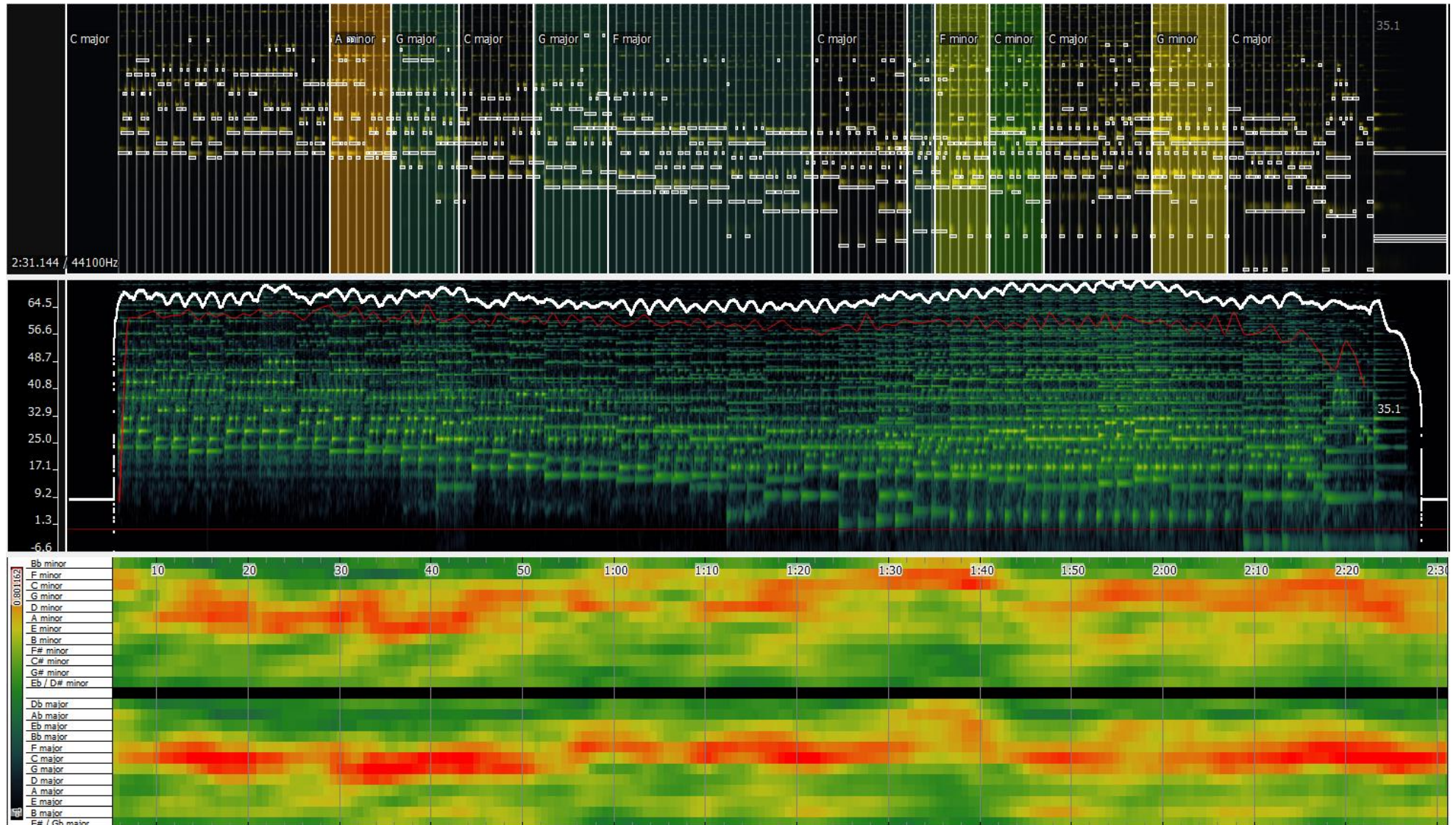
- Margulis, E. H. (2007a). Moved by nothing: listening to musical silence. *Journal of Music Theory*, 51(2), 245-276.
- Metzer, D. (2006). Modern Silence. *The Journal of Musicology*, 23(3), 331-374.
- Syroyid Syroyid, B. (2020). Analysis of Silences in Music: Theoretical Perspectives, Analytical Examples from Twentieth-Century Music, and In-Depth Case Study of Webern's Op. 27/iii. (Doctoral Dissertation in Musicology at KU Leuven, Belgium).
- Wang, S. (2013). *The Aesthetics of Silence in the Works of Federico Mompou, Chou Wen Chung, and George Crumb*. (Master's thesis, University of Cincinnati, Division of Composition, Music History, and Theory). — recommended reading pp. 1-16
- Yin-Lo, K. (2015). *Functions of Silence in the Twelve-tone Music of Anton Webern* (Master's thesis, McGill University). — recommended reading pp. 1-19
- Doctor, J. (2016). The Texture of Silence. In N. Lossef & J. Doctor (Eds.), *Silence, Music, Silent Music*. Routledge. (Original work published 2007)

## BOHDAN SYROYID SYROYID

Composer, pianist, and musicologist. Associate Professor in Music Education at the University of Castilla-La Mancha (UCLM), Faculty of Education in Albacete (Spain). He has worked as Associate Professor in Didactic Strategies and Fundamentals of Music Education at the University of Valladolid (UVa), Faculty of Education in Soria (Spain). As Invited Professor he taught music analysis courses at the University of Turku (Finland) and the International University of La Rioja (Spain).

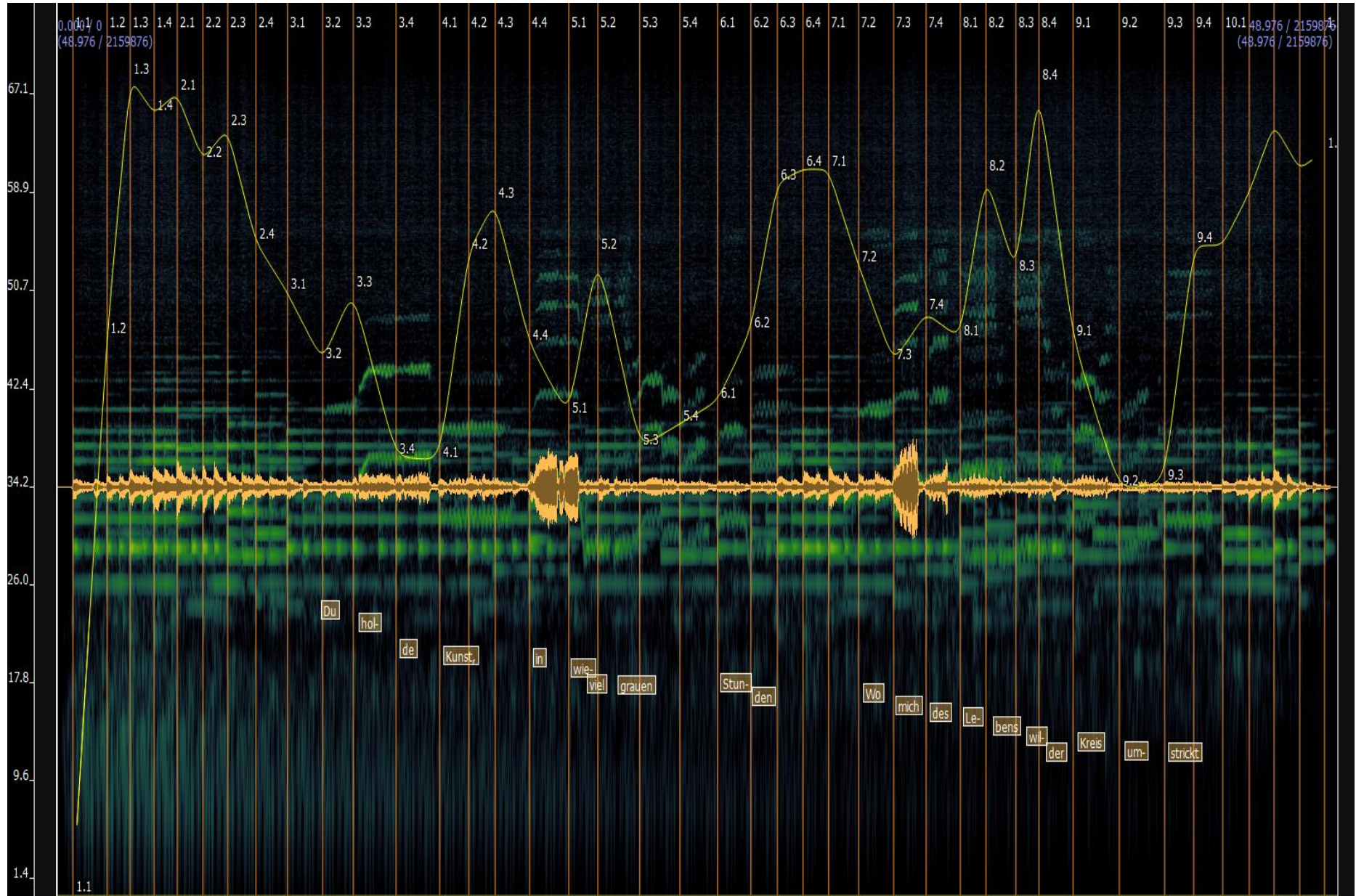
BA (Hons) in Music Composition by the Higher Conservatory of Music of Málaga (Spain), MA in Music Research by the International University of La Rioja (Spain). MFA with Distinction in Professional Composition and Orchestration by the University of Chichester (United Kingdom), MA in Management, Innovation and Leadership of Educational Centers by the University of Camilo José Cela (Spain). PhD in musicology with the dissertation "Analysis of Silences in Music: Theoretical Perspectives, Analytical Examples from Twentieth-Century Music, and In-Depth Case Study of Webern's Op. 27/iii" supervised by Mark Delaere, University of Leuven (Belgium).





Example 1: Analysis of Prelude in C major BWV 846 by Johann Sebastian Bach. Upper panel is a melodic spectrogram overlaid with a MIDI transcription of the piece and automatically detected modulations (with significant deviations). Middle panel is a logarithmic spectrogram with the tempo oscillations highlighted with a red line and the dynamic curve with a white line. Bottom panel is an automatically generated key strength plot that roughly indicates the development of pitch structures. Link to audio <https://youtu.be/PlpTAgpabmo>





Example 2: Analysis of tempo changes in 'An die Musik' by Schubert mm. 1-10 in the version of Elena Gerhardt (1911). Link to audio <https://youtu.be/KftfpelSbIw>

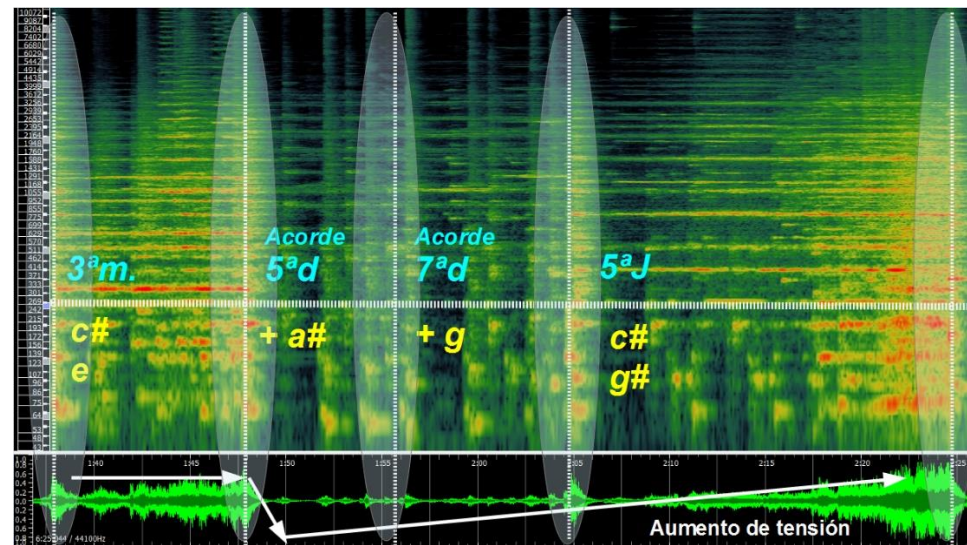
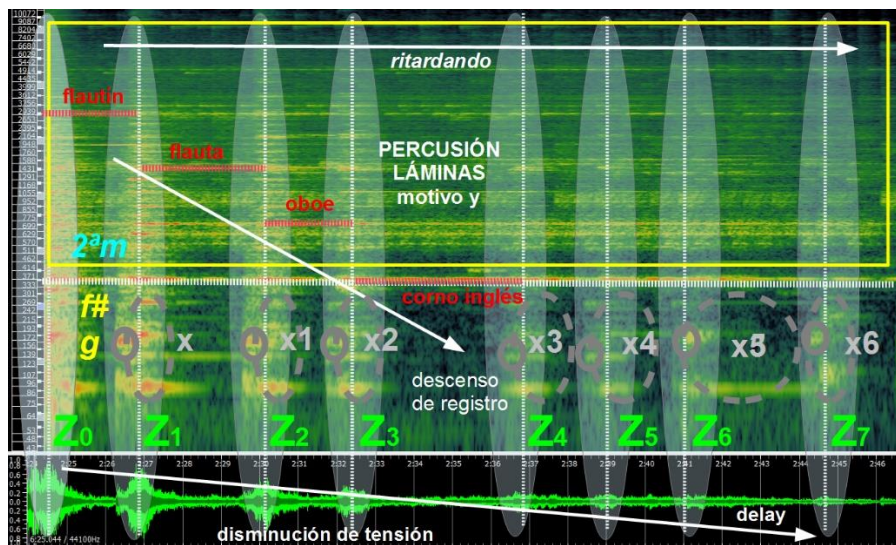


64  
Fl.  
Fl.  
Ob.  
Cm.  
Ing.  
3. B.  
Cl.  
p. B.  
Fag.

pedal estático  
delay del motivo y  
descenso de registro  
delay secundario

Glock.  
Vln. I  
Vln. II  
Vla.  
Vcl.  
Cb.

bordadura de I (re)  
escala cromática  
crescendo  
y



Example 3. Comparative analysis between scores and audio recordings. Source: Syroyid Syroyid, B. (2020). Dodecafonismo espectral: Un breve estudio analítico sobre la construcción musical de la primera sección de Los bosques de cemento, obra ganadora del I Concurso de Composición para Orquesta Sinfónica “Emilio Lehmborg” [https://sulponticello.com/wp-content/uploads/2020/01/068\\_el-resonador\\_bosques-de-cemento.pdf](https://sulponticello.com/wp-content/uploads/2020/01/068_el-resonador_bosques-de-cemento.pdf) Link to audio <https://youtu.be/NYfj4amxxIM>