

Durham E-Theses

*Rhythm Beyond Measure: Computational and
Ethnographic Approaches to Analysing Free-Rhythm
Taksim Improvisation*

JULIANO TAQUES BITTENCOURT ABRAMOVAY

How to cite:

ABRAMOVAY, JULIANO TAQUES BITTENCOURT (2025) Rhythm Beyond Measure: Computational and Ethnographic Approaches to Analysing Free-Rhythm Taksim Improvisation. Doctoral thesis, Durham University.

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a <https://etheses.durham.ac.uk/id/eprint/16235/> is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full Durham E-Theses policy](#) for further details.

Rhythm Beyond Measure: Computational and Ethnographic Approaches to Analysing Free-Rhythm Taksim Improvisation

Juliano Taques Bittencourt Abramovay

Abstract

This dissertation explores the rhythmic dimension of *taksim* improvisation within the *makam* musical tradition, addressing analytical challenges posed by its free-rhythm characteristics. Despite the centrality of *taksim* to *makam* music, existing analytical tools have struggled to articulate its rhythmic nuances, largely due to its non-metric nature. Responding to this gap, the research introduces an innovative methodological framework that combines dialogues with musicians and computational analysis to investigate rhythm in *taksim* performances.

The research begins by integrating existing literature with insights gathered from conversations with contemporary musicians based in Greece who are experts in the *makam* tradition. These perspectives inform the construction of computational tools designed to quantify rhythmic structures that have previously resisted categorisation. The resulting methodology enables detailed empirical analysis and visual representation of parameters such as pulse variations and metricity within improvisations.

These tools are applied in the analysis of selected *taksims* by 20th Century *oud* masters Yorgos Bacanos, Kadri Şençalar and Cinucen Tanrıkorur, revealing their individual stylistic tendencies. This is followed by the analysis of *taksims* performed by contemporary *oud* players, highlighting how current performers creatively engage with, reinterpret, or diverge from traditional rhythmic styles.

Ultimately, the dissertation contributes to the field of computational ethnomusicology by providing analytical tools adaptable to other free-rhythm musical traditions. It offers quantifiable measures for discussing rhythmical tendencies in *taksim*, enabling more nuanced analysis than previously available. By challenging scalar-based theoretical models dominant in *makam* music theory, it proposes a phrase-oriented analytical framework more closely aligned with performance practice. This research thus bridges computational analysis, ethnographic engagement, and theoretical innovation, promoting wider understandings of rhythm in free-rhythm musical improvisation.



Rhythm Beyond Measure: Computational and Ethnographic Approaches to Analysing Free-Rhythm Taksim Improvisation

Juliano Taques Bittencourt Abramovay

A thesis submitted in fulfilment of the qualification of PhD in Music

Music Department

Durham University

2025

Table of Contents

1	LIST OF TABLES	XI
2	NOTE ON TRANSLATION AND TRANSCRIPTION	XII
3	STATEMENT OF COPYRIGHTS	XIII
4	ACKNOWLEDGMENTS	XIV
5	CHAPTER 1. MAKAM IN CONTEXT: HISTORICAL ROOTS, TERMINOLOGY, AND THEORETICAL CHALLENGES	1
1	1.1 LAYING THE GROUNDWORK	1
1.1	Laying the Groundwork	1
1.2	Positioning the Research: Subject, Methods, Research Questions, Contribution and Timeliness	5
1.3	Makam music	8
1.3.1	Terminological Choices: The Case for 'Makam Music'	8
1.3.2	Definition	14
1.3.3	Rules for melodic development: <i>seyir</i>	16
1.3.4	<i>Taksim</i>	17
1.3.5	The problems involving modernisation of <i>makam</i> theory	19
1.4	The Oud	23
1.5	Greek Contributions to Makam: Tradition and Transformation	24
1.5.1	The 'Greek style' in <i>makam</i> music	28
1.5.2	About the musicians consulted in this research	30
1.6	Conclusion	35
2	CHAPTER 2. EXPLORING NON-METRICITY: HISTORICAL AND THEORETICAL DISCUSSIONS AROUND FREE-RHYTHM	37
2.1	Introduction	37
2.2	Rhythm, meter and free-rhythm in musicology	42
2.3	Theoretical discussions related to free-rhythm in Ethnomusicological research	47
2.4	Analytical propositions towards free-rhythm music	51
2.5	Analysis of free-rhythm in the context of <i>taksim</i> improvisation	63

2.6	Conclusion	73
3	CHAPTER 3. WORKING WITH MUSICIANS: SETTING UP THE ANALYTICAL TOOLS	76
3.1	Introduction	76
3.2	Musicians' Discourses Around Rhythm in Taksim	78
3.3	Pulse Within Taksim Improvisation	80
3.4	'The phrase'	86
3.5	'Rhythmic Phrases' – Exploring Metricity in a Free-Rhythm Environment	89
3.6	Conclusion	93
4	CHAPTER 4: TOWARDS A COMPUTATIONAL ANALYSIS OF RHYTHM IN <i>MAKAM</i> MUSIC	98
4.1	Contextual overview and aim of the chapter	98
4.2	Approaches to computational analysis	99
4.3	Computational analysis, makam music and previous analytical developments	101
4.4	Objectives of the Computational Methodology	104
4.5	Onset Detection: Techniques and Challenges	105
4.6	Segmenting Phrase and Sub-Phrase in Taksim Improvisation	112
4.7	Large scale Segmentation of Taksim Improvisation	115
4.8	Estimating Pulse in Free-Rhythm Music	116
4.9	Quantifying Metricity in Taksim	124
4.10	Visualisation of Rhythmic Data: Plotting Pulse and Metricity	128
4.11	Pulse and Metricity Estimation in Sections	129
4.12	Cadential phrases – Comparing Pulse and Metricity	130
4.13	Observing small-scale rhythmical features	131
4.14	Conclusion	132
5	CHAPTER 5 PEDAGOGICAL APPROACHES TO <i>TAKSIM</i> IMPROVISATION: INSIGHTS FROM GREEK MUSICIANS	135
5.1	Musicians in lessons: innovation and heritage on Turkish musicians	136
5.2	Musicians in lessons: rhythm and taksim in the pedagogical context	139
5.3	Imitating the teacher's phrases	140

5.3.1	<i>Phrases variations in the context of imitation</i>	141
5.3.2	<i>Phrase imitation without variation</i>	143
5.3.3	<i>Phrase variations based on a small fragment</i>	144
5.4	Constraining the melodic range	149
5.5	Imitating phrases of existing taksim improvisations	153
5.6	Conclusion	157
6	CHAPTER 6. RHYTHMIC STYLES IN TAKSIM IMPROVISATION: A COMPARATIVE ANALYSIS OF THREE MASTERS FROM THE 20TH CENTURY	160
6.1	Introduction	160
6.2	Kadri Şençalar	163
6.2.1	Kadri Şençalar: Uşşak taksim	164
6.2.2	Kadri Şençalar: Hicazkar taksim	168
6.2.3	Kadri Şençalar: Rast taksim	170
6.2.4	Discussion	172
6.3	Cinucen Tanrıkorur	176
6.3.1	Cinucen Tanrıkorur : Uşşak taksim	176
6.3.2	Cinucen Tanrıkorur: Hüseyini taksim	179
6.3.3	Cinucen Tanrıkorur: Pençgâh taksim	181
6.3.4	Discussion: Cinucen Tanrıkorur 's Rhythmic Style	183
6.4	Yorgo Bacanos	185
6.4.1	Yorgo Bacanos – Rast taksim	185
	Tanrıkorur and Bacanos: discussion	189
6.5	Conclusion: Comparing Şençalar, Bacanos and Tanrıkorur's taksims: the 'taverna style' and the 'art style'	190
7	CHAPTER 7: OBSERVING CONTEMPORARY OUD PLAYERS	195
7.1	Introduction	195
7.2	Evgenios Voulgaris	198
7.2.1	Evgenios Voulgaris: <i>Nikriz Taksim</i>	198
7.2.2	Evgenios Voulgaris: <i>Nihavent taksim</i>	204
7.2.3	Discussion – comparing Evgenios Voulgaris's <i>Nikriz</i> and <i>Nihavent taksims</i>	209
7.3	Kyriacos Tapakis	212
7.3.1	Kyriacos Tapakis: Uşşak <i>taksim</i>	212
7.3.2	Kyriacos Tapakis: Rast <i>taksim</i>	216
7.4	Alexandros Papadimitrakis	222
7.4.1	Alexandros Papadimitrakis: Uşşak <i>taksim</i>	222
7.5	Yurdal Tokcan	228
7.5.1	Yurdal Tokcan: two <i>Nihavent taksims</i>	228
7.5.2	Yurdal Tokcan: <i>Nihavent taksim 2</i>	233
7.5.3	Comparing Yurdal Tokcan's <i>Nihavent taksims</i>	235

7.6	Conclusion	238
8	CHAPTER 8. CONCLUSION	240
9	APPENDICES	251
9.1	Appendix I: Information Sheet and Consent form	251
9.2	Appendix II: instructions for accessing the supporting documentation	253
9.3	Appendix II: RStudio Script for data preparation	254
9.3.1	Creating 'Onset' and 'Phrase' .csv files based on segmentation created on Sonic Visualiser.	254
9.3.2	Creating dataset with pulse and metricity estimation using Onsetsync package (written by Tuomas Eerola)	256
9.3.3	Creating Large-scale plot for rhythmic visualisation in <i>taksim</i> (based on an original script by Tuomas Eerola)	258
9.3.4	Estimating the average and standard deviation of sections	259
9.3.5	Comparing cadential and non-cadential phrases	260
9.3.6	Comparing sections of different <i>taksims</i>	262
9.4	Appendix III: Average and standard deviation of pulse and metricity of <i>taksims</i> studies in Chapter 6 and Chapter 7	264
9.4.1	Kadri Şençalar: Uşşak Taksim	264
9.4.2	Kadri Şençalar: Hicazkar Taksim	265
9.4.3	Kadri Şençalar: Rast Taksim	267
9.4.4	Cinucen Tanrıkorur: Uşşak Taksim	268
9.4.5	Cinucen Tanrıkorur: Hüseyini Taksim	270
9.4.6	Cinucen Tanrıkorur: Pençgâh Taksim	271
9.4.7	Yorgo Bacanos: Rast Taksim	273
9.4.8	Evgenios Voulgaris: Nikriz Taksim	274
9.4.9	Evgenios Voulgaris: Nihavent Taksim	276
9.4.10	Kyriacos Tapakis: Uşşak Taksim	277
9.4.11	Kyriacos Tapakis: Rast Taksim	279
9.4.12	Alexandros Papadimitrakis: Uşşak Taksim	280
9.4.13	Yurdal Tokcan: Nihavent Taksim 1	282
9.4.14	Yurdal Tokcan: Nihavent Taksim 2	283
10	BIBLIOGRAPHY	285

List of Figures

Figure 1.1: origins of the genre taksim (in: Feldman, 2023: 306).	18
Figure 2.1: histogram presenting number of entries for the term ‘Free-rhythm’ on ProQuest.	38
Figure 2.2: transcription of ālāp improvisation performed by Dr. Ritwik Sanyal. In: Widdess 1994: 67.	59
Figure 2.3: John Roeder’s adaptation of Christopher Hasty’s concepts of meter-as projection for the analyses of free-rhythm music. In: Roeder, 2019: 57.	61
Figure 2.4: Arnon’s transcriptions of pauses in taksims by Necdet Yasar. In: Arnon, 2008: 41.	64
Figure 2.5: mind map with key words of the literature reviewed.	74
Figure 3.1: graphic representing musician’s understanding of pulse in taksim.	86
Figure 3.2: conceptual map of the main concepts discussed in the chapter.	96
Figure 4.1: representations of ‘onset’, ‘attack’ and ‘decay’. In: Bello, 2005: 1035.	106
Figure 4.2: flowchart demonstrating the step-by-step of a standard onset detection algorithm. In: Bello et al., 2005: 1036.	106
Figure 4.3: representation of the amplitude of a note (bottom), including its p-centre, and its waveform (top). In: Danielsen, 2019; 404.	107
Figure 4.4: representation of the amplitude of a note played on the oud (bottom), including its p-centre, and its waveform (top).	108
Figure 4.5: Example of a manual onset detection of notes (purple), including the pitch representation of a glissando (green).	109
Figure 4.6: example of onset segmentation on software Sonic Visualiser. Each purple vertical line represents one onset.	111
Figure 4.7: taksim phrase performed by Perikles Papapetropoulos.	112
Figure 4.8: example of onset detection (purple) and phrase segmentation (green). For the phrase segmentation, one timestamp should be added in the beginning of the phrase, and one in the end of it.	114
Figure 4.9: Example of manual pulse detection. The length of a regular section (selection in purple) is measured and divided by its notes.	117
Figure 4.10: tempogram from taksim improvisation by Murat Aydemir in makam Hicazcâr. The colours indicate regions (Y-axis, in milliseconds) in which periodicities are identified over time (X-axis). Brighter colours indicate a stronger periodicity.	118
Figure 4.11: scatterplots with regression line comparing the manual detection of pulse (based on the normal curve) with three methods of automatic pulse detection: Per, FFT, and ACF.	122
Figure 4.12: example of representation of rhythmical aspects of taksim in makam Nihavent by Evgenios Voulgaris.	128
Figure 4.13: box-plot comparing metricity and pulse distributions in cadential and non-cadential phrases.	130
Figure 4.14: transcription of a phrase including the phrase’s pulse (lower bracket), each note’s duration and the ratio of each note in relation to the phrase’s pulse (top bracket).	131
Figure 4.15: comparison between the ratio of notes in 5 similar phrases performed by Ercüment Batanay.	132
Figure 5.1: transcription of four variations from a taksim phrase played by Papapetropoulos. The values in the internal brackets indicate the ratio between the note’s IOI and the phrase’s pulse.	142
Figure 5.2: transcription of taksim phrase played by Papapetropoulos.	143
Figure 5.3: two representations of the duration of notes of phrase b performed by Papapetropoulos.	144
Figure 5.4: example of phrase in makam Huzzam performed by Papapetropoulos. The values in the internal brackets indicate the ratio between the note’s IOI and the phrase’s pulse.	145
Figure 5.5: variations over phrase in makam Hicaz performed by Papapetropoulos. The values in the internal brackets indicate the ratio between the note’s IOI and the phrase’s pulse.	146
Figure 5.6: Papadimitraki’s phrases on makam Uşşak within the context of the “limited melodic range” exercise. The values in the internal brackets indicate the ratio between the note’s IOI and the phrase’s pulse.	150
Figure 5.7: representation of time signature division of Papadimitrakis’s phrases.	151
Figure 5.8: opening phrase of Tanrıkorur’s Uşşak taksim. The values in the internal brackets indicate the ratio between the note’s IOI and the phrase’s pulse.	155
Figure 6.1: pulse and metricity profile of Uşşak taksim by Kadri Şençalar.	164
Figure 6.2: metricity and pulse of cadential and non-cadential phrases of Kadri Şençalar’s Uşşak taksim.	167

Figure 6.3: pulse and metricity profile of Hicazcâr taksim by Kadri Şençalar.	168
Figure 6.4: metricity and pulse of cadential and non-cadential phrases of Kadri Şençalar's Hicazkar taksim.	169
Figure 6.5: pulse and metricity profile of Rast taksim by Kadri Şençalar.	170
Figure 6.6: metricity and pulse of cadential and non-cadential phrases of Kadri Şençalar's Rast taksim.	171
Figure 6.7: pulse and metricity profile of sections of Kadri Şençalar's taksims.	174
Figure 6.8: pulse and metricity profile of Uşşak taksim by Cinucen Tanrıkorur.	177
Figure 6.9: metricity and pulse of cadential and non-cadential phrases of Cinucen Tanrıkorur's Uşşak taksim.	179
Figure 6.10: pulse and metricity profile of Hüseyini taksim by Cinucen Tanrıkorur.	180
Figure 6.11: pulse and metricity profile of Pençgâh taksim by Cinucen Tanrıkorur.	181
Figure 6.12: metricity and pulse of cadential and non-cadential phrases of Cinucen Tanrıkorur's Pençgâh taksim.	182
Figure 6.13: pulse and metricity profile of sections of Cinucen Tanrıkorur's taksims.	183
Figure 6.14: pulse and metricity profile of Rast taksim by Yorgo Bacanos.	186
Figure 6.15: metricity and pulse of cadential and non-cadential phrases of Yorgo Bacanos's Rast taksim.	188
Figure 6.16: pulse and metricity profile of sections from Yorgo Bacanos and Cinucen Tanrıkorur's taksims.	189
Figure 6.17: pulse and metricity profile of sections of Yorgo Bacanos, Kadri Şençalar and Cinucen Tanrıkorur's taksims.	193
Figure 7.1: pulse and metricity profile of Nikriz taksim by Evgenios Voulgaris.	198
Figure 7.2: phrases 1-4 from Evgenios Voulgaris's Nikriz Taksim. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	200
Figure 7.3: metricity and pulse of cadential and non-cadential phrases in Evgenios Voulgaris's Nikriz taksim.	202
Figure 7.4: pulse and metricity profile of Nihavent taksim by Evgenios Voulgaris.	205
Figure 7.5: phrases 35-40 in Evgenios Voulgaris's Nihavent. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	207
Figure 7.6: comparison between metricity and pulse of cadential and non-cadential phrases in Evgenios Voulgaris's Nihavent taksim.	208
Figure 7.7: pulse and metricity profile of sections of two taksims by Evgenios Voulgaris.	210
Figure 7.8: pulse and metricity profile of Uşşak taksim by Kyriacos Tapakis.	212
Figure 7.9: phrases 43-45 from Kyriacos Tapakis's Uşşak taksim. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	213
Figure 7.10: comparison between metricity and pulse of cadential and non-cadential phrases in Kyriacos Tapakis's Uşşak taksim.	215
Figure 7.11: pulse and metricity profile of sections of Tapakis, Tanrıkorur and Şençalar's Uşşak taksims.	216
Figure 7.12: pulse and metricity profile of Rast taksim by Kyriacos Tapakis.	217
Figure 7.13: phrases 7-9 from Kyriacos Tapakis's Rast taksim. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	218
Figure 7.14: phrases 18-19 from Kyriacos Tapakis's Rast taksim. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	219
Figure 7.15: comparison between metricity and pulse of cadential and non-cadential phrases in Kyriacos Tapakis's Rast taksim.	220
Figure 7.16: pulse and metricity profile of sections of two taksims by Kyriacos Tapakis.	221
Figure 7.17: pulse and metricity profile of Uşşak Taksim by Alexandros Papadimitrakis.	222
Figure 7.18: phrases 96-99 from Alexandros Papadimitrakis's Uşşak taksim. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	225
Figure 7.19: pulse and metricity profile of Şençalar's, Tanrıkorur's and Papadimitrakis's Uşşak taksims.	227
Figure 7.20: temporal representation of Nihavent taksim 1 by Yurdal Tokcan.	230
Figure 7.21: phrases 1-3 from Yurdal Tokcan's Nihavent Taksim 1. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	231
Figure 7.22: comparison between metricity and pulse of cadential and non-cadential phrases in Nihavent taksim 1 by Yurdal Tokcan.	232
Figure 7.23: temporal representation of Nihavent taksim 2 by Yurdal Tokcan.	233
Figure 7.24: phrases 10 and 12 from Yurdal Tokcan's Nihavent taksim 2. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.	234

Figure 7.25: comparison between metricity and pulse of cadential and non-cadential phrases in Nihavent taksim 2 by Yurdal Tokcan.	235
Figure 7.26: pulse and metricity profile of sections of two taksims by Yurdal Tokcan.	237
Figure 7.27: pulse and metricity profile of sections of taksims by Tapakis, Tokcan, Voulgaris and Papadimitrakis.	238

List of Tables

Table 4.1: percentage of manually adjusted onsets.	111
Table 4.2: example of how data from phrase segmentation is presented.	114
Table 4.3: Pearson Coefficient comparing the accuracy of automatic methods of periodicity detection in relation to the manual detection.	123
Table 4.4: average difference between manual and automatic pulse estimation in phrases with 3-14 onsets.	123
Table 4.5: example of output from R-package onsetsync presented as '.csv' file including phrase number, pulse, number of onsets of the phrase and its start.	124
Table 4.6: example of data generated from calculations of pulse and metricity.	127
Table 4.7: example of representation of section's pulse, metricity, its average and standard deviations.	129
Table 5.1: comparison between lesson and taksim from Alexandros Papadimitrakis.	152
Table 6.1: comparison between rhythmical features from Şençalar, Bacanos and Tanrıkörür.	192

Note on Translation and Transcription

All non-English words (excluding personal names) appear in *Italic* throughout this dissertation. Terms commonly used in the *makam* system are typically written in Turkish, with a vocabulary that includes words derived from Arabic, Persian and Greek. I follow the orthography established in standard scholarly sources on *makam* music (Feldman, 2023 [1993]; Stubbs, 1994; Signell, 1986; Aydemir, 2010).

Pitches are indicated by their conventional *makam* names, accompanied by their equivalents in Helmholtz pitch notation (Lloyd & Rastall, 2001).

In the *makam* terminology, the names of *perdes* (notes) can refer to three distinct concepts: a specific pitch, a flavour (a brief melodic gesture emphasizing particular notes and characteristic phrases) or an entire *makam*. When designating an individual pitch, the *makam* note name is given in lowercase with its Western pitch equivalent included in parentheses—for instance, *dügâh* (A). When referring to a melodic flavour or a specific *makam*, the name begins with an uppercase letter, preceded by the term indicating its function—for example, flavour Rast or *makam* Rast.

The *makam* system employs a fixed intervallic structure which performers may transpose freely. Therefore, all analytical descriptions and notations refer to pitches as conceptualized within the *makam* system, rather than their absolute sounded frequencies. Musical transcriptions in this dissertation utilize proportional durations and the Arel–Ezgi–Uzdilek notation system for notating intervals (Ayangil, 2008).

Statement of Copyrights

The copyright of this thesis (including any appendices or supplementary materials to this thesis) rests with the author, unless otherwise stated.

This copy has been provided under licence to the University to share in accordance with the University's Open Access Policy, and is done so under the following terms:

- this copy can be downloaded for personal non-commercial research or study, without prior permission or charge.
- any quotation from the work (e.g. for the purpose of citation, criticism or review) should be insubstantial, should not harm the rights owner's interests, and must be accompanied with an acknowledgement of the author, the work and the awarding institution.
- the content must not be changed in any way or sold commercially in any format or medium without the formal permission of the author.

Acknowledgments

This research was conducted with the invaluable support of many individuals, to whom I am deeply grateful. I began my PhD trajectory in 2019 and concluded in 2025. It is impossible to know how this period will be remembered, but as of the writing of this text, it certainly seems to be a historic moment in which many optimistic visions for humanity's future have been overshadowed by major global events. In addition to one large-scale pandemic and two major wars, we are witnessing a catastrophic rise to power of numerous far-right political movements across the globe (had I been conducting this research in another English-speaking country, would it even be safe to write these words in an academic text?). This striking combination creates the sense that I am ending this journey in a much more difficult global environment than the one in which it started.

Because of this, there were periods when the very act of conducting research on music, in a topic seemingly distant from these urgent matters, felt less significant. In such times, invaluable conversations with friends, colleagues and teachers were crucial in restoring my faith in this project, in the research in Arts and Humanities and, to be perfectly honest, in humanity itself.

I would like to express my deepest gratitude to all the musicians that contributed to this research through lessons, conversations, musical exchanges: Thimios Atzakas, Michalis Cholevas, Ross Daly, Kudsi Erguner, Chrysanthi Gkika, Michalis Kouloumis, Harris Lambrakis, Alexandros Papadimitrakis, Perikles Papapetropoulos, Kyriacos Tapakis, Yurdal Tokcan, Evgenios Voulgaris.

To my friends and academic community in Durham University that helped me to feel home in every visit: Budhaditya Bhattacharyya, Tom Graves, Sam Horlor, Sophie Horrocks, Angus Howie, Miles Hudson, Petr Nuska, Simone Tarsitani, Matthew Warren.

I would like to thank the invaluable support of my supervisory team, Prof. Martin Clayton and Prof. Laura Leante, for their careful readings and for their constant and generous help, as well as Prof. Tuomas Eerola for numerous talks and assistances with the computational aspect of the research.

I would like to thank friends and colleagues who, through their conversations, helped untangle several knots and make this project flow: Victoria Harari, Francisco de Oliveira, Ariana Valcarcel, João Batista de Brito Cruz, Nathan Bernacki, Filippo Bonini Baraldi, Panagiotis Poulos, Helena Kallimopoulou, Lara Pearson, Leda Cartum, Manu Falleiros, Fernando Kleiman, Fernanda Bittencourt, as well as my colleagues and students at Codarts – University for the Arts.

I would like to acknowledge the support of the Prins Bernhard Cultuurfonds, Gerry Farrel Scholarships, Durham Hartfield Research Fund and Durham's Faculty of Arts and Humanities Postgraduate Research Support. Without such support, this research could not have been possible.

Finally, I cannot thank enough my family, who have always been an endless source of inspiration and admiration.

Chapter 1. *Makam* in Context: Historical Roots, Terminology, and Theoretical Challenges

*The same stream of life that runs
through my veins night and day runs
through the world and dances in rhythmic measures.*

*It is the same life that shoots in joy
through the dust of the earth in numberless blades of grass and
breaks into tumultuous waves of leaves and flowers.*

*Rabindranath Tagore, The Stream of Life.
Gitanjali: Song Offerings.*

1.1 *Laying the Groundwork*

This research project emerged as the culmination of various areas of interest. As a musician and researcher, my interest in *makam* and the music of the Eastern Mediterranean region began almost by accident. In 2010, I visited Istanbul and, after entering a CD store, was captivated by the music playing in the ambience. The timbre formed by the combination of instruments, the character of the melodies, and the quality of the improvisations performed by musicians compelled me to immediately purchase the album being played in the store – Kudsi Erguner's CD *Alla Turca*.

Upon returning to my home country, Brazil, I began trying to play some of the compositions from this album and, together with fellow musicians passionate about the topic, created musical groups to play Ottoman traditional music and more general Balkan music. In the early 2010s, the best way to learn about this music was to search for material on the internet and to arrange encounters with the very few masters who would occasionally visit the country. To my surprise, one such master who came to Brazil was Kudsi Erguner, the creator of the album that had fascinated me a few years earlier in an Istanbul record store. Erguner performed with his ensemble a repertoire devoted to the Sufi tradition at the Festival of

Turkish Music and Dances hosted by Sesc São Paulo in 2012. Conversations with him and one of the musicians from his ensemble, Michalis Cholevas, solidified my desire to deepen my knowledge of this fascinating musical art, leading to my move to the Netherlands in 2016 to begin a master's in performance in Turkish music at Codarts – University for the Arts, where both Erguner and Cholevas teach.

Although performance was the focus of the master's programme, the practical aspect of this music was not the only element that attracted my attention. I was equally interested in being informed by perspectives from various fields on how this music functions, particularly in understanding the connection between tradition and innovation in different musical practices. Benefitting from a highly international environment, I had Greek and Turkish teachers, and I was fascinated by the fact that what I knew at that point as 'Turkish Music' had different names, nuances, and was more internationalised than I could have imagined. During this period, I was fortunate to benefit from an environment that encouraged incorporating different types of research-based practice into my studies.

As a relatively new student, there were several challenging aspects to performing this music. Producing the correct intonation is certainly a very important one. Indeed, the intonations used in the *makam* tradition have clear particularities and are probably the first aspect to attract the attention of most music students (as well as scholars) coming from a Western background. However, conversations with Cholevas (who at this point was supervising my master research) often led to discussions on the topic of rhythm in the context of *taksim* improvisation. I considered myself relatively comfortable and agile with the rhythmical aspects of compositions and didn't struggle as much with the odd rhythms that typically challenge a beginner in this musical universe. However, when dealing with *taksim* improvisation, I was baffled by the examples presented by my teachers and from recordings by masters. My inability to imitate the rhythm from *taksims* – as well as to create rhythmically interesting phrases – often led to discussions with Cholevas on how to understand this fascinating topic. The fact that this musical idiom presents no apparent metricity and offers different ways in which rhythm can be understood also sparked my interest.

A second point of curiosity arose while having discussions with musicians in workshops and masterclasses. Often, there was an explicit or implicit criticism of the role of music theory in this context. Such criticisms sometimes emerged for political reasons, for instance, when theoreticians try to establish a nationalistic point of view by claiming that the tradition 'belongs' to a country. But on a more profound level, I noticed an atmosphere in which there was a feeling that *makam* theory as conventionally presented cannot explain the intricacies of this music. The fact that I was benefiting from informal and institutional education outside of the central place of production of this music contributed to these kinds of discussions and somehow guided the development of this work. As someone interested both in the academic and performative aspects, I observed that teachers had different ways of explaining the *makam* phenomena, with interesting consequences for their practices as teachers.

As an outsider to this music coming from a bachelor's and master's in Western music, I could not help but compare my previous institutional learning process with how I was observing this music being taught, as well as the binding element that connected different (and often conflicting) regions and cultures. I was particularly attracted to the conception of a pan-national musical style with multiple inflections that somehow bonded a region permeated by centuries of conflict. As will be observed in this chapter, such a vision proposes an understanding of *makam* music that conflicts with an important part of the existing academic literature. The fact that this is a less explored way of observing this music also attracted my attention.

My interest in rhythm in *taksim* intensified as I went through the literature on the topic of free-rhythm. It became clear that, as indicated by academic papers from the late 20th century (Clayton, 1996; Frigyesi, 1993; Widdess, 1994) and more recent analyses (Ohriner, 2016; Roeder, 2019), many musical practices which are pivotal in their respective traditions make use of free-rhythm elements. Yet, the difficulties of discussing free-rhythm led to little work being produced on the topic, and consequently, few methodological tools to analyse such phenomena. One major challenge lies in the absence of a common vocabulary to describe the characteristics of free-rhythm, which often leads to ambiguity in academic discussions. Additionally, the improvisational nature of free-rhythm and its dependence on specific performance contexts make it difficult to fit within existing analytical frameworks. These

aspects contribute to the complexity of analysing free-rhythm and have limited the scope of research in this area.

This chapter presents the conceptual frameworks that guided the subsequent research. Beginning with the exploration of the intricate dynamics of naming and categorising the musical tradition known as '*makam* music', this discussion delves into the historical and cultural contexts that influenced the various terminologies — such as 'Turkish music', 'Ottoman Classical Music' and 'Music of Istanbul' — used by scholars and musicians over time. Examining these terms will clarify the reasons to adopt the term '*makam* music' throughout this dissertation, particularly in light of the preferences and perspectives of the Greek musicians who form a significant part of this study. This chapter also addresses how the choice of terminology reflects broader cultural and nationalistic identities and the complexities these identities impose on understanding and categorising *makam* music. Although not central to the overall dissertation, this section will consider how the evolution of *makam* music and its theoretical frameworks has influenced discussions around its practitioners within the broader context of Greek musicians' engagement this practice. This exploration sets the stage for the subsequent analysis of the theoretical and practical aspects of *makam*, as well as the specific contributions of Greek musicians to this musical tradition.

1.2 Positioning the Research: Subject, Methods, Research Questions, Contribution and Timeliness

Before delving into the historical overview, it is important to clarify the focus and scope of this research. The primary topic investigated here is the rhythm in *taksim* improvisation. While *taksims* are central to *makam* music, detailed analysis of rhythm in *taksims* remains challenging, largely due to difficulties inherent in examining free-rhythm music. Addressing this gap requires first developing suitable analytical tools capable of capturing rhythmic features of this practice. Once such tools are established, the research moves towards applying them to specific case studies: selected improvisations by 20th century masters and Greek contemporary musicians.

Each stage of this investigation adopts a distinct methodological approach, designed to build sequentially upon preceding steps. Initially, a literature review on free-rhythm practices (Chapter 2) establishes theoretical grounding, complemented by conversations with expert musicians led during fieldwork (Chapter 3). These sections highlight critical gaps in existing analytical approaches and inform the development of computational tools tailored specifically for rhythm analysis in *taksims* (Chapter 4). Equipped with these new analytical methods, it becomes possible to revisit ethnographic interactions, facilitating deeper dialogues with musicians about rhythm, analytical insights, and pedagogical techniques employed in teaching improvisation (Chapter 5). This iterative process culminates in detailed comparative analyses, first of historical masters (Chapter 6), and subsequently, of contemporary musicians established in Greece and specialized in *makam* (Chapter 7).

While multiple methodological approaches are included in different phases of the research — combining ethnography and computational analysis — the research is imbued with an effort to include participatory and practice-led components. Being a performing musician, I was able to engage with expert musicians not only as a researcher, but also as a music student. This positionality enabled me access to in-depth musical dialogues that unfolded naturally in the context of lessons, rehearsals, and informal exchanges. Expert musicians are involved in all the stages of the research, and most of the discussions were conducted in the

context of music lessons. Therefore, the methodology was built iteratively, drawing upon discussions with musicians to establish the basis of the analysis, but also revisiting these conversations with musicians to discuss analytical findings and teaching techniques related to *taksim*.

Combining all these different steps, the main research question which will guide this research is the following:

- *How can the development of a computational methodology for rhythm analysis enhance our understanding of rhythmic characteristics of taksim improvisation?*

This research question can be unpacked in the following sub questions:

- *How can insights from expert musicians and existing analyses of free-rhythm music inform the construction of computational tools for analysing taksim improvisation?*
- *How do musicians discuss and transmit rhythmical aspects of taksim improvisation in lessons?*
- *How does the analysis of improvisations from 20th Century masters contribute to understanding the different rhythmic structures and stylistic tendencies in taksims?*
- *What does the analysis reveal about the ways in which contemporary musicians engage with, adapt, or diverge from such rhythmic practices in taksims?*

By addressing these questions, this research contributes to several distinct yet interconnected fields. Firstly, it introduces an innovative methodology enabling empirical analysis and visualization of rhythmic characteristics in *taksim* improvisation. In doing so, it advances the field of computational ethnomusicology, offering analytical tools that propose new ways of observing rhythm, particularly in contexts traditionally resistant to quantification.

Secondly, the participatory approach adopted by this research makes an indirect but significant contribution to *makam* music theory. Traditional ‘scalar-based’¹ theoretical models of *makam* have faced critique from practitioners for failing to adequately represent the nuances of the actual musical practice. This research addresses this critique by developing a ‘phrase-based’ analytical framework, more closely aligned with musicians’ conceptualizations of *makam* music. Such a shift challenges established theoretical paradigms, suggesting new pathways for understanding *makam* through practice-informed lenses. Furthermore, by engaging primarily with musicians based in Greece rather than in the traditional centre of Istanbul, this work enriches the discourse by providing a transnational, decentralized perspective on the *makam* tradition.

Finally, the dissertation offers in-depth discussions and analyses of rhythm in *taksim* improvisation, directly addressing a significant gap in current ethnomusicological scholarship. Despite the prominence of free-rhythm genres across various musical traditions, few methodologies currently exist for their rigorous analysis. This research not only proposes tools to address this deficit but also explores nuanced stylistic differences across individual performers, improvisational styles, and generations of performers. As such, it provides an important foundation for future comparative studies between neighbouring musical traditions, allowing for in-depth analytical perspectives of shared musical features.

The timeliness of this research is underscored by a growing scholarly emphasis on cross-cultural and transnational musical analysis, as well as an increasing recognition of the analytical value embedded in participatory and computational approaches². By responding directly to these emerging scholarly interests, this dissertation advances current understandings of rhythm in *taksim* improvisation, while also offering methodologies with potential applications extending well beyond the immediate scope of *taksim* improvisation.

¹ A detailed discussion on the differences between ‘phrase-based’ and ‘scalar-based’ approaches is presented later in this chapter.

² For recent discussions on music and migration, computational analysis and participatory approaches, see Born (2020), Stokes (2021, 2012), Tenzer & Roeder (2011), Turino (2008), Giri (2022), Tzanetakis et. al. (2007), Serra (2017) and Egan (2021).

1.3 *Makam* music

1.3.1 Terminological Choices: The Case for '*Makam* Music'

This dissertation discusses a musical practice intertwined by a complex array of different names, cultural particularities and geographical complexities. Although the socio-political aspects surrounding the *makam* universe are not central to this body of work, clarifications are necessary to understand the nature of the practice described here, beginning with explaining the terminology employed in this dissertation.

Makam is the name of the modal system used in the context of a musical genre commonly known as 'Turkish art music', 'Turkish Classical music' or 'Turkish-Ottoman Classical Music'. Variations of these terms are used by Feldman (1990, 2022, 2023), Signell (1974, 1976, 1986), Ederer (2011), Wright (2013), and Stubbs (1994), among others. According to Feldman, the use of the term 'Turkish' is justified by the fact that the Ottoman musical culture was grounded in regions where the secular literary language of the Muslim population was Turkish, while non-Muslim groups – most notably Greeks and Jews in Macedonia, Thrace and other regions created their own versions of the Ottoman musical culture (Feldman, 2023: 4). Stubbs (1994) adopts the terminology 'Music of Istanbul' in his dissertation title and subtitles but uses 'Turkish Music' interchangeably in his text. As all the aforementioned authors research either musical practices in contemporary Turkey or historical practices taking place during the Ottoman Empire, it is natural that these names did not evoke further problems.

The association between *makam* music and the Turkish Republic underwent different phases throughout the 20th century. In the years following the establishment of the Turkish Republic, the association with any cultural aspect of the Ottoman heritage was seen by the Young Turks and the founders of the Republic as synonym of old and antiquated, therefore inadequate to represent the values of the Western-oriented modern Turkey³. Effectively, *makam* music was maintained largely by the court of the fallen Empire, and the association between the now-

³ For more information on the relationship between the founders of the republic and Ottoman culture, see Ahmad, 1993; Yarman, 2008; Landau, 2023.

deceased Empire and this musical practice was undeniable. Additionally, there was an aim to adopt elements from Central Anatolia as the cultural core of the Turkish Republic, and *makam* music was marked by the new regime as ‘Byzantine’, ‘Arabic’, ‘quarter-tonal’, hence, ‘synthetic’, ‘unnational’, and ‘abominable’ (Yarman, 2008: 16). As a result, despite attempts by various figures knowledgeable in *makam* music to adopt this practice as a cultural heritage in the early stages of the Turkish Republic, *makam* music was effectively banned from public performances and broadcasts, and places where this music was practised were shut down⁴. In Istanbul, the music from the Ottoman period survived due to a continued thread of master-student relationships called *mesk*⁵, as well as from existing recordings from the pre-republican period⁶.

After the 1940’s, the political discourse around the music from the Ottoman period began to change, and progressively governmental authorities embraced this ‘Ottoman-Turkish’ traditional music. However, this shift in mentality took place under a nationalistic/modernistic approach. During this period, the Ottoman repertoire was again performed, but now by large choirs and orchestras that used a combination of Western and traditional instruments, and with musicians adopting a Western-oriented style of clothes⁷. This modernisation of the musical practice resulted in a significant distortion of the very nature of this musical practice; in a large orchestra, it is necessary to perform in unison, establishing one style of intonation and ornamentation. *Makam* music was originally meant to be played by a smaller set of instrumentalists and, although all musicians execute the same melody, the outcome is not exactly a unison since each instrumentalist performs different ornaments and small variations on the composition. This creates a musical texture often referred to as heterophony (Cholevas, 2007: 197), something impossible to perform by a large orchestra. Additionally,

⁴ The most significant ban occurred in the Sufi orders, particularly the Mevlevi, which has historically been an important cradle of this music. For more information on the relationship between the Mevlevi order and *makam* music, see Feldman, 2018 & 2021; Oley, 2017.

⁵ *Mesk* denotes the master–apprentice, aural/oral pedagogy through which repertoire, *seyir* and *usul* were learnt by imitation and memorisation—historically in court and Sufi settings—and whose ethos continues today alongside conservatoire and media-based learning. For historical account of the *mesk* system in the development of the Ottoman musical tradition, see Feldman, 2023. For contemporary dynamics involving the *mesk* tradition, see Poulos, 2011.

⁶ In fact, the existence of such recordings re-shaped the development of the entire *makam* tradition. For more information on the topic, see Stubbs, 1994; Ederer, 2011.

⁷ For more information on how different Turkish governments embraced Ottoman music as an institutional practice, see (O’Connell, 2005; Yarman, 2008).

the modernisation of Ottoman music that took place in Turkey between 1940s and 1970s also followed a nationalistic discourse where, often, musical styles and repertoire associated with non-Turkish minorities of the Ottoman Empire were considered inauthentic and not cherished, if not completely dismissed. For these reasons, several musicians and academics connected to the musical practice are critical of the modernising initiatives promoted by national policies developed by national governments⁸.

To scholars discussing musical or cultural aspects of *makam* music until the 1980s, the terms 'Turkish' or 'Turkish-Ottoman' were effectively the most coherent ones to adopt. After all, the musicians involved in research were almost exclusively Turkish and, even though important composers, performers, and theoreticians from the Ottoman period had different ethnic backgrounds, the close connection between the living practice of *makam* music and the region where the Republic of Turkey is located justified this terminology. Additionally, many scholars research historical aspects of this musical practice, context in which using the name 'Ottoman' is more than logical.

However, especially after the 1980s, *makam* music and academic discussions began to include non-Turkish musicians and academics either from or with heritage from neighbouring countries of Turkey. Academically, authors began to present historical traces and current practices connecting *makam* with musical practice in Southern Europe, Algeria and even geographically distant places as Malasia (Elsner, Jähnichen & Talam, 2014). The importance of expressive minorities on the formation of the music of the Ottoman Empire has also been extensively studied, and existing musical styles began to have their '*makam*' characteristics more appreciated⁹. At the same time, non-Turkish musicians started specialising in this practice and began to be recognised for their expertise in *makam* music. To many non-Turkish actors involved in this discussion, this music was also a part of their heritage, and the term 'Turkish Music' implied a sense of ownership of this music by the Turkic population, failing to highlight the multi-ethnic character of the populations that established this tradition (Poulos,

⁸ See Öztürk, 2018; Landau, 2023 for a deeper discussion on the topic. It should be mentioned that such nationalistic approach did not happen only in Turkey. In Greece, similar nationalistic politics were developed (see Tragaki, 2018; Pennanen, 2004).

⁹ For historical contribution of ethnic and religious minorities in the development of Ottoman Music, see O'Connell, 2003; Erol, 2015; Feldman, 2019; Poulos, 2022.

2012; Kallimopoulou, 2012&2016). These factors, combined, led to a certain discomfort in accepting unequivocally the term 'Turkish Music'.

Different solutions have been (and continue to be) proposed to improve the adequacy of the name of this musical practice. First, it is possible to remove the 'Turkish' reference from the name, leaving it as 'Ottoman music'. This term has historical precision, as this music is essentially an urban phenomenon with its core in the capital of the Ottoman Empire, and its creation is intrinsically associated with the religious and bureaucratic institutions of the Empire¹⁰. Indeed, using the term 'Ottoman' helps to dissolve the problem of associating this music exclusively with the Turkish population. On the other hand, 'Ottoman' associates this tradition with an Empire that ceased to exist over a century ago. As consequence, this implies that it is a musical practice attached to the past, thereby hindering the fact that it is dynamic and contemporary practice which is constantly evolving. While this would not be a concern for a scholar investigating historical aspects of this practice, contemporary musicians do present this as a reason for the inadequacy of using the term 'Ottoman'. Additionally, the term 'Ottoman' can also be problematic due to the oppressive nature that the centuries of Ottoman occupation had in the neighbouring countries¹¹.

But avoiding the terms 'Turkish' and 'Ottoman' does not exhaust the possible terminologies. A solution to this problem is using the term 'Music of Istanbul'. Such a term has historical accuracy as, by all accounts, the epicentre of this musical practice is the city of Istanbul (Stubbs, 1994: 3; Poulos, 2012: 45). Previously the capital of the Byzantine and Ottoman Empire (then under the name of Constantinople), the city represents the cultural complexity and, to a certain extent, multi-ethnic diversity that formed the musical practice investigated here. Therefore, adopting 'Music of Istanbul' dissolves the problem of 'ethnic ownership' posed by the terms 'Turkish' and the anachronism posed by the term 'Ottoman'. However, using the term 'Istanbul' also brings discomfort to certain populations, as the city was the stage of intense dispute during the early 20th century during the 1921 Greek-Turkish war

¹⁰ For historical connections between religious orders and *makam* music, see Feldman, 2023. For a historical perspective for this music, including the relation between the bureaucratic institutions and the music, see Behar, 2006.

¹¹ I have heard such remarks from musicians Ross Daly, Alexandros Papadimitrakis and Michalis Kouloumis, and from music students from Codarts - University for the Arts.

(Kallimopoulou, 2016: 176). It is not uncommon in Greece to hear the older generation (and even young people) refer to the city by its pre-Turkish Republican name of Constantinople.

Another solution, then, is to maintain the city as the symbol for the name, but to use the pre-Turkish Republican name: 'Music of Constantinople'. This maintains historical accuracy, while removing the name 'Istanbul', which may be sensitive to a Greek-nationalist oriented population. While this reduces the political problems, once again it re-inserts the problem of using a term attached to a static past, failing to acknowledge that this music is alive and constantly evolving.

At this point, it is useful to mention the nature of the *makam* practice investigated here, which is primarily from the perspective of Greek contemporary musicians. These musicians maintain a distinct position in relation to the core of this tradition, and such a position will be expanded further in this chapter. In the non-academic circles I frequented, musicians used terms such as 'Turkish Music', 'Ottoman Music', 'Music from Istanbul', and 'Music from Constantinople' interchangeably, often as synonyms and eventually acknowledging the limitations of each term. 'Music of Istanbul' and 'Music of Constantinople' are names particularly used, especially as titles or subtitles of albums, as they have the commercial advantage of conveying some sort of meaning (or, at least, an imaginary one) to a broader audience.

Another solution for naming this musical practice is to adopt the name of the modal system itself: '*makam* music'. This choice helps reducing the politically charged nature of terms previously employed, using a term generally accepted by the community of musicians and scholars. Indeed, '*makam* music' does not carry any particular sense of ownership that might trigger negative reactions, and, in specialised international circles, this is often the term preferred to avoid major politically sensitive situations¹². Additionally, the term '*makam* music' can possess a wider connotation, in the sense that it can refer either to the 'classical

¹² More than once I have witnessed, for instance, musicians of Turkish origins that, while teaching a masterclass to an international audience, would use the term 'Turkish' music only to correct themselves immediately with 'makam' music. To me, this suggests that these musicians are used to employing the term 'Turkish Music' in their country, but aware of the sensitivity to the term, and trying to change their practice (even if this is a new, or not natural thing to them).

Ottoman' practice or to 'semi-classical *makam*'¹³ and even other styles which are influenced by but are not typically seen as exactly '*makam* music' by academia. In this situation, calling a certain practice '*makam* music' indicates that one is looking at this music through the lens of the modal system developed over centuries, as opposed to other (often Western-influenced) theoretical points of view.

In this dissertation, I have chosen to use the term '*makam* music' to refer to the practice I will discuss. This choice is particularly suitable for this research as the term was most often employed by the living sources consulted during the research, who clearly prefer this term over the more common 'Turkish' or 'Ottoman' terminology. The positionality of these sources – mostly musicians of Greek origin – makes the choice of '*makam* music' more suitable not only due to their preference for the term but also because, as we will see in the coming section, the musicians are a part of a movement that takes place outside of Turkey. Therefore, naming this musical practice as 'Turkish music' would be incoherent. '*Makam* music' also implies an open approach in relation to the very concept of tradition, as described by Ross Daly:

(...) Tradition for us is a dynamic process, every bit as relevant to today and tomorrow as to yesterday, and that it demands of us to be creative artists and not just museum curators. Our approach is not one of conservatism, on the contrary we see every aspect of what is broadly referred to as tradition as being an integral part of today's life. (In: Bourdeau, 2021).

The fact that there is a significant conundrum involved even in the most basic feature of this practice – its very name – shows the complex nature *makam* music and the importance of defining the terms which will be used. This section aimed to explain the reasoning behind using the expression '*makam* music', arguing that it is a term that embraces a more open perspective of the phenomenon both in terms of multi-nationalistic and multi-ethnic

¹³ Most scholars establish the distinction between the 'classical' repertoire of *makam*, associated with the music from the court and the Sufi, and other repertoire which might be 'semi-classical', or 'folk'. See Signell, 1984; 10-15 for a detailed discussion on the topic.

characteristics and in terms of the potential genres it encompasses. In the coming section, I will present definitions of what is a *makam*, comparing academic perspectives with ones presented by musicians. I will also discuss key concepts for the understanding of this practice, including some of the theoretical problems it has faced in the past century.

1.3.2 Definition

Makam music is situated within the context of what is generally referred to as modal music traditions. The term 'mode' has received different definitions over the centuries. Historically, it has often been used to designate classes of melodies (i.e. scales), but, in the 20th century, it has also been used to describe certain kinds of norms and models for composition and improvisation (Powers, 2004). Typically, modal traditions tend not to include many harmonic features, and are composed of single melodic lines with (and occasionally without) percussion accompaniment. In *makam* music, several instruments typically play the same melody, each with its own characteristic ornamentation, producing a sound mass described as heterophonic. Considering these definitions of modes, *makam* music stands alongside *ragas*, *dastgah*, and the Arabic *maqam* as one of the highly described and evolved modal traditions of Central Asia and the Eastern Mediterranean.

'*Makam*' is a Turkish word with Arabic origins that means 'place', 'location', 'position', 'spot', 'state' (Öztürk, 2018: 1771; Powers, 2004). Stubbs (1994) also mentions the terms 'station', 'office' or 'authority' as English equivalents of *makam*, resonating with the fact that each *makam* favours a certain area within a wider register and selects from a 'seemingly infinite variety of pitch within this larger gamut' (Stubbs, 1994: 118). As a musical term, the word was derived from the 'seat' of the melody, i.e., from the single tone upon which the melody rests, or sometimes the final tone or the melodic dominant (Öztürk, 2018: 1771). In this terminology, which began to be used in fifteenth century Ottoman musical treatises, the word '*makam*' defined the mode by its position upon the general scale (Oransay 1966: 71-81). In

Sufi¹⁴ terminology, *makams* are understood as definitive ‘stations’ on the ‘mystical path to reach to God’ (Knysh, 1999: 303-306. In: Öztürk, 2018: 1771).

Signell (1986: 16) defines the *makam* system as ‘(...) a set of compositional rules by which the melodic component of a piece of music is realized’. This definition understands *makam* as the melodic aspect of that system, whereas *usul*¹⁵, the rhythmical component of the modal system, is the other half upon which the entirety of the system can be expressed. The word *makam* can refer to the entire system (as in the term *makam* music) or to specific modes, each one following a different set of rules (as in the *makam Uşşak*, or *makam Hicaz*).

The documentation on the theory of *makam* music is extensive, dating from at least the 15th century. According to Feldman (2023: 12), by the later seventeenth century the body of work regarding *makam* music allowed generic distinctions and divided this practice into four main categories: court music (*fasil*), military/ceremonial music (*mehter*), Sufi music (*ayin, ilahi, tevsih, durak, naat*) and mosque music (*tecvit, ezan*). The most extensive body of research is devoted to court and Sufi music, and important differences between the two practices involve the form of the compositions, as well as some melodic features (Wright, 1992; Behar, 2006; Feldman, 2021&2023). However, it was not uncommon for both practices to be performed by the same musicians.

The decline of the Ottoman Empire was accompanied by a reduction in the patronage for Court Music (Pennanen 2004: 3-7; Ayangil 2008: 401-2; Feldman 1996 :15-18), and musicians specialising in *makam* had two main routes to follow: either to align with the musically conservative dervish orders, or to find work in wine-houses (*meyhanes*) and nightclubs (*gazinos*) owned by members of the urban Greek and Armenian minorities (Feldman, 1990; Ederer, 2005; Beken, 1998; O’Connell, 2000: 120). According to Ederer,

The *meyhane/gazino* musicians were largely successful because they fused courtly music with contemporary popular urban music in a way that greatly

¹⁴ Sufism is a mystical branch from Islam and, historically, has been one of the important centres in which *makam* music developed. For more information on the connection between Sufism and *makam*, see Feldman, 2022.

¹⁵ To keep the consistency of the work, I have gathered all the information regarding rhythm in *makam* music in the Chapter 2 of this dissertation.

added to the sophistication of the latter, though, from the point of view of the dervish-oriented musicians, tarnished and threatened the former in the process. (Ederer, 2008: 34)

As observed, the two facets of this music – one conservative, dervish-oriented, and another popular, entertainment-oriented – allowed the increase of musicians from ethnic minorities in this music, especially Jews, Armenians, Greeks and Roma. This is relevant for this research, as it strengthens the connection between *makam* music and the current object of investigation, which are Greek musicians specialized in this practice.

1.3.3 Rules for melodic development: *seyir*

A central component to understanding the *makam* system is the concept of *seyir*, which is defined as the ‘detailed yet generalized exposition of the progression of a given *makam*’ (Signell, 1986: 60). The *seyir* is the melodic path that the composition or improvisation should follow, indicating the melodic resting points of the given *makam*. According to Signell, ‘the realization of the *seyir* of a *makam* (...) [is a] purposeful melodic movement regulated by rules’ (1986: 66). Stubbs (1994: 117) defines *seyir* as ‘the self-generative principle of *makam* that comes into play during improvisation’, adding that

The *seyir* ("path" or "progression") is an idealized concept of melodic development peculiar to each *makam*, properly distinguishing it from other *makams*. Whether this development is described in prose terms, in musical notation, or by demonstration, *seyir* addresses the dynamic components of the melody, and may include a wide range of abstract modal concerns that exist beyond the realm of specific repertoire, but have to do with how repertoire coalesce in *makam* families. It describes at once what all pieces in the repertoire have in common, and also exactly what a composition or an improvisation needs to stay within the grammar of the mode. The *seyir* is a melodic theory that goes beyond the pitches of the mode, to show characteristic phrase movements, emphases and rests (Stubbs, 1994: 127).

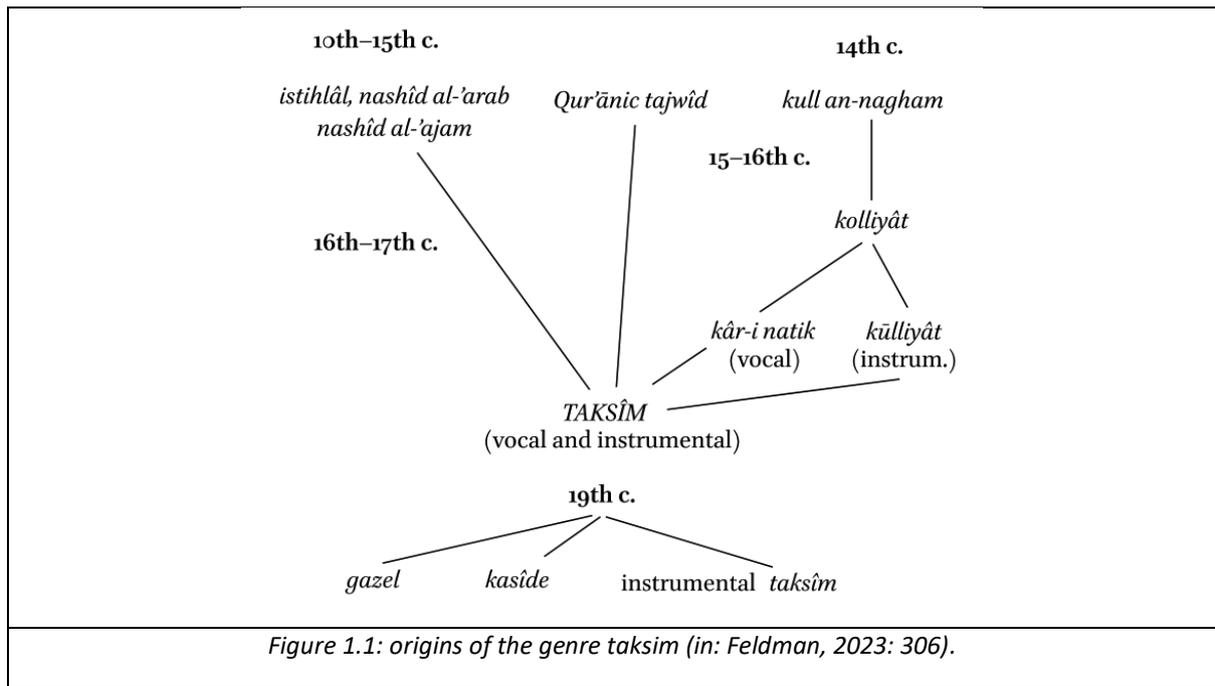
It is worth noting the aforementioned definitions of *seyir* in light of Power's opposition of modal systems between scalar configurations and melodic rules. Here, it is clear that the *seyir* is largely within the scope of melodic norms, being responsible for regulating the movement of the melodic configuration. This will be an important concept that will come to the foreground when discussing the different approaches to *makam* theory.

1.3.4 *Taksim*

Taksim is an improvisational practice central to the universe of *makam* music. The first historical discussion using the term '*taksim*' for performance-generated practices is presented by Cantemir¹⁶, who associates *taksim* with the newly created recent practice of modulations within the *makam* system¹⁷. The term *taksim*, however, is found in fifteenth-century Turkish *mecmua* anthologies, meaning 'a section setting the first verse block' (Wright 1992: 316). Feldman presents a clear map indicating the non-metered, at least partially improvised genres that prevailed in the Islamic world which culminated with the establishment of the *taksim*.

¹⁶ Demetrius Dimitr Cantemir (1673-1723), known in Turkey as Kantemirouğlu) was a Moldavian prince, polymath and author of 'The Book of the Science of Music According to Lettered Notation', the most important treatise of the 17th and 18th century (Wright, 1992; Behar, 2006; Feldman, 2023; Ederer, 2011).

¹⁷ In the context of *makam* practices, modulation is the process of shifting from one *makam* to another in the middle of a composition or *taksim*. It is a very common practice, which seem to have began in the early 17th Century, and is still widely used in contemporary *makam* music (although not a mandatory one). For further discussions on modulation in *makam*, see Signell, 1986.



Stubbs defines *taksims* as a ‘living musical message in the *makam* language in which we hear the vernacular voice of the tradition, together with the devices of rhythm and rhetoric with which the performer persuades understanding from the listener’ (Stubbs, 1994: 23). To Ederer, a *taksîm* is a ‘form of praxis of principles drawn from the body of *makam* theory, that is, the enactment of (a delimited subsection of) *makam* (theory) in the moment of performance’ (Ederer, 2010: xxix). The importance of *taksims*, therefore, comes from the fact that it is a moment in which not only does the musician demonstrates their understanding of the internal nature of a specific *makam*, but at the same time, also expresses their individuality and artistry on the topic.

Feldman continues to explain the fundamental elements that have historically been present in *taksims*:

The *taksîm* as it is known in modern Turco-Arabian music is defined by four major characteristics, which are not present as an ensemble in any other non-metrical genre within the core Muslim world (including the Maghreb and Transoxiana): 1) performance-generation which precludes learned tune-like models 2) specific rhythmic idioms within an overall flowing rhythm context, 3) codified melodic progressions (*seyir*), 4) modulation. (Feldman, 1993: 3)

An important feature of *taksims* is their rhythmic characteristics. Traditionally, *taksims* are described as ‘unmetered’, with ‘flowing rhythm’ and ‘free-rhythm’, which is a topic that will be discussed in detail in the following chapters. There are *taksim* styles with different rhythmic features. Liontou-Mochament exemplifies this by mentioning the *usulü taksim*, an ‘instrumental improvisation with the concurrent existence of an *usul*’, and the *taqasim muwaqqa’ah*, a measured improvisation (Liontou-Mochament, 2023: 10). However, these practices are less frequent than the typical free-rhythm *taksim*.

Taksims have an interesting relationship with the concept of *seyir*. Both terms emerged more or less in the same historical period, being defined according to this terminology for the first time by Cantemir. According to Ederer, there seems to be uncertainty about whether the practice of *taksim* began to consolidate the *seyirs* of given *makams* or if, on the contrary, *taksims* began being described once the concept of *seyir* became codified (Ederer, 2020: 49-51). Whichever is the case, it is clear that a *taksim* is the manifestation of a specific *seyir*, according to what is required by the *makam*.

The concept of *taksim* has been studied from a historical perspective (Feldman, 1993 & 2023) and in contemporary practices (Signell, 1974; Stubbs, 1994; Poulos, 2008; Pennanen, 2014; Cholevas, 2022; Liontou Mochament, 2023). *Taksims* have an equivalent in the traditional Arabic music, which is the *taqasim* (or *taqsim*)¹⁸. As will be observed in the coming chapters, even though the concept of *taksim* has been examined from different perspectives, its free-rhythm character has remained largely unexplored.

1.3.5 The problems involving modernisation of *makam* theory

An important element ingrained in the historical development of Ottoman music is an ambiguous relationship with European culture, which is generally observed as a cultural trace

¹⁸ For studies delving into the Arabic Maqam or the relationship between both, see Touma, 1971; Rohana, 2023, Royer-Artuso, 2015.

of the Ottoman Empire as a whole¹⁹. *Makam* theory was particularly affected by this relationship. According to Yarman (2012: 9), attempts to observe *makam* theory under a Western-oriented musicological perspective began as early as 1864. However, it was during the late 19th century and early 20th century that *makam* underwent a consistent theorisation under a westernised perspective. Rauf Yektâ Bey, the founder of modern Turkish musicology, embraced a Western oriented perspective of music theory, aiming to align this musical practice with the values cherished by the new republic (Yarman, 2008: 13-17). Yektâ Bey devotes an extensive part of his work to propose systems for the scalar division of this music, which eventually led to the Yektâ-Arel-Ezgi system of intonation adopted by the Turkish Music Conservatoires²⁰. Throughout the 20th century, much of the musicological debate around Turkish Music revolved around finding the most adequate ways of proposing scalar segmentation of the ‘*makam* scale’, discussing historical and contemporary practices to attempt to reach a definitive scalar division of the *makam* system. As for the ‘melodic rules’ aspect of the modal configuration, *makam* theory typically presents a description of the ways in which the *seyir* of a *makam* should behave, indicating the melodic resting points and, eventually, acceptable alternatives to it²¹. By all accounts (including those from the authors of such statements), such explanations are not sufficient for a proper understanding of the *makam* and serve more as guides for the experienced performer to understand the functioning of a *makam* either during an improvisation or for writing compositions (Signell, 1986: 46; Aydemir, 2008: 19).

This process of modernisation led to *makam* theories that highlight a scalar perspective of the music, focusing on the microtonal configurations of how the notes were placed in the octaves. In some cases, this also meant reducing the microtonal nuances to approximate it to a Western perspective for political reasons. But most importantly, it led to an understanding of *makam* music as a static phenomenon, without much attention being given to the internal rules that drive the melodic behaviour within the system.

¹⁹ The literature discussing the relationship between the Ottoman Empire and Europe is far too extensive to be referenced here. From a musical perspective, O’Connell, 2000 present interesting perspectives on how this power balances happened through the centuries.

²⁰ The socio-political context around the creation of the Yektâ-Arel-Ezgi system, although fascinating, lies beyond the scope of this dissertation. For more information on this, see Yarman, 2008: 7-20.

²¹ See Signell (1986: 60-65) or Ederler (2012) for typical descriptions of *seyir*.

The outcome of this process was the creation of an academic body of work on *makam* theory which, according to musicians consulted for this research, is not well connected with the practice of the music. These theoretical treatises devote a great amount of time to propose intonation systems that are able to accommodate the entirety of the *makam* system, but fail to understand that this music functions largely as a collection of phrases and, as such, might include a very dynamic use of intonations.

According to Evgenios Voulgaris,

The Turkish and Western-oriented musicologists make a large effort in explaining the scale and measuring the precise interval of the *makams*, but they do not take into account the real motivation, the psychological reason why the notes are being produced and why the overall forms end up being created. This is the fundamental aspect, and it is not investigated - it is like they are looking at the wrong things. This creates the impression that whatever cannot be objectively counted seems to be magical, mystical. But it is possible to discuss the fundamental parts of this music if you look at the phrases, which are basic unit of this music. (Voulgaris, 2024, personal communication)

Ross Daly summarises the problem with the following understanding of *makam* music theory:

(...) often, people that have created the theories of these systems are influenced by western analysis of scale material and modality, so they try to present everything from a Western point of view, which is not very helpful. This is easily noticed by students of modal music which are not from the country from which this music derives. They read this material in the books, but when you take all that information, it doesn't translate into music, it's not enough. The way to connect with these models is through the phrase material, which you absorb through studying the compositions. When you play these compositions, you quickly discover that many of the compositions do not conform with the theory from the book. You have to look at a large

number of compositions. For each *makam*, there are landmarks, the most essential compositions, from which you can understand the mode. (Daly, 2021)

One should note that, especially in recent years, there have been musicologists who share a similar position. Öztürk argues for the existence of two *Turkish* music theory approaches: one that has been described here as ‘scale-oriented’, which came to show a scientific value to the music, and to connect it with the Western world, but which carries an understanding that is not adequate to shed light on the phenomena adequately (Öztürk, 2018: 1772). The second, ‘melody-oriented’, draws from the Turkish music theory dating before the Westernisation movement²², and is more appropriate to further develop the theory of this genre. Andrikos (2020: 225) argues that the ‘use of the octavic scale as the absolute ‘reference size’ creates a plethora of misunderstandings not only in the theoretical but also in the practical field’.

Interestingly, such critique of the local music theory is not restricted to *makam* music, but also useful in observing related musical practices from the region:

Eastern modality²³ is primarily concerned with phrase material or phrase units and only secondarily if at all with scales and other such theoretical constructs and devices. In fact, the vast majority of modes in any of the major modal systems of the East (*raga*, *maqam*, *dastgah*, *ayak*, *ichos*, etc.) cannot actually be described as scales and can only be rendered as units of phrase material or as highly malleable phrasal archetypes which, despite their exceptional fluidity and flexibility are always immediately recognizable (Ross Daly. in: Bourgeau, 2021).

Daly’s remarks regarding the different modal traditions are not merely an anecdotal feature. They are part of a conscious discourse by the musicians to highlight similarities in musical

²² Against this point, it could be said that there are several native Turkish music theories which adopt an intervalar approach, the most notable being the treatise by Cantemir. However, discussions on this point are beyond the scope of this dissertation.

²³ The concept of Eastern modality is inserted into the context of what Daly refers to as Contemporary Modal Music, a musical genre which englobes multiple musical traditions linked by common musical practices. For more information on Contemporary Modal Music, see Kallimopoulou, 2016; Liontou-Mochament, 2023; Bourgeau, 2023.

practices that have at times been observed more for their differences than for their similarities. In his view, the characteristics that make a particular mode recognisable are not its scalar configuration, but aspects related to its ‘highly malleable phrasal archetypes’ and its ‘fluidity and flexibility’. Naturally, these characteristics are much more difficult to grasp and synthesise into a coherent theory, especially if one recognises that most of the theoretical work from the past was developed to understand music theory in the opposite – scalar – direction. However, such challenges should not prevent a consistent attempt for finding ways to discuss this *makam* under a novel perspective, which is what this research aims to do.

1.4 The Oud

A substantial part of this dissertation is devoted to discussing free-rhythm (Chapter 2) and constructing a methodology for analysing rhythm in *taksim* (Chapter 3). The complexities of such topics led to the decision to focus the body of analytical work on a single instrument, a choice that in a first moment facilitates comparisons and the establishment of basic parameters. The analytical section of this research will focus on music performed in the oud²⁴, a plucked string, short-neck, bowed shape instrument. The oud has a close relationship with the Arab culture. While it is not clear exactly when this community began using the instrument, literary sources from the sixth century suggest that the instrument had been long played by the *qaynat* (literally ‘singing girls’) in urban centers of *Hicaz* (Beckless-Wilson, 2022: 5). The instrument was particularly important from the 9th century onwards, period in which it was used as the main reference instrument presented in treatises discussing music intonation from authors as *Abu Yusuf Yaqub ibn Ishaq Al-Kindi* (ca.800-873 C.E.), *Abu Nasr Muhammed Al-Farabi* (ca.850-970) and *Abu Ali al-Husayn ibn Abdullah ibn Sina* (ca.980-1037) (Yarman, 2008: 42-43).

²⁴ One notable exception are the analyses of sessions with Perikles Papapetropoulos, which plays *lavta* and *saz*. The decision to include him in the body of work comes from his importance in the movement of *makam* music in Greece, particularly by the wide range of influences of his musical style.

The oud was part of the music from the Ottoman court until last third of the seventeenth century (reign of *Mehmed IV*), period after which it stopped being used (Feldman, 2018: 177). After this period, the *tanbur* prevailed as the plucked-string instrument most associated with the tradition of *makam*. Only in the latter 19th century did the oud return to the *makam* scene, period in which it is possible to observe musicians from different ethnicities and social backgrounds mastering the instrument (Beckless-Wilson, 2022: 47). As a consequence, it is also possible to observe a wide range of musical styles being performed in the instrument. In Chapter 6, the analytical tools constructed during this research will allow for the observation of details regarding the rhythmical differences between different styles of improvisations.

There are several reasons for focusing on this particular instrument for the analyses. Being a plucked string instrument, it is notably easier to identify the attacks (onsets) of the notes, which reduces the number of manual corrections on onset detection and facilitates the analytical process²⁵. Unlike other plucked string instruments such as the *tanbur*, the oud is relatively widespread in Greece, with a good number of Greek oud players in comparison to other plucked string instruments (Beckless-Wilson, 2023: 6). Furthermore, it is an instrument that transits between different musical genres and styles of *taksim*. This flexibility allows for clearer comparisons between rhythmic characteristics from two contrasting traditions. Lastly, it is an instrument which I have been studying for several years, which facilitates the methodological approach of following classes and discussions with musicians.

1.5 *Greek Contributions to Makam: Tradition and Transformation*

This chapter established that *makam* is a musical practice that emerged in close connection with the Ottoman Empire and is currently associated with contemporary Turkish culture. However, not only is this music played by Greek musicians with an impact on a significant international group of musicians, but *makam* music is, in some senses, also understood as

²⁵ Further discussion on onset detection can be found on Chapter 4.

part of a specific type of Greek heritage. The following section will explore how *makam* music is situated in the Greek musical context through the emergence of the *paradhosiaka* movement.

The debate over what constitutes 'Greekness' has dominated much of Greece's modern history. A central point of debate is the importance given to the Ancient Greek/Hellenic Classical past, in opposition to a more recent Byzantine Greek/Eastern-influenced past. During the period leading to the creation of the modern Greek state (1830), strengthening the connection between the modern Greek state and Classical Greece was fundamental for establishing ties with the European states²⁶. However, the 'Greekness' of indigenous cultural practices with strong connections to Eastern traditions was only brought into discussion through the 20th century (Kallimopoulou, 2006: 21).

One notable event in terms of positioning Greece on the 'East-West cultural spectrum' is the 1922 exchange of population between Greece and the newly founded Turkish Republic. Due to the Greek-Turkish war of 1919-1922, a large number of Greek Orthodox Christians living in Turkey (particularly in the Black Sea region and in Smyrna) were forced to abandon their homes and move to Greece, whereas Turkish Muslims in Greece were forced to move to Turkey. Such a massive displacement of populations had major socio-cultural significance and, musically, it resulted in a cross-cultural exchange with important implications²⁷. Perhaps, the most well-known consequence of this major event is the emergence of the musical genre *rebetiko*. *Rebetiko* was consolidated in tavernas of the 1920s by a population predominantly of migrants, becoming in a few decades one of Greece's most popular musical styles. Even though the *rebetiko* is played on instruments that use Western tuning and harmony, the melodic construction and style of singing presents clear origins in 'Eastern music' – which is only logical, considering that many musicians responsible for the diffusion of *rebetiko* were ethnically Greek but grew up in the Ottoman Empire and were forced to move to Greece in the 1920s²⁸.

²⁶ Kallimopoulou, 2006: 20. For an extensive account of this discussion, see Herzfeld 1986: 75-96.

²⁷ For discussions on the cultural implications of the 1921 Greco – Turkish population exchange, see (Tragaki, 2018).

²⁸ For discussions on the foundations of *rebetiko* music, see Tragaki, 2009. For the relationship between *makam* and *rebetiko*, see Pennanen, 2004 & 1997.

The term *dromos* ('road'; pl. *dromoi*) is often used as an equivalent to *makam* when describing the modal practice of *rebetiko*. Although several names overlap (e.g., *Uşşak/Ousák*, *Hicaz/Hitzáz*, *Rast*), their *seyir* and, at times, their basic scalar content may differ. Accordingly, *dromoi* are best understood as somewhat fragmented, simplified and modified iterations of the *makam* system developed within urban popular practice rather than as fully codified *makam* in the classical sense (Pennanen, 1997: 110).

While *rebetiko* is formed by a combination of elements from Eastern and Western culture, *makam* music is exclusively connected to an Eastern identity, something that did not appeal to a Greek population that had conflicting positions with Turkey. Possibly because of this, *makam* music did not maintain its cultural existence in Greece throughout the 20th century²⁹. After virtually disappearing from the Greek musical scene in the second half of the 20th century, *makam* music re-emerged in Greece in the 1980s within the framework of the *paradhosiaka* movement, which presented a 'renewed interest among Athenian youth in exploring and drawing upon various musical traditions of Greece and Asia Minor' (Kallimopoulou, 2006: 15).

The *paradhosiaka* movement is defined by an expansion of what was until then explored as traditional Greek music (*dhimotiko*)³⁰. One important characteristic of the *paradhosiaka* was the use of musical instruments that, at the time, were mainly found in Turkey, such as the *oud*, *kanun*, *tanbur*, *politiki lyra* and *lavta*. While these instruments were not part of Greece's cultural landscape until the early 1980s, claims concerning the 'Greekness' of some of these instruments are pertinent. Not only were some of these instruments consolidated in the Ottoman Classical music through popular traditions of the Christian Orthodox Greek speaking communities, but many of these instruments had been part of Greece's recent past, entering the country through the exchange of population from 1921. Nevertheless, the line of oral transmission was indeed discontinued during the second half of the 20th century in Greece

²⁹ Daly, 2022. Personal communication

³⁰ *Dimotikó* (δημοτικό) is translated as 'of the people' or 'folk', while *paradosiaká* (παραδοσιακά) refers to the musical movement in question. Both practices are understood within the context of *paradosiakó tragoúdi/paradosiakí mousikí*, which translates as traditional music in general. (Kallimopoulou, 2016: xvii).

and, most likely, these instruments would have been seen as exotic in the country by the late 1970s³¹.

Paradhosiaka emerged as a movement aiming to revitalise musical practices by proposing a new concept of traditional music – one that sees Greece as part of a broader cultural practice related to the system of *makam*. Because of this, according to Eleni Kallimopoulou, the relationship of participants in the *paradhosiaka* movement with the idea of tradition was different from what was seen as traditional music in Greece at the time.

(...) In *paradhosiaka* there was no 'revived tradition' per se. The focal point was rather the Eastern instruments, not as bearers of a specific tradition but as potential enrichments of a broad context of music making viewed as 'traditional'. Accordingly, *paradhosiaka* actors drew upon a wide range of distinct but geographically and historically related repertoires and traditions, whether regional 'folk' repertoires or urban *makam*-related ones, from mainland Greece or Asia Minor and even beyond. Despite a wide diversity of views, in their majority *paradhosiaka* actors do understand what they do as part of 'tradition' (Kallimopoulou, 2006: 13).

The significant change in the understanding of 'tradition' promoted by the *paradhosiaka* musicians in the 1980s had concrete implications for Greece's contemporary musical scene. Although still relatively small (at least in comparison to popular genres such as *rebetiko*), there are spaces for musicians to perform and study *makam* music in Greece, and many of the musicians consulted in this research are teachers in conservatoires, universities³² and music high schools where one can study this music from an early age. Another important centre of study is the Labyrinth Music Workshop. This musical centre was founded by Ross Daly, one of the main actors to establish the *paradhosiaka* movement, and hosts seminars and workshops throughout the year where musicians from different parts of the world come to teach and

³¹ Kallimopoulou, 2006.

³² Some of the institutions with courses oriented towards traditional music (including *makam*) include the University of Athens, University of Macedonia, Aristoteles University, Patras Conservatoire, Artez Conservatoire. According to Thimios Atzakas, hundreds of young musicians are formed every year specialized in traditional music (Atzakas, 2022; personal communication).

study musical traditions related to the modal universe of the Minor Asia/Eastern Mediterranean region.

1.5.1 The 'Greek style' in *makam* music

Even though the revival of the *paradhosiaka* movement strengthened the connection between *makam* music and Greece, Greek musicians tend to remain in a relatively peripheral position in relation to the most traditional views of *makam*. This does not mean that these musicians are not appraised and recognised as experts in this music. However, there are clear differences between Greek and Turkish musical performances, and the latter are usually considered the ones with the 'standard' practice. Some of these differences involve technical components of the instrument. For instance, in Greece, the *politiky lyra*, or lyra of Istanbul, is generally played using metal and synthetic strings, whereas in Turkey (where it is known as classical *kemenche*), it is generally played with gut strings. Because of this, melodies in the Greek version of the instrument are generally more agile and have a brighter sound.

Beyond differences in the construction of the instruments, musicians are able to recognise a distinct way of performing *makam* music which is associated with Greek musicians, and this can be referred to as the 'Greek style'. Poulos exemplifies this when he describes remarks made by his Turkish teachers regarding his playing during music lessons: "... in many cases my teachers had commented to my way of playing as being 'correct but Greek-style'" (Poulos, 2006: 22). Evgenios Voulgaris also recalls a similar experience:

A Turkish musician came to Artha for three months as an Erasmus [exchange teacher], and he discussed a *taksim* that I did on the *Yaili Tanbur* that he liked. He told me that this *taksim* would never happen like this in Turkey. He could understand and enjoy it, but something was not typical. (...) He could recognise the phrases, but he could not explain it, [there was] something with the phrases. (Voulgaris, 2022. Personal communication).

The difference in the style of playing is not perceived by the Turkish musicians as wrong, but it is something that they would not perform in that manner. As there is no literature discussing the technical aspects of these differences, one is left to make speculations. One hypothesis is that, in Turkey, there tends to be a clear division between Art Music (i.e. Classical *Makam*) and Folk Music. It is common to find musicians who are experts in one of these styles and have only vague familiarity with the other one. In Greece, on the other hand, this division is not so clear since the central paradigm of *makam* music is not the core of the region's practice. Therefore, *makam* music can be easily influenced by popular or traditional Greek music³³. More importantly, unlike the case in Turkey, there are no musicians in Greece playing exclusively *makam*; all musicians from the *paradhosiaka* arrived at *makam* music from a background in Byzantine music, traditional Greek music, Jazz or other traditions. The fact that musicians in Greece study *makam* music in addition to other musical styles is an important difference in the education of Greek and Turkish musicians, and most certainly contributes to this difference.

According to Voulgaris, another central component to the Greek Style is the main language spoken by the performers. In his view, musicians from different countries in the region share a similar melodic repertoire, which makes it possible to identify and discuss the same *makams* in different communities (and consequently, to perform songs together). However, the way how musicians perform such melodies is inherently different:

If you go into the national languages that we have, you understand that our brain is very familiar with the way we create the [rhythmic] patterns in our language. Generally, my [musical] phrase is really connected with patterns that I can understand. And this is automatic. For this reason, I'm sure that I can understand a Greek melody because of the flow of the pattern. And for this reason, when I have an Arabic *Beyati*, or *Uşşak*, I can recognise the *Uşşak*, I feel it, but the phrase has a different feeling – I can swear that we would never create this phrase. (Voulgaris, 2022. Personal communication)

³³ Papadimitrakis, 2022 (personal communication).

As we can see, according to Voulgaris, the regional differences in performing melodies are closely influenced by rhythmic patterns assimilated by the musician through spoken language³⁴.

This section demonstrated how the existence of a ‘Greek style’ reinforces the idea that there is a distinct way of performing this music which is associated with Greek musicians, and that this style is recognised and accepted as a part of the *makam* tradition – even though it is not the standard practice. Three important factors were for understanding such concept: (1) the positionality of the practice of *makam* in Greece, and the way these musicians understand the concept of tradition through the movement of *paradousakia* (2) the eclectic musical background of the Greek musicians and (3) and the language spoken, which might affect the way in which the musicians perform. Chapter 5 will resume the discussion of different rhythmical approaches of *taksims* by comparing different improvisational styles.

1.5.2 About the musicians consulted in this research

In this research, I have interacted with musicians in different stages of their careers and coming from different musical backgrounds. In common, they have the fact that they are all professional musicians who are active in the environment of the Greek music scene. The goal of the interaction with the musicians was twofold. First, it was important to understand how rhythm is perceived in the context of *taksim* improvisation. Based on conversations which took place in music lessons, masterclasses and interviews, I have established the basic parameters from which I designed a methodological approach to analyse rhythm in *taksim*. Such discussions are concentrated on Chapter 3. Subsequently, I observed in music lessons how the rhythmical concepts discussed in Chapter 3 are presented in these musician’s *taksim*. The outcome of this section is observed in Chapters 5 and 7.

³⁴ Chapter 2 of this dissertation discusses the connection between language and free-rhythm presented in other academic papers.

Even though there is no attempt to produce a statistically significant outcome from the qualitative data obtained in interviews, I have consulted with different generations of musicians, ranging from musicians born in the 1950s to the 1990s. These musicians can be divided into four generational categories:

- Musicians responsible for the establishment of *paradosakia*

Within this group, I have consulted with multi-instrumentalist Ross Daly. Born in England of an Irish family that travelled the world, Daly began his musical studies with the cello and the classical guitar. His interest in traditional non-Western music started with the sitar and, in his early twenties, he started travelling and studying different musical traditions of the Middle East. Around the 1970's, Daly established in Crete and started specializing in the Cretan lyra, a pear-shaped bowed instrument very popular in the island. Soon, and with an extensive knowledge on music from the region, Daly became a seminal figure, teaching generations of musicians interested in an open-ended approach towards traditional music. In 1990, Daly established the Labyrinth foundation, which promotes regularly masterclasses and seminars with experts in different modal traditions. Daly's seminal role in promoting modal traditions have been studied in academia by Bourdeau (2021, 2024), Kallimopoulou (2012) and Aubert (2021).

- Musicians that received their musical education during the emergence of *paradosakia* (1980-1989)

From this generation, I have consulted with Evgenios Voulgaris and Perikles Papapetropoulos.

Papapetropoulos was born in Athens but grew up in Crete, benefiting from the rich musical traditions of the island. His early musical experiences were deeply rooted in Cretan music, and by the age of 16, he was actively participating in local village festivals, playing instruments such as the *laouto* and *bulgari*. He met Daly in 1985 and soon became his student in the

*baglama saz*³⁵ and *tanbur*. This led to a long-time collaboration with Daly and, as a member of Labyrinth, Papapetropoulos has participated in numerous concerts, recordings, and television productions both in Greece and internationally.

He has recorded several solo albums and participated in numerous projects, including leading the Saz Grubu orchestra. His collaborations focus on music from Asia Minor, but also includes music from Bulgaria, working with prominent artists from Greece, Turkey, and beyond. In addition to his performance career, Papapetropoulos is a highly respected educator. He has taught at institutions including the Experimental Musical Gymnasium-Lyceum of Pallini and the Athens Conservatoire, focusing on the *saz* and *lavta*.

Evgenios Voulgaris is a prominent singer, *Yayli tanbur* and oud player. After receiving formal education in Byzantine music, he led the ensemble Romioi, specialized in *makam* music, and has released several recordings, including his solo album *Wanderings*. Voulgaris is known for contributions with the transcription and study of the of *rebetiko* genre. He co-published a significant collection of rebetika songs from the Civil War period, proposing to observe this phenomena from the perspective of *makam* music³⁶.

Voulgaris has been involved with several educational institutions in Greece and abroad, including the Municipal Conservatory of Patras, the Technological Educational Institute of Epirus, and the Labyrinth Musical Workshop in Crete.

With both Voulgaris and Papaetropoulos, I took private instrument lessons and conducted interviews.

- Musicians with their musical education after the emergence of *paradosakia* (1990-1999)

³⁵ *Bağlama saz* is a long-necked lute widely popular in Turkey, regarded as the principal instrument of rural musical traditions, which began to gain some prominence in Greece after the 1990s.

³⁶ See Voulgaris & Vantarakis, 2009.

This generation received musical education after the establishment of this novel approach on traditional music in Greece. One of the important educational impacts of this generation was the consolidation of Music Lyceums, a model high school with emphasis on music which many of them attended (and subsequently taught). This is the group with the largest population of musicians consulted: Alexandros Papadimitrakis, Haris Lambrakis, Thimios Atzakas and Kyriacos Tapakis.

Papadimitrakis is an oud and lavta player with an established career in Europe. He has studied with Yurdal Tokcan, Sokratis Sinopoulos, and Christos Tsiamoulis, extending his studies to Arabic oud techniques through workshops with masters like Taiseer Elias and Nasseer Shamma. In addition to establishing a performance career, Papadimitrakis teaches at Codarts in Rotterdam and at Labyrinth Catalunya. His workshops often delve into the intricate techniques and ornamentation associated with Greek and Turkish aspects of *makam* music, providing a deep dive into these rich musical traditions.

Haris Lambrakis is a *ney*³⁷ player based in Athens. His musical education included studying with Marios Mavroidis in music theory, Giannis Arvanitis in Byzantine music, and Sylvia Koutrouli and Ömer Erdoğan in ney performance. He founded the Harris Lambrakis Quartet, combining jazz and improvisational music with the ney and proposing an innovative approach towards traditional music. Lambrakis has collaborated with numerous artists and ensembles, including Savina Yannatou & Primavera en Salonico, Ross Daly, and Haig Yazdjian.

Based in Athens, Kyriacos Tapakis is Greek Cypriot oud player. He studied with Antonis Apergis, Ioannis Arvanitis, and Katerina Papadopoulou, and attended masterclasses with Necati Çelik, Simon Shaheen, and Ara Dinkjian. Tapakis is involved in several musical ensembles, including the Notio Toxo, Balarom Trio, and Tania Giannouli Trio, and has collaborated with the New Zealand Symphony Orchestra, Sokratis Sinopoulos and Katerina Papadopoulou, among others.

³⁷ Ney reed flute often found in makam music. It is perhaps the most important instrument for this tradition, especially in the Mevlevi iterations of this music (Feldman, 2023).

Thimios Atzakas began his career in the classical guitar, later exploring the oud and *makam* music with Ziad Radjab and Ross Daly. In addition to co-founding Armos Ensemble and the Tropos Quartet Berlin, he serves as the artistic director of the 'Music Village', an international summer course held annually in Agios Lavrentios, Pilio. Atzakas is a professor at the University of Macedonia's Department of Music Science and Art, where he teaches oud and traditional Greek music ensembles.

- Musicians with their musical education after the emergence of *paradosakia* (2000-2009)

From the younger generation of musicians, I have discussed the phenomena of *taksim* with Chrysanthi Gkika. Gkika began her musical studies at an early stage, studying the lyra of Istanbul under the tutelage of Stratis Psaradellis, Sokratis Sinopoulos, and Derya Turkan. After completing her formal education at the University of Macedonia, she has collaborated with the Netherlands Blazers Ensemble, Kudsi Erguner and Ross Daly. Gkika is a requested educator, being a regular instructor at the Labyrinth Musical Workshop, where she teaches courses on the repertoire and technique of the lyra of Istanbul.

The intention of this research is not to provide a full landscape or unified vision of how rhythm in *taksim* is understood in an entire community; considering the subjective characteristics of free-rhythm (and therefore, the different points of view that will emerge), this would not be realistic. Here, the goal is to present examples from representative musicians on how the free-rhythm aspects of *taksim* improvisation are perceived, discussed and performed.

It should be equally noted that the term *paradosakia*, although academically accepted, is not widely referenced in the musicians' community. Ross Daly adopts the term 'Contemporary Modal Music' to describe his musical practice. Such term proposes to bind the modal traditions of the Eastern Mediterranean, Central Asia and, to a certain extent, India by combining elements of these traditions into a musical style. Daly proposed such term in contrast to the debatable concept of World Music, which he opposes (Bourdeau, 2023; Aubert, 2021).

1.6 Conclusion

This chapter provided an exploration into the cultural, historical and theoretical elements necessary to begin an exploration into the universe of *makam* music. I have discussed the complexities involving its terminology, the definitions of the key concepts of *makam*, *seyir* and *taksim*, and two contrasting perspectives on what constitutes *makam* theory. By addressing these issues, this research aims to contribute to an understanding of *makam* theory that is more aligned with how a specific group of contemporary musicians conceptualizes and performs this music, rather than one confined strictly to theoretical treatises.

Furthermore, I examined the particularities of *makam* practice in Greece, a region whose historical and cultural relationship with *makam* music is shaped by a combination between Ottoman heritage, national identity, and contemporary musical trends. By doing so, I highlighted how musicians in Greece engage with *makam* theory and performance, often negotiating between oral traditions and more formalized theoretical models.

Additionally, this chapter introduced the key musicians whose perspectives will be central to the development of the proposed methodology and subsequent analyses. Their insights will serve as a foundation for understanding the ways in which rhythm, phrasing, and improvisational structures manifest in contemporary *makam* performance. This ethnographic dimension is crucial, as it situates the study of *makam* within the lived experiences of its practitioners, allowing for a more nuanced and practice-based examination of its characteristics.

Building on this foundation, the next chapter will delve into theoretical discussions surrounding rhythm, metricity, and free-rhythm — concepts that are vital for understanding the analytical framework developed in this research. By surveying relevant literature, I will trace how scholars have approached these issues in various musical traditions, establishing the theoretical grounding necessary for analysing rhythm in *taksim* improvisation. The relationship between metricity and non-metricity, structure and freedom, and pulse and non-

pulse will emerge as central themes, shaping the analytical perspectives that will be developed in later chapters.

Chapter 2. Exploring Non-Metricity: Historical and Theoretical Discussions around Free-rhythm

There is certainly a universal and unconscious propensity to impose a rhythm even when one hears a series of identical sounds at constant intervals... We tend to hear the sound of a digital clock, for example, as 'tick-tock, tick-tock' - even though it is actually 'tick tick, tick tick'.

*Oliver Sacks, Musicophilia:
Tales of Music and the Brain.*

2.1 Introduction

The term free-rhythm has been used in a wide range of social contexts to refer to different types of freedom in rhythmic characteristics of music and speech. The most frequent usage of the term refers to a certain lack of metricity, although the term has not always been properly defined in its usage. This lack of specificity creates ambiguity about what is being addressed when discussing free-rhythm, underscoring the need for further exploration and clarification. In this chapter, I will introduce theoretical propositions regarding free-rhythm music, discussions related to the concept of metricity, and analytical essays that discuss free-rhythm. Before delving into academic writings, I will present a short introduction to how this term has been approached in non-specialized literature.

A search for the words 'free-rhythm'³⁸ on the ProQuest platform located 2,736 entries with the term. From this total, 1,406 entries were found in dissertations and theses, while the rest

³⁸ This search was conducted on 13th December of 2023 through the basic search function of ProQuest, which includes the 70 databases available in the platform. Only sources in English were included in this investigation, considering that defining accurate translations and databases in other languages would add complexity that goes beyond the goal of this short introduction.

were spread among historical periodicals and newspapers, scholarly journals, books and magazines.

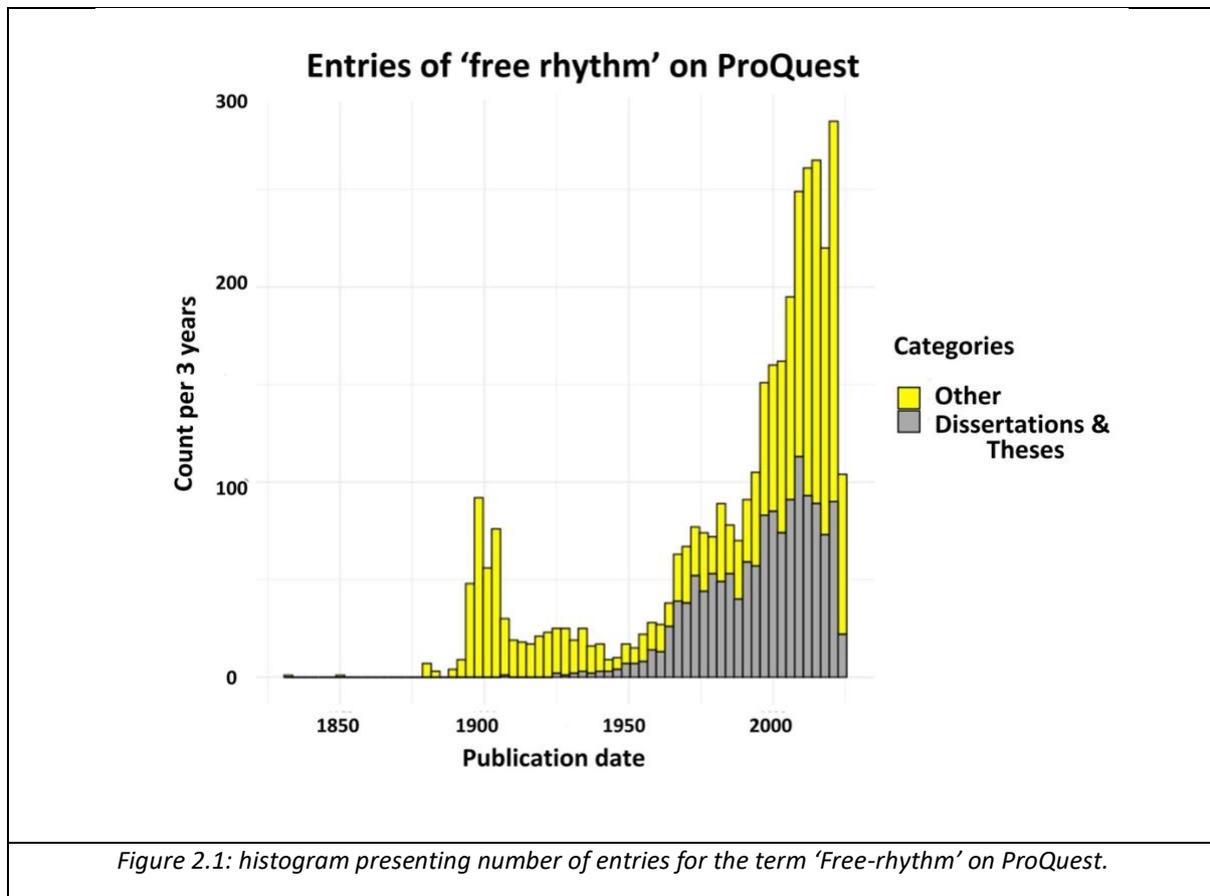


Figure 2.1: histogram presenting number of entries for the term 'Free-rhythm' on ProQuest.

Between the years 1890 and 1915, there was a high incidence of usage of the term in sources such as historical magazines, newspapers and periodicals. In this period, one can find several discussions related to how the religious chants should be performed during congregational activities. In a 1911 edition of *The Musical Herald*, an anonymous writer summarized a discussion following a paper presentation.

Free-rhythm, in [Mr. C. Kennedy Scott's] view, corresponded with ordinary prose, which had possibly irregular accentuation, but a kind of flow which was observed in the measured speech of a practised speaker. Strict rhythm corresponded with poetical or metrical accentuation. Besides the intellectual or measurable aspect, there was the emotional aspect of rhythm. Strict and free-rhythm led us into different realms - the spiritual and the physical. Metrical rhythm

was the easiest to grasp; free-rhythm the most difficult to follow. The further we got from material things, the more we expressed ourselves in prose rhythm (...). (The Musical Herald, 1911)

This publication is titled 'A plea for free-rhythm', and an important point of debate is the differences between the 'old music', which was not metrical and had rhythmical characteristics of prose, and 'new music', which was metrical and rhythmically more regular³⁹. Mr. Scott's apparently controversial stand was that the rhythmic regularity of the 'new music' highlighted physical and intellectual qualities and was therefore less suitable for religious practices. The author exemplifies his argument with a particular case: '[a]lthough we got satisfaction from Bach's music, which is obviously metrical, we did not feel that we were brought into contact with a man who was conscious of the Divine Presence'. The prose-like features of 'Old Music', on the other hand, were more capable of evoking spiritual and immaterial realms, as '[i]t was the value of old music that it revealed sides of our nature that modern music left untouched'. Leaving aside the author's opinion regarding Bach's conscience of the Divine Presence, it is evident that, not only does the author wish to defend the use of free-rhythm in his musical practice, but he also claims that there is a fundamental experiential quality created by this feature, perhaps even transcendental, and this quality of experience cannot be replicated through the use of metrical music.

Published almost 20 years earlier, another anonymous author presented a different understanding of how these free-rhythm structures operate, while at the same time highlighting the vagueness of definitions and terms used in previous conversations:

(...) all the authorities seemed to agree that rhythm played an important part in plainsong, but none appeared to have any exact knowledge of what that rhythm was. (...) Musical rhythm was of two kinds, strict and free; the former corresponding to that in poetry, the latter to the balance of phrases in good prose. The Anglican chant, with its recitation note and subsequent barred music, was a mixture

³⁹ With the information available, it is not very clear how did the authors define 'Old' and 'New' music. The composers Byrd and Mundy are mentioned as examples of 'Old' Music, whereas Bach and Beethoven exemplify 'New' music, which leads to the understanding that the separation probably lies within the Renaissance Period.

of free and strict rhythm. (...) The lecturer showed that the text and music combined in free-rhythm were based on the same fundamental laws as those of strict rhythms, i.e., that each portion or phrase had a specific relation to others and the whole. (Musical News, 1892).

Here, the author offers an interesting proposition: that music which claims to be free-rhythm is in fact not as free as one could expect, because even in such cases, a note still has a 'specific relation' to its neighbours and the whole. While the author does not delve into a discussion regarding the impact of this difference, they highlight the importance of having 'knowledge of the accentuation in Latin' to study the rhythm of plainsong.

As previously mentioned, the bulk of these discussions pertained to topics such as choir singing, plainsong, and psalms. The following quote exemplifies the volume of correspondence published discussing how to perform the rhythm of religious texts:

In the voluminous correspondence which is now going on in your columns on the vexed question of chanting, I observe that much use is made of the terms "free-rhythm," "unfettered rhythms," etc., as applied to the Psalter; and it is plausibly argued that the chants used for the Psalms must have correspondingly "free and unfettered musical rhythm," (i.e., be without bars). (Poole, H. J., 1895).

Interestingly, there are also a few sources from the first half of the 19th century in which similar discussions occur. The earliest example found by this research was an entry from *The Biblical Repository* (1831-1834) which discusses the eventual use of metricity within a particular religious practice:

[...] Others, on the contrary, maintained that the Hebrew poetry is altogether destitute of metre and of feet. Most of the learned Jews are of this opinion. Thus in the book of Cosri, it is boasted of as a peculiar excellence of the Hebrew poetry, that it is not fettered and confined by a syllabic measure, and that it aims not so much at tickling the ear, as at distinctness and force of thought, which are promoted

by the freedom of its movement. (Article 1 -- No Title: *VIII. Historical Interpretation of the Psalms IX. Exegetical Helps*, 1833)

Once again, a clear distinction between the effect of poetry having or not metre can be observed. The author defends that metric poetry is 'confined by a syllabic measure' that aims at 'tickling the ear', while unmetred poetry has 'freedom of its movement' features and 'distinctness and force of thought'. Even considering the uncertainty of what the author means with a vague term such as 'tickling the ear', it is reasonable to assume that, according to his description, unmetred poetry is highlighted as responsible for a more substantial and deep experience, in comparison to metered poetry.

The context in which these discussions were taking place could hardly be more distant from what will be addressed in this dissertation, as we will not delve into details of choir singing in England during the early 20th Century, metered poetry in ancient Hebrew texts or philosophical discussions related to religion and metricity. Far from being an exhaustive examination of existing documentation on the topic, this short digression exemplifies ways in which metricity (or a lack of it) can impact musical practices. It is possible to observe that the referred authors demonstrate clear ideas about the impact of metricity in the singing and are able to articulate these ideas to defend a preferred practice. Metricity is often associated with notions of order, structure, and predictability, reflecting a mechanical or earthly quality. In contrast, the idea of non-metricity is linked to transcendence, fluidity, and a departure from the constraints of the physical world.

These contrasting views resonate with many of the opinions expressed by musicians in Chapter 3. For example, some practitioners described metricity as essential for grounding the listener and establishing regularity, particularly in festive or social contexts. Others viewed non-metricity as a medium for exploring deeper emotional or spiritual dimensions, allowing for improvisational freedom and personal introspection. This tension between metricity and non-metricity serves as a recurring theme, not only in historical texts but also in contemporary discussions with musicians about the nature of rhythm in *taksim*.

As observed in figure 2.1, the number of entries with the term free-rhythm becomes less frequent in non-academic writings between the period of 1920-1960. Most of the results from this period continue to be related to choir and religious chants, although this research did not locate any particularly interesting new perspective on the topic. Additional topics such as music education for children, and music that had been recently published from composers such as Claude Debussy and Erik Satie also begin to emerge. In all those cases, the term is used in a rather vague sense, without presenting a deeper discussion on any aspect related to freedom. Publications discussing non-western music, jazz and blues start to appear around 1950, and become more frequent from 1970 onwards, a period in which we observe a large rise in the number of publications. Despite a noticeable diverse range of topics and a larger number of publications from the last quarter of the 20th century onwards, all the non-academic entries located by this research continue to use the term 'free-rhythm' either to refer to a non-metrical aspect of the music or to suggest a large amount of freedom in the interpretation of the musician.

2.2 Rhythm, meter and free-rhythm in musicology

Even though free-rhythm sparked the interest in specialized circles as early as in the mid 19th Century, discussion around free-rhythm music began to appear in academic discussion only in the second half of the 20th Century. Sachs (1953) introduced the concept of rhythmical freedom referring to the opposition between freedom and strictness, associating these two concepts with chaos and mechanization, respectively.

Order is the vast expanse between the deadly extremes of chaos and mechanization. There are numberless shades within this expanse, some of which draw closer to one of the poles, and some to the other: freedom is often not far from chaos; punctilious, frigid strictness stands next to mechanization. (...) Rhythmical freedom must therefore not be looked upon as law-breaking with a judge's contemptuous eyes. It is neither inferior nor rudimentary, but just dissimilar. (Sachs, 1953: 20).

Here, Sachs makes an effort not to classify rhythmical freedom as inferior. Nevertheless, he does attribute free-rhythm to a rather 'primitive' origin, stating that 'free-rhythm, a precious heirloom from our animal ancestry, is doubtless the earlier quality. Strictness comes with man.' (Sachs, 1953: 21).

The author draws from ancient sources to reiterate opinions similar to what was observed in the first section of the chapter; that unmetered music or speech is imbued with more expressive characteristics in comparison to metered ones. He exemplifies his argument citing Aristotle: 'orators should refrain from meter since its pedantic punctiliousness would impair the force of expression' (Aristotle, Rhetoric, 1403 B. In: Sachs, 1953: 71) and Yehuda ha-Levy: 'meter appealed to the sense only, but impaired comprehension and the intensity of expression' (Yehuda ha-Levy, Sefer hakusari, ed. David Cassel, Leipzig, 1853m book II, ss 69 ff: 181. In: Sachs, 1953: 70). Once again, it is possible to associate metre with a rather negative aspect of mechanization, while non-metered speech or music are suggested to be capable of more intense expressive characteristics.

Additionally, Sachs presents interesting descriptions of free-rhythm within certain musical traditions, particularly the Japanese *no* drama and the *taqsim*⁴⁰ phenomena. Regarding the latter, Sachs argues the following:

(...) Music in the Near and Middle Orient also knows the charm of total freedom. Art forms, from solo songs to orchestral ensembles, have an elaborate introduction (...) in an entirely free, now meditative, now brilliant, virtuoso-like improvisation, without any words or a definite rhythm. True, there might be passages sustained by an ostinato pedal of even quarter beats. When this occurs, the melody must follow somehow, but often breaks loose in offbeats and syncopations. This rhapsodic *taqsim* is an almost exact counterpart of the *ālāpa* before

⁴⁰ The spelling of the term '*taqsim*' with a 'q' indicates that the author is referring to the Arabic iteration of this practice, in which such spelling is the standard.

the Indian *raga*, and of the *bebuka* before the Indonesian *patet* (Sachs, 1953: 95).

As an early academic source mentioning the concept of free-rhythm, Sachs' book provides descriptions with insights into the authors' understanding of the nature of rhythm. Unsurprisingly, the combination of the quotes above allows for the conclusion that the contrast between strictness and freedom is in direct association with the opposition between metre and non-metre. This opposition is categorized similarly to what was observed in the first section of the chapter: non-metered practices corroborate a stronger expressiveness, while metre relates to order and mechanization. Within the realm of non-metre, however, the concept of freedom is not necessarily well defined. For instance, while discussing *taqsim*, Sachs mentions that this practice can happen 'without any word or a definite rhythm', which does create uncertainty over the meaning of the term 'rhythm' for Sachs. The 'syncopation' and 'offbeat' mentioned in the previous quote also might be interpreted as the musician playing metrically, but avoiding to clearly present this metricity, but it is not entirely clear if this is the author's intention or if the terms are used to demonstrate that the rhythm employed is not corroborating the metricity present in the background. These ambiguities are not surprising, considering the lack of previous discussions around these topics.

Sachs' references to these aspects highlight the complexity of discussions around free-rhythm, in these early academic efforts. While his work reflects the challenges of categorising rhythm in non-metric contexts, it presents important ideas for exploring its expressive and structural potential. The ambiguities in Sachs' descriptions, particularly regarding the role of rhythm in *taqsim* and its interplay with metricity, reveal the need for further investigation into how these practices function within their respective traditions. By framing rhythmical freedom as a spectrum that exists between 'chaos and mechanisation', Sachs opens the door for more nuanced analyses of free-rhythm in music.

Written almost a decade later, Cooper and Meyer (1960) presented fundamental contribution to the field of rhythm studies. The authors refer to free-rhythm in the first chapter:

While there can be no meter without an underlying pulse to establish the units of measurement, there can, as we shall see, be meter without any clearly definable rhythm. Conversely, there can be rhythm without meter - as in the 'free' rhythm of some Oriental and folk music and in what has been called the 'measured rhythm' of Gregorian chant (Cooper & Meyer, 1960: 4).

Here, the mention of free-rhythm music appears briefly in the context of discussing the distinction between meter and rhythm. According to the authors, meter and rhythm are two distinct phenomena that should be treated differently; meter is 'the measurement of the number of pulses between more or less regularly recurring accents' (Cooper & Meyer, 1960: 4), while rhythm 'may be defined as the way in which one or more unaccented beats are grouped in relation to an accented one' (Cooper & Meyer, 1960: 6). While a detailed discussion regarding theoretical works that deal with metre and rhythm goes beyond the scope of this dissertation⁴¹, it should be noted that the separation between metre and rhythm solidified as standard for most of the rhythm theories from the 1950's beyond. A few years before Cooper & Meyer published their book, Zuckerkandl (1953) employed the metaphor of a wave to exemplify his understanding of the difference between the meter and rhythm:

To put it metaphorically: the ground upon which the tones fall is itself in wave motion. The wave is the meter; rhythm arises from the different arrangements of the tones on the wave (Zuckerlandl, 1957: 171. In: London, 2002: 697).

Other authors from the later part of the 20th century onwards also argued that meter and rhythm should be understood as different types of phenomena. To mention a few influential theories, Yeston (1976) proposes a stratification of layers of rhythmical activity between which different layers of metre emerge. Lerdahl & Jackendoff (1983) treat rhythm and meter as independent but inter-related hierarchies: one hierarchy of durational groups, and another of metrical time points (London, 2002: 712). Neuman (1959) argues that meter is separate

⁴¹ For a detailed discussion on rhythm theories in the 20th Century, see London (2002). For discussions on rhythm and meter in ethnomusicology, see Clayton (2012).

from rhythm, with the rhythmic experience being prior to any sense of meter-as-measurement (London, 2002: 700).

Moving away from this perspective, Hasty (1997) proposes a contrasting approach for meter and rhythm. The author argues for a reunification of rhythm and meter, claiming that meter is a *particular kind* of rhythmic structure: rhythm involves durational and projective processes, of which meter is a particular kind of projection. According to Hasty, projections are related to the expectation that a listener creates over the length of a second sound after a first sound is produced. A projection acts as a measure by which listeners may assess the timing of upcoming events. For instance, if an event presents the same duration from its predecessor, the projection is felt to be realized. For events with similar, but not the same length, Hasty presents a series of temporal sensations associated with durational projection and realization. Projective subordinated events such as continuation or anacrusis are also understood within this scope of this phenomenon.

Hasty's theory differs significantly from its peers by conceiving meter not as an overall framework upon which rhythm can function, but as one of the phenomena inside the broader scope of rhythm. While investigating rhythm theories, it was challenging to understand how the knowledge created by these researchers could relate to rhythm theories since metricity is such a prominent feature in all of them. Hasty's theory becomes particularly interesting for the studies of free-rhythm music, since it allows for an analysis that does not rely necessarily on metricity. Effectively, Hasty's theory was employed by Roeder (2019) in the study of free-rhythm music, as will be observed in the coming section.

The discussions presented in this section significantly influenced the development of my approach to rhythm and metre in free-rhythm music. While many theoretical perspectives treat metre as a binary choice — either present or absent — my analysis aims to engage with metre as a more fluid concept, existing along a spectrum of metricity. This perspective allows for the exploration of rhythmic phenomena that are neither strictly metrical nor entirely free but instead occupy an intermediate space where varying degrees of metricity can be felt. This approach aligns with Hasty's conception of metre as an emergent quality within rhythmic structures, rather than an overarching framework imposed on rhythm. By integrating this

understanding into the analysis of free-rhythm, I aim to provide a more nuanced view of how musicians interact with and shape rhythmic structures in real time, particularly in the context of *taksim*. These ideas will contribute to the creation of the methodologies and analytical tools introduced in subsequent chapters, where the relationship between metre, rhythm, and expressive freedom will be examined in depth.

2.3 *Theoretical discussions related to free-rhythm in Ethnomusicological research*⁴²

From 1990's onwards, it is possible to identify more nuanced theoretical discussions around the topic of free-rhythm. Frigyesi (1993) presents some of the reasons why non-metered music has remained an intriguing, yet almost unexplored topic in musicological discussions. The author begins by focusing on the characteristics of Western notation and its consequences for the analysis of music which is free-rhythm. Essentially, a score aims to capture the rhythmical structure of a piece of music, but the knowledge of how this score should be executed according to the genre and style of the piece is something that is transmitted from teacher to student through generations. Therefore, these visual representations were not intended to capture a performance of a composition. They aimed to express the 'underlying rhythmic system which, although obviously manifested in the performance, was not identical with it' (Frigyesi, 1993: 60). Therefore, even though the differentiation between a score and its performance is well known in the Western tradition, the specificities of how a score should be interpreted according to a specific style are transmitted from student to teacher. In Frigyesi's words, 'the manner of translating the visual signs into an auditory experience ('making music from the score') is the oral tradition of Western music' (1993: 60).

The problems resulting from this differentiation become more salient when transcriptions are discussed, especially in the context of free-rhythm music. As the author explains,

⁴²This section focuses on papers that emphasise theoretical discussions of free-rhythm. Papers with a stronger emphasis on analysis are included in section 2.4, even if they also address theoretical issues.

transcriptions should also present the background structure of the temporal experience. However, the difficulty of transcribing free-rhythm points toward the fact that there is a large distance between what Western musical perception and analytical thinking is capable of describing – essentially metric figures - and the types of phenomena occurring in free-rhythm music. This does not imply that free-rhythm music has been absent from the Western canon; it suffices to think about opera recitatives or cadenzas of concertos. However, these genres have a somewhat marginal position, hence the little attention that has been given to the topic in Western musicology.

Frigyesi continues explaining the theoretical framework relevant to this topic. According to the author, there is a consensus about what defines metricity. 'It is generally agreed that in metric music we sense a series of regularly recurring beats which normally appear on more than one hierarchical level' (Frigyesi, 1993: 63). However, to claim that free-rhythm is the complete opposite of metric rhythm would be to imply that there is no periodicity whatsoever in this phenomenon, something that the author states as incorrect. In fact, according to Frigyesi, 'most of the so-called free-rhythms are not entirely metric, (...) [and] not entirely free either' (1993: 64).

Overall, the first section of Frigyesi's article introduces some of the fundamental issues that need to be understood if we are to delve into the topic of free-rhythm. Even if concepts such as pulse and meter are not detailed, the author offers relevant insights into the cultural significance of the phenomenon, as well as reasons why Western musicology did not successfully engage in the topic. Most importantly, the author provides reasons for studying the phenomenon, highlighting the fact that several free-rhythm formulations are inserted into a 'deep-rooted tradition of associating rhythmic styles with *genre, form and function*' (Frigyesi, 1993: 66).

Published three years after Frigyesi's publication, Clayton's article (1996) unveils comprehensive and thorough reflections on the subject, starting from a similar premise as Frigyesi's: that 'Free-rhythm is an important musical phenomenon which has been largely neglected by the field of ethnomusicology' (Clayton, 1996: 323). In this article, Clayton's main

concerns are the lack of existing suitable analytical techniques to investigate this music, the reasons for this dismissal and the necessary steps to overcome it.

If the initial assumption adopted by Clayton is similar to the one from Frigyesi, his approach differs significantly; Frigyesi tends to describe the problems of free-rhythm adopting a Western comprehension of rhythm theories. Clayton's approach, on the other hand, is more meticulous; he begins the article presenting a brief survey of free-rhythm styles, in which the author also presents the general context in which the majority of these styles are presented. The author claims that it is possible to observe that 'free-rhythm occurs in a wide variety of forms and context' and, although it is not possible to make generalizations about the range and type of musical forms described as free-rhythm, it should be possible to develop a typology of free-rhythm styles (Clayton, 1996: 325).

The author continues with a survey over free-rhythm in ethnomusicology that presents the few attempted analyses of free-rhythm forms, including Frigyesi's work. While stating the main problem that these works face – the lack of a suitable analytical technique –, Clayton essentially agrees with Frigyesi that there are no existing Western theories that can be tested in another cultural context, and transcription is indeed a major challenge. The author adds an important piece of information; the fact that there are no theories from non-Western cultures known to us that can be applied to free-rhythm music.

While Frigyesi revolves extensively around problems related to Western score and transcription, she mentions rhythm theories only briefly, and mainly from a historical perspective, affirming that 'there is a consensus about what constitutes metricity' (Frigyesi, 1993: 63). Clayton presents a more rigorous discussion on rhythm theories. The author defines pulse as 'a regular beat perceived by the listener to fall at equal intervals of time – we can call these intervals 'categorically equivalent', since they need not be exactly equal in time' (Clayton, 1996: 327). In sequence, he affirms that metre is more problematic to define, presenting several definitions proposed by Kolinsky, Cooper and Meyer, Yeston and Lerdahl and Jackendoff. Although each of these authors presents its particular definition of metre, they essentially agree that metre involves a sense of hierarchy (through strong and weak

beats) combined with the organization of a pulse to provide a framework for rhythmic design (Clayton, 1996: 327-328).

Free-rhythm music, then, might have some of those elements but lack others, and the author proposes a more detailed definition of free-rhythm: '*the rhythm of music without pulse-based periodic organization* – in other words, free-rhythm may or may not have a simple pulse, but where this pulse is organized periodically, free-rhythm cannot be said to exist' (Clayton, 1996; 329).

Differently from Frigyesi, Clayton's paper does not produce any analysis of free-rhythm music in this paper. The author's contributions present a detailed historical overview of genres in which this music is contained, a clear definition of free-rhythm, the relation between free-rhythm, metre, and pulse, and the analytical challenges that this music poses.

Clayton proceeds with contributions on the topic on a later book (2012), where the author expands on his thoughts related to free-rhythm by focusing on the practice of the Indian *ālāp*. The author revisits Widdess's remarks on pulse (which will be discussed in sequence), contributing with the discussion by including remarks from musicians and a short analysis of an *ālāp* in rag Bilaskhani by Amjad Ali Khan. Clayton proposes the following tentative findings: *ālāp* seems to be made of a series of notes or gestures combined into longer phrases and episodes and timing seems to play a role in marking phrases boundaries; there are different temporal levels organizing *ālāp*, from the division of three major phases to the division of phrases of 1-30 seconds, and notes of gestures of 1-5 seconds; longer durations at the end of phrases may be interpreted as a strategy to mark the end of a moment and break a sensation of an emerging pulse; while there is a possibility that a pulse underlies the production of the *ālāp*, it is extremely unlikely that this pulse will be perceived by the listener (Clayton, 2012; 102-103).

Several of Clayton's remarks regarding the practice of *ālāp* resonate with the rhythmic and structural dynamics of *taksim* improvisation, as reflected in discussions with performers. While the contexts of *ālāp* and *taksim* differ significantly, the underlying principles identified by Clayton — such as the multi-layered temporal organization, the use of phrase-final

elongation to disrupt the sensation of an emerging pulse, and the possibility of an existing yet unperceived pulse — find remarkable parallels in the insights shared by musicians. These observations do not simply confirm the author’s findings but also offer a foundation for developing a methodology to approach free-rhythm. This connection will be further explored in Chapter 4, where these parallels are unpacked to inform the analytical tools employed in this study.

The following section of this chapter presents several analytical propositions that address the complexities of free-rhythm in music. These propositions draw from diverse theoretical perspectives and examples, offering tools and frameworks that can be applied to the study of rhythmic practices in non-metric contexts. The following section aims to deepen the understanding of how free-rhythm operates across different musical traditions and how these insights can inform the broader scope of this dissertation.

2.4 Analytical propositions towards free-rhythm music

The first academic work located by this research that extensively investigates rhythmical aspects of unmetered music is Tsuge’s PhD dissertation (1974). *Āvāz* is a prestigious form of singing in Persian traditional music (Blum, 2007) and it is typically characterized by its unique texture in free-rhythm and performed improvisatorially by a solo singer (Tsuge, 1974: 24). An important characteristic of *Āvāz* is the relationship between the rhythm of the melodies and the poetical metre of the verses, and Tsuge’s dissertation concentrates on examining the unique rapport between the metre of Persian poetry and the rhythms of *Āvāz* performed during the period of his work.

The intrinsic relationship between poetic meter and musical rhythm is of great importance here because it provides the most essential, and yet, constantly missing elements for the study of free-rhythm: a clear framework in which the analyses can be established. The author describes the functioning of the eight poetic feet existing in Persian poetry, explaining that poetic metre results from repeating and combining various poetic feet (Tsuge, 1974: 121). In

sequence, he proposes comparisons between the poetic meter and rhythm within three pieces: a performance of *Dobeyti* from Khorāsān, a ‘folk rendition of non-metric singing’ and two examples of classical *Āvāz*. *Chahār-bāgh*, which illustrates the style of close correspondence between poetic and musical metre, and *Deylamān*, representative of the ‘complex and highly elaborate style’ (Tsuge, 1974: 153).

In *Dobeyti*, Tsuge notices that the initial short syllables of each poetic foot are always faithfully observed in the melody and are represented in his transcriptions as ‘short’ sixteenth notes (Tsuge, 1974: 151). The durations of long notes, on the other hand, can vary depending on their position within each foot, with the last long syllables being considerably longer than the first and second ones. In this example, the performer adheres strongly to the poetic meter, making this an important *organizational tool*.

The two examples of the classical *Āvāz* repertoire present a less clear application of poetic meter in its musical rhythm. His transcription suggests a generally faithful adherence to the poetic metre, with clear distinctions between long and short syllables. However, because of the extensive nature of the long syllables, words can be split into two in their metrical division, which can obscure the meaning and identity of the text. To avoid a loss in meaning, singers take an extra effort in abstaining from elongation and embellishment of the long syllables in those cases. Tsuge also highlights the practice of producing melodic and rhythmical compression-relaxation patterns, which is when the text is compressed at the opening of each line by ‘squeezing the syllables closely together, thereby allowing elaborate embellishments on the remaining long syllable towards the close of the phrase’ (Tsuge, 1974: 164). In these sections, the melody is not very restricted to the rules of poetic metre; the distinction of long and short syllables is less clear, and the melody can be guided by a ‘musical demand’. Finally, the author stresses that within the *Āvāz* repertoire, there is a general characteristic of employing iambic patterns as openings. Although Persian verses tend to follow this pattern, which is a strong justification for this behaviour in *Āvāz*, Tsuge highlights that many instrumental openings also follow this rule.

Overall, the dissertation presents a very extensive study on the relationship between poetic metre and *Āvāz* performances. While it presents interesting insights related to the usage of

rhythm and creative transcriptions of unmetered music, the study does not present clear contributions for styles of free-rhythm which are not associated with poetry. Such fact is understandable as it would be extremely challenging at that time to create precise measurements which would allow the author to delve in greater details into the durations of each note. Nevertheless, as Roeder mentions in a paper subsequently discussed in this chapter, while theories of prosody help explain some of the generative strategies of performers, they do not define large-scale forms or engage with the specific durations of syllables, phrases or sections.’ (Roeder, 2019: 56). This limitation is significant because large-scale forms provide a framework for understanding how individual phrases and notes contribute to the overall structure and expressive intent of a performance. Without this perspective, it becomes challenging to analyse how free-rhythm interacts with the broader musical form, particularly in terms of transitions between sections and overall development. Similarly, engaging with the specific durations of notes allows for a more detailed understanding on the nuances of timing and its role in creating an emotional impact. These aspects are critical for studying free-rhythm practices that extend beyond poetic metre, as they provide the tools needed to explore its internal logic.

Written over a decade later, Reckford’s dissertation (1987) addresses several of the topics raised by Tsuge. This study aims to understand the characteristics of three unmetered genres of Iranian religious chant: *madh*, the *muṣībat*, and *rawāyat*, which are a part of the *rawḍa* ceremony. Similarly to Tsuge, Reckford also identifies reciting poetry – in association with certain performance conventions - as a central factor responsible for controlling aspects of rhythm and timing in the cases studied. While the author also recognizes the centrality of poetic meter, he benefits from using technological innovations that were not available during the period of Tsuge’s work. By doing so, Reckford is able to delve deeper into aspects that were identified by Tsuge, but for which he had no means to deepen into.

Reckford proposes an investigation of the duration of hemistichs, which are the half lines of a verse and configure the basic units of this music. Because hemistichs are not uniform, the author starts by sampling variety and contrast, observing that hemistichs vary enormously among themselves. In order to find the principle of rhythm and timing which underlies these

genres, he analyses the following microstructural aspects of hemistich: basic pulse, long and short syllables, caesura placement in relation to considerations of grammar and verse structure, dynamic accent, patterns of dynamic and agogic accent as complementary elements, and the iambic structure of Persian chant and rhythmic density (Reckford, 1987: 134). While an explanation of all the aforementioned elements would exceed the scope of this dissertation, the following aspects are particularly relevant to this research:

Basic pulse

Reckford attempts to verify if there is a 'basic pulse' common to all chanted examples (Reckford, 1987: 136-141). He does so by printing the loudness impression of the recordings onto a graph paper, and subsequently measuring the distances between the smallest unit that could be accurately measured, corresponding to 100 milliseconds. In sequence, the author presents a table indicating the frequency of appearance of units of 100 milliseconds in all versions of the performance. The tables presented indicate a small occurrence of units of 100 milliseconds, leading to the conclusion that this is not an area of duration preferred, and it is not possible to assert a basic unit of pulse due to a large spread and variable percentage of occurrences.

There are some issues with Reckford's method which should be addressed; it is not clear the reasoning behind the selection of 100 milliseconds as a potential area of a basic pulse, and the author also does not specify what is the margin for which he considers units within the 100 milliseconds framework. Units with 200 and 400 milliseconds, of which the 100 milliseconds are a sub-sections, also do not seem to be included in this category. Nevertheless, the work is pioneer in attempting to establish an analytical method to systematically investigate free-rhythm music.

Regulation of rhythm by long and short syllables

Reckford presents a table with the duration of each syllable of the same verse in different recordings, suggesting that, while it is useful to maintain the distinction between long and short syllables, the ratio between these can vary immensely (Reckford, 1987: 141-144). A long syllable can only be perceived as such in comparison to a short one near it, not due to its

duration. Because of this, the comparison of syllables by their absolute values in performances would be a less useful tool for the analysis.

This perspective is particularly relevant to the analyses presented in Chapters 5 and 6, as it aligns with the observation that the variability of short durations in *taksim* improvisations is smaller than the one of longer durations. By prioritizing the proportional relationships between notes rather than treating their durations as absolute values, Reckford's approach allows for a more precise perspective for understanding rhythmic behaviour in free-rhythm music. This perspective was adopted later in this research, enabling a clear comparison between different phrases and their role in shaping rhythmic structures within *taksim* performances.

Reckford also discusses the point mentioned by Tsuge that the iambic pattern has been commonly associated with unmetred songs of the classical Iranian music. Reckford claims that this generalization can be misleading in the cases he studied because the distribution of areas of compression and relaxation throughout the piece is varied and complex, distorting what can be understood as an iambic model.

In order to represent the patterns of movement created by the compression and relaxation of syllables, Reckford proposes to measure density referents, which are the result of dividing the total duration of the phrase by the number of syllables in the phrase (Reckford, 1987: 157). This allows observing more clearly the patterns of compression and relaxation throughout the verses. Once again, Reckford's data led to the conclusion that no generalization can be made in terms of compression to relaxation, neither inside phrases of a hemistich nor through the hemistich of an entire piece.

In summary, even though Reckford states that a complete understanding of the parameters regulating rhythm and timing in unmetred genres of religious chant awaits further research, the author presents interesting conclusions on the usage of rhythm in this context. Reckford demonstrates that microstructural and macrostructural levels of timing include a wide range of variability, which gives phrases immediacy and intensity, qualities appreciated by the audiences. Although the calculations proposed by Reckford do not allow for generalizing

patterns of rhythmic behaviour, the author expanded the limits imposed by the technology of the time. One idea which is particularly interesting is the 'density referents', which can relate to a tool employed in this research and explained in chapter 4. By calculating the density of notes within a given phrase, this research adopts a similar principle to Reckford's method of dividing total phrase duration by the number of syllables, albeit tailored to the context of *taksim* improvisation.

In the second part of Frigyesi's article (1994), the author discusses a segment of the Jewish liturgic tradition which is presented as free-rhythm, the *nusah*, with the analysis of two interpretations of this practice. Jewish liturgy appears to be a relevant place to study free-rhythm, as, according to Frigyesi, at least 80-90% of the material of service is free-rhythm (Frigyesi, 1994: 68). When metric tunes do appear in this context, they are insertions that suspend momentarily the basic flowing-rhythmic music, highlighting sections of the text and enlivening and articulating the form of the service. From a purely liturgical point, the metric tunes are not essential, and 'the service may fulfil its religious function even if the entire material is eliminated' (Frigyesi, 1994: 69). In this context, 'the function of free-rhythm is not to introduce, connect, or lead to something; to the contrary, free-rhythm itself is a fundamental style'.

Frigyesi presents a comparative analysis involving two transcriptions of performances, in which the author uses a relatively limited number of rhythmic values (quarters, eighths, triplets, and two quintuplets) to express the music, categorising the different phrases by letters. While one of the performances presents a sense of pulsation below the level of phrases, but no obvious metricity, in the other performance, '(...) there is clearly some feeling of regular pulsation (although not meter in the strict sense), long and short rhythm values are differentiated, and motive and characteristic rhythm profiles appear' (Frigyesi, 1994: 74).

However, the reader can do little more than take the word of the author as a fact; by looking at the score, it is not possible to understand either the free-rhythm character which the music seems to have or the differences between the interpretations claimed by the author. Frigyesi

agrees that this difference does not appear greatly in the transcription: 'On the paper, the difference may seem minimal; in the actual performance, however, this slight change means a great deal' (Frigyesi, 1994: 75). While this reinforces Frigyesi's argument that Western scores are not suitable to represent free-rhythm phenomenon, no alternative is presented to solve this problem.

And this leads to a fundamental point for this article. In the first section of the paper, Frigyesi manages to explore important issues that are involved in free-rhythm music; the difficulty of expressing its fundamental characteristics outside of the oral tradition and the lack of rhythmic theories capable of encompassing it. However, in her analysis, the author provides a transcription in which it is not possible to properly understand the expressive features of free-rhythm. Frigyesi provides general descriptive qualities of the sound such as 'this uninterrupted simple reading has its own beauty and religious meaning' or 'it is fluid to the point of being intoxicating, almost enchanting' (Frigyesi, 1994: 74). What is missed is the exploration of how these qualities are reflected in the rhythm. For instance, it would be valuable to understand how the perceived fluidity or 'enchanting' nature of the performance emerges from specific rhythmic behaviours or patterns. Are there particular temporal relationships, variations in note durations, or micro-timing adjustments that contribute to this expressive quality? Without this layer of analysis, the rhythmic essence of the *nusah* remains to be explored, making it difficult to connect the described characteristics to concrete rhythmic phenomena. This gap points to a broader challenge in studying free-rhythm music: *the need for analytical tools that bridge the descriptive and structural aspects of rhythm while accommodating the nuances of oral traditions.*

In summary, Frigyesi successfully highlights some of the key challenges and cultural significance of free-rhythm. Her contribution lies in framing free-rhythm as a fundamental stylistic element in Jewish liturgy and drawing attention to the inadequacies of traditional transcription methods for capturing its essence. Even if the absence of a detailed exploration of the micro-structural rhythmical features limits the potential for understanding how free-rhythm operates on a microstructural level, the insights presented in the paper provide an important foundation for further research, inviting more nuanced and methodologically innovative approaches to studying free-rhythm in music.

Widdess (1994) investigates an *ālāp* improvisation by the musician Dr. Ritwik Sanyal, creating his transcription and analysis in close collaboration with the performer. Similarly to Frigyesi, Widdess begins by addressing the problem of transcription of *ālāp*, which naturally includes rhythm. The slow tempo *ālāp* is normally followed by further *ālāp* in a medium and fast speed, where a regular but unmetred pulse is apparent. While, in the latter stages, transcriptions are not problematic, the slow *ālāp* seldom exhibits any obvious pulse, presenting a similar problem as the one seen in previous examples. Contradicting the normal assumption that *ālāp* are typically non pulsed, Dr. Sanyal affirms that there is always a pulse in his mind throughout the performance of *ālāp*, and that this pulse is regular and consistent, apart from a gradual acceleration (Widdess, 1994: 65). By timing with a stopwatch the successive onsets of this improvisation (figure 2.2), Widdess was able to identify a consistent pulse through the musician's performance, varying in length between about 1.59 and 1.67 seconds. This allows him to corroborate Dr. Sanyal's statement and affirm that, at least for one performer in one recording, *ālāp* is rhythmically structured with reference to a regular pulse (Widdess, 1994: 65).

Figure 3: Illustration of pulse in the beginning of ālāp



Figure 2.2: transcription of ālāp improvisation performed by Dr. Ritwik Sanyal. In: Widdess 1994: 67.

The fact that there is an underlying pulse through this performance does not remove it from the category of free-rhythm mentioned earlier by Clayton – for this, the music would need to have a regular hierarchy between pulses, establishing therefore metricity, which it does not. But the idea that there might exist an underlying pulse in the performer’s mind during a free-rhythm performance is a claim that could modify the understanding of rhythm in this context. It makes it potentially relevant for this music to be analysed under the scope of different analytical tools that can effectively deal with pulses.

As we will observe in the third chapter of this dissertation, conversations with musicians over the existence of pulse in unmetred improvisation reveal a wide spectrum of perspectives, often marked by individual practices and stylistic contexts. These discussions highlight the complexity of identifying and defining pulse in free-rhythm music, highlighting its role as, at

times, internalized reference rather than always externally perceivable structure. Widdess' article contributes significantly to this discourse by demonstrating how a performer's perception of an underlying pulse, even in the absence of metricity, can influence their improvisational choices. This insight not only deepens our understanding of rhythmic structures in *ālāp* but also provides valuable framework for analysing similar phenomena in *taksim*, as explored later in this dissertation.

Roeder (2019) explores the issues raised by Clayton's 1996 article and formulates an analytical proposition for free-rhythm music based on Christopher Hasty's theory for rhythm and meter. The benefits of using Hasty's ideas to analyse free-rhythm are very clear: listeners may perceive and project durations even in very brief and irregular succession of events, and the theory offers a way to characterize the time-sensations that they afford (Roeder, 2019: 56). Additionally, this theory does not involve pulse hierarchies or entrainment, but an assessment of durational reproduction based on a limited number of features. Therefore, Roeder's application of Hasty's theory has the potential to identify time-sensations that might be understood to create formative processes in the rhythmic development of these pieces. This could offer an adequate explanation of the rhythmic functioning of large-scale processes and micro timing features within free-rhythm music, potentially offering a methodology for analysing a wider range of music with this particularity. The figure 2.3 presents temporal sensations associated with the concept of durational projections.

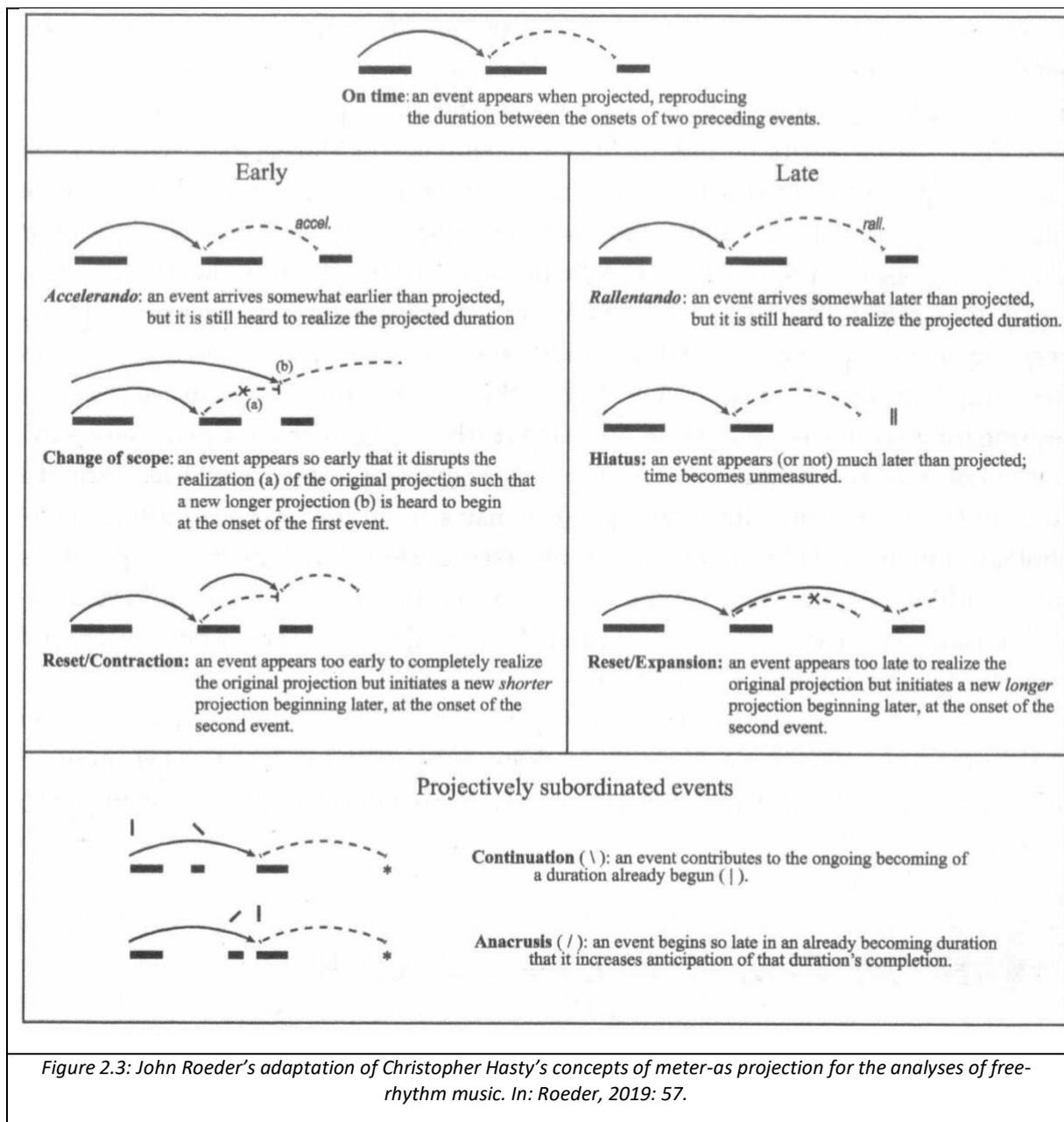


Figure 2.3: John Roeder's adaptation of Christopher Hasty's concepts of meter-as projection for the analyses of free-rhythm music. In: Roeder, 2019: 57.

Roeder presents an effort to consider potential critiques of this analytical approach. He mentions a previous remark posed by Frigyesi in which she argues that due to the constant and subtle changes of pitch, timbre and loudness, it is illusional to think that one can scientifically measure a note because any measurement will be influenced by one's preconceived perceptions of how periodicity functions within a particular style. Roeder presents an analysis of Afsane Zia'i's vocal performance of the melody *Bidad* from the *dastgah homayun* to demonstrate that even in situations with a complex phenomenon, it is possible to articulate a clear moment of discontinuity and observe its subtle variations. Furthermore, the author argues that it is not essential to 'quantitatively measure' an event to determine

the features proposed by his theory. Therefore, Roeder argues, it is valid to observe the 'internal life' of durational projections, considering that they can help explain the function of the durations in relation to the overall piece.

Roeder's analysis presents a rhythmic strategy in the opening phrases where the singer 'realizes projections of increasing length, culminating in a long F# that thereby affirms both as a modally significant pitch and as a promise of continuation and connection to the following music' (Roeder, 2019: 60). He proceeds to present a chain of events that affords a reset/expansion sensation, finishing in a hiatus. A similar process takes place subsequently, where a succession of reset/expansion and realized projections leads to another hiatus. In his analysis, Roeder attempts to demonstrate that 'the theory of projection distinguishes and precisely characterizes several types of 'freedom' in its rhythm, each affording a distinctive temporal sensation' (Roeder, 2019: 61).

Indeed, Roeder's narrative is effective in presenting how the theory of projection distinguishes and precisely characterizes types of freedom in its rhythm, each affording a distinctive temporal sensation. By reading his article, it is possible to coordinate the observations relative to durational projection in an analysis that attributes purpose to every event in its time (Roeder, 2019: 62). However, the number of processes which are described in a condensed period of time makes the reader question how much of these temporal sensations can be actually felt by the listener. In that sense, it does seem like an analysis which, while very coherent and convincing on paper, might be a bit disconnected from the actual sensations that a listener might feel while listening to this music. Nevertheless, Roeder's application of Hasty's theory on free-rhythm improvisation presents a very important contribution towards an analytical proposition that could, potentially, be generalizable to different styles and genres.

Before moving to the next section, it is worth briefly introducing Inner Metric Analysis. While this theory was not developed with free-rhythm music as its primary focus, some of its features make it suitable to discuss at this point.

Inner Metric Analysis provides a structural description of metre in musical pieces without relying on external information such as time signatures or bar lines. Instead, it compares the relative position of notes in musical scores to infer pulse and assigns two types of weight to each event – *spectral weight* and *metric weight*. These values are combined to generate metric weight profiles, allowing for a ‘fine-grain structural description of the time organisation of a musical piece’ (Volk, 2008b: 259-260). Beyond individual pieces, Inner Metric Analysis has been applied to corpus studies and to the analysis of phenomena such as syncopation and metrical ambiguity (Volk, 2008a; Volk & De Haas, 2013), showing how rhythmic structure can be derived directly from event patterns rather than imposed through notation.

Such an approach has clear potential for application in free-rhythm contexts. Because it is based on internal rhythmic events, it can be applied to music that does not follow an explicit metrical framework. It would also be effective in phrase-based analysis, where each phrase could be examined in terms of its spectral and metric weight. However, the method in its current form is designed for score-based events (Volk, 2008a: 261) and cannot be directly applied to onset data taken from audio recordings. Adapting Inner Metric Analysis from a fixed notational grid to a performed phrase would require additional methodological steps, which lie beyond the scope of this dissertation. For this reason, I employ a simpler (and admittedly less refined) technique to address the internal rhythmic characteristics of phrases, while leaving the possible use of Inner Metric Analysis for future development of the methodology presented here.

2.5 *Analysis of free-rhythm in the context of taksim improvisation*

Arnon (2008) proposes an investigation on the usage of pauses in the Turkish *makam*. The author departs from the idea that there are different types of temporal units that can be identified in a *taksim*, with pauses being on one side of a melodic activity spectrum and intense rhythmical activity on the opposite pole. The paper focuses on the contrast between pauses and ‘played sections’, acknowledging that this limited scope would be the starting point for a more elaborate analysis.

Arnon presents a graphic with the proportional durations of pauses in a series of *taksim*s by Necdet Yasar, arriving at the categorisation of three features which appeared recurrently in the construction of temporal structures: beginnings with long pauses, clusters of short pauses and pauses in ‘the same length’. The author also presents a table with statistical features such as the average length of pauses, numbers of pauses in each *taksim* and the percentage of pauses in relation to the duration of the *taksim*. Arnon proceeds to point out a few examples in which he observed the usage of pauses of similar length in different melodic contexts and the combination of two lengths of pauses in the context of a melodic sequence.

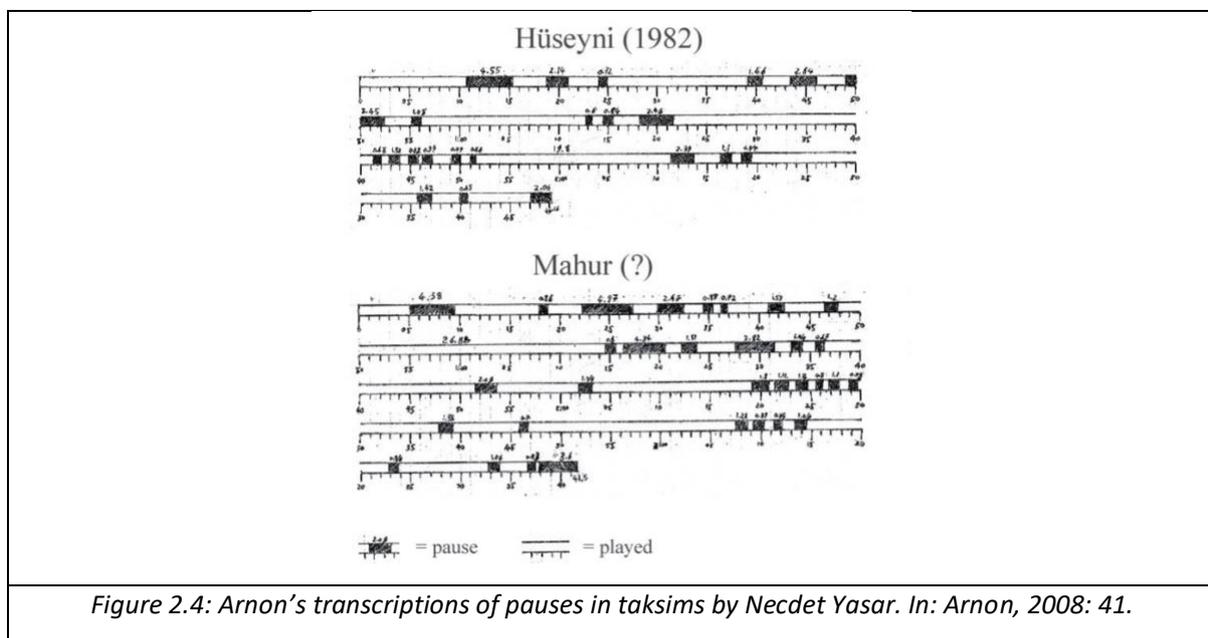


Figure 2.4: Arnon's transcriptions of pauses in *taksim*s by Necdet Yasar. In: Arnon, 2008: 41.

While Arnon's effort in presenting a new methodology should be praised (and acknowledging the paper as a preliminary study), several inconsistencies in his approach hinder any effort to derive relevant musical information from it. The author does attempt to present a clear difference between pauses, long notes, and a gap, but he is not clear in defining what is the threshold to categorize a pause as equal to another, making his examples unclear. Additionally, considering the number of pauses existing in the studied *taksim*s, the few examples presented could be seen as statistical coincidences, especially because the only suggestion of a potential function of the mentioned categories is that the usage of pauses with the same length could be associated with repeating a certain cadence (Arnon, 2008: 42). Because of this, it is challenging to use his analysis to validate the idea that 'Yasar uses pauses

in an intuitive, yet structured and artful way' – even if the conclusion is not necessarily incorrect. Yet, the paper is original in that it is the first identified by this research to focus on rhythmical aspects of an instrumental free-rhythm performance, which is an approach which was further developed a few years later in the next paper reviewed here.

Holzappel (2013) is the first author known to this research to apply a signal processing approach to investigate rhythm within non-metered improvisation. The author departs from an understanding of free-rhythm which is consistent with previous literature – the notion that free-rhythm is characterized by the absence of the 'underlying template of a meter or continuous organized pulsation'. The main aim of the paper is to investigate the occurrence of pulsation in free-rhythm improvisational styles, a topic explored by Widdess. Holzappel compiled a dataset of 52 *taksim* improvisations on the tanbur, an instrument with clear plucked strokes that facilitate onset detections. He then applied the signal processing to reveal aspects of rhythmical configuration, in particular related to the pulse of the pieces. The author proceeds with a comparison between *taksims* from Tanburi Cemil Bey and Mesut Cemil, demonstrating that his method of detection is able to present clear distinctions between pulse configuration in each musician. While Cemil Bey's *taksim* presents a regular disposition of pulse, Mesut Cemil's *taksim* has less clear presence of pulse. The author proceeds with suggestions on possible musical and social reasons for this, such as the possibility that the difference between the performers could be the result of changes implemented by Mesut Cemil Bey in the modernization of the institutional musical environment of modern Republic.

Holzappel's article is particularly relevant for this research not only because of the subject he is approaching but because he makes use of computational tools, which carry a central position in this dissertation. The article presents important contributions by building its analyses from a robust dataset and rigorous tools, drawing from existing discussions both on the conceptual understanding of free-rhythm and regarding its methods to calculate periodicity. However, the use of autocorrelation as a function to assess the existence of a pulse could be debated, since autocorrelation is calculated by comparing the value of a given duration in relation to its predecessor (Norton & Ravignani, 2017). In the fourth chapter of

this dissertation, a comparison between different methods of pulse detection within *taksim* is presented, including autocorrelation, suggesting that other methods of detection of pulsation such as Fast Fourier Transform present higher accuracy for this. Furthermore, Holzapfel computes the autocorrelation in windows of 3 seconds, with a hop size of 0.5 seconds from one window to the next one. As we will observe in chapter 3, the basic units of musical expression of *makam* are its musical phrases, and this is a central feature that should be considered in a rhythmical analysis. An arbitrary division of 3 seconds for the autocorrelation calculations will inevitably combine different phrases in the same calculation and, therefore, might produce an outcome which might suggest clear mathematical logic but is less coherent from a musical perspective.

Holzapfel suggests interesting paths to delve into this topic, including making interviews with listeners to assess how rhythm is perceived in *taksim*, and exploring the relationship between rhythm of *taksim* and recitation of Turkish poetry and free speech samples. Even considering the limitations caused by the method employed, the paper presents a significant contribution to the field, as it ventures on an unexplored territory with original analytical propositions.

Ohriner (2016) produced one of the most detailed analyses of free-rhythm music. His object of investigation is a *taqasim*⁴³ improvisation by the musician Rahim Alhaj, which is observed under the scope of entrainment theory. The author discusses the issue of metricity in free-rhythm context, aiming to demonstrate that this music (1) is capable of affording entrainment; (2) might be considered metered and (3) enables a degree of metric behaviour in some of its listeners.

The author presents his arguments in favour of metricity from two angles. The first is an analysis of the metric salience and synchronicity of the performance, in which he attempts to 'generate procedures whose application results in a description of metric structure' (Ohriner, 2016: 11). The second angle is to observe the presence of metre through participants'

⁴³ The '*taqasim*' the Arabic counterpart of the *taksim*, and, because of this, has a different spelling.

tapping, which has the potential to demonstrate intersubjective agreement on the presence of meter in the excerpt.

In his analysis of the performance, Ohriner focuses on two segments; the first forty seconds and an interior excerpt from the third minute of the improvisation. After producing a transcription on a modified western score – which contains a time signature of 7/16 on the second excerpt – the author categorizes the notes through a five-level metric structure, in which longer durations appear higher in the structural level. In this procedure, the author ‘treats near-periodicities as periodic and attends to patterns in duration or contour’ (Ohriner, 2016: 12). He does not, however, entail a significant analysis of the segment, preferring to leave this for the second part. Here, the main goal seems to be representing the metricity of the segment.

The second part of the article details the procedures used to verify how and if listeners perceived the eventual metricity of the excerpts. The audience was submitted to three excerpts of the improvisation, in which they were required to ‘tap salient events’ while listening to Alhaj’s performance. Ohriner’s analysis is more extensive here; he presents charts and graphics that correlate the tempo perceived by the listeners with his transcription and analysis of the performance. The author’s general conclusion is that some of the listeners are indeed metrically entrained with the performance in one of the segments, in particular, the one he observed as more metrical.

It is positive to observe that aspects related to metricity in free-rhythm received new analytical regard; previous literature has raised this as an important issue, and the idea of inspecting it through entrainment theory should be praised. However, several points of Ohriner’s argument could have benefited from further explanation.

First, certain aspects of the methodological approach could stand to be more thoroughly explained. Ohriner clarifies what entrainment is, why it should be used in the context he is proposing and what are the adjustments that are required in the theory, creating a term that would ‘emphasize the centrality of bodily entrainment in this view of meter’: meter-as-

entrainment (Ohriner, 2016: 2)⁴⁴. The author claims that there are three main benefits of using what he names as “meter-as-entrainment”; (1) it sidesteps controversies surrounding metric theory, in particular, the necessity of hierarchy in the definition of meter; (2) a theory of meter-as-entrainment is more responsive to aspects of music’s temporality, meaning that it allows to describe not only meter as such but also phenomena often associated with groove, and (3) it highlights the embodied aspect of the cognition of musical meter.

These seem to be valid points in favour of using this term. However, many of the benefits claimed by the author for using ‘meter-as-entrainment’ do not seem to be present in the paper. First, his use of metre along the article seems highly hierarchical; in his analysis, Ohriner creates procedures that ‘generate a five-level metric structure’, using schematics that resembles aspects of Lerdahl and Jackendoff’s representations of rhythm (Ohriner, 2016: 13-14). His transcription of the musical performance assigns a time signature into the music, which also seems to be a way to establish a sense of hierarchy between pulse and bar. Second, throughout the paper, the author does not present strong arguments towards ‘aspects of music’s temporality’ such as groove, which is something he had pointed as a benefit of ‘meter-as-entrainment’ and could have strengthened his argument.

The second line of problems is an apparent lack of rigor while conducting his tapping experiment and its subsequent analysis. He conducted the experiment with 13 undergraduate students; however, due to ‘user error, the taps of four participants have a lag of unknown duration and are excluded from discussion’ (Ohriner, 2016: 18). The author presents the results of 10 participants, and this is because he includes his own tapping in the data of the experiment. This seems like an odd decision, especially considering that there is a large gap between his level of familiarity with this music and the one from the other participants (a possible bias towards a result that points to metricity also seems problematic). Finally, although 3 excerpts were listened to by the participants, the author also focuses only on the interior section of the improvisation and, to a smaller extent, on the opening part. The third

⁴⁴ Ohriner introduces the term ‘meter-as-entrainment’ as his solution to emphasize the centrality of bodily motion, contrasting his view with more cognitive approaches such as the one from Lerdahl and Jackendoff or the more poetic orientation from Cooper and Meyer (Ohriner, 2016: 2). This leads me to the conclusion that the author is not employing the term with the exactly meaning as proposed by London (2012: 191).

part is excluded from the discussion because it is similar to the opening: 'meter is complex and fleeting if present at all and participants did not tap it in any consistent way' (Ohriner, 2016: 19). Although Ohriner's main point seems valid, the combination of these facts seems to hinder the strengths of the author's arguments.

Ohriner's central claim is that some listeners behave metrically while listening to this performance, meaning that 'free-rhythm can be discussed in metric terms, but only in reference to the specific listening experiences of individual listeners, and only some of the time' (Ohriner, 2016: 34). This is in line with Bruno Nettl and Ronald Riddle's analysis of a taqsim improvisation from 1973 mentioned a 'degree of metricity', in which the performances progress from less metric to more metric material, both across sections of the performance and within sections' (Nettl & Riddle, 1973). The literature reviewed in this paper, written between 1993-1996, also points towards this direction.

Finally, it should be highlighted that Will, Clayton et. al. (2015) produced a paper investigating SMS applied to *ālāp* improvisation. This paper, which involved an extensive experiment with participants tapping into an existing recording, produced results that 'suggest an entrainment mode in which pulse is understood as the experience of one's internal periodicity: it is not necessarily linked to temporally regular, structured sensory input streams; it can arise spontaneously through the performance of repetitive motor actions, or on exposure to event sequences with rather irregular temporal structures' (Will et. al., 2015: 1). This conclusion does not contradict Ohriner's central claim; on the contrary, the authors state that

'(...) cognate traditions over a wider geographical area (such as the Arabo-Turkish *taksim*) would be worth investigating: we would hypothesize that a similar entrainment function would be engaged, although differences in the stimulus structure may nonetheless produce differences in the particular response patterns' (Will et. al., 2015: 24).

In his PhD thesis, Cholevas (2022) brings a different perspective towards the study of *taksim* improvisation. His research proposes to investigate differences between theory and praxis in the field of *makam* music education, with the goal of producing a pedagogical proposition to be implemented by students interested in the practice of *taksim* improvisation. The gap between praxis and theory in *makam* has been discussed in works such as Ederer (2011), which presents an extensive comparison between the theory of certain *makams* and how they are performed by masters in the field. A major contribution of Cholevas' work is that, being himself a professional musician and teacher in the field, he proposes the creation of a protocol to transcribe *taksim* improvisations and creates visual representations which aim to enhance the learning process of this practice. This is especially valuable today, when the traditional *mesk* master–apprentice model is harder to sustain: students and teachers have limited time for prolonged, side-by-side work, and conservatoire structures (modular timetables and credit-driven curricula) rarely permit extended apprenticeship-style contact.

The most relevant aspect of Cholevas' dissertation for this body of work is his approach towards the rhythmical aspects of *taksim* improvisation. Cholevas identifies similar problems described by Clayton, Widdess and Frigyesi, reinforcing how transcriptions of *taksims* are commonly conducted with a focus on melodic development, and little attention is oriented towards its rhythmical aspects. One of the author's goals is to propose a method of transcription which balances accessible readability while maintaining essential information; an overly complicated transcription becomes unusable for students, while a simplified one does not present the basic rhythmical features of this music. Naturally, in order to obtain this method, it is important to define the central problem which has been defined since Frigyesi (1993): what are the essential rhythmical characteristics of this music?

Here, Cholevas' original proposition comes to the foreground. The author reveals the experimental process which led to his methodological approach, which began measuring onsets of existing recordings. Cholevas observes that, in the example studied, even though the music appears free-rhythm, individual phrases seem to contain a nucleus which appears to have a relatively steady pulse, allowing an average of tempo to be calculated. The same process could be replicated for several phrases of the improvisation mentioned, allowing for the creation of a tempo estimation for each phrase of the music (Cholevas, 2022: 29).

Until this point, Cholevas's proposition resonates with previous literature as several authors agreed that the concept of a pulse was observable in many free-rhythm practices. But Cholevas takes a step further by proposing that, once the music is segmented in phrases and each of the phrase's pulse is determined, it is possible to transcribe all notes according to a reduced set of rhythmical values: eighth notes, dotted quarter and quarter notes. Not only that, but the notes can be subdivided into groups of 2 or 3 notes, establishing 'locally metric organisation of phrases' (Cholevas, 2022: 31).

Such locally metric conception is worth further discussion. At first, claiming the existence of metricity in *taksim* seems to contradict the nature of free-rhythm, as most of the literature referenced here establishes that this phenomenon can encompass the existence of a pulse, but it is essentially defined by its non-metricity. Cholevas's approach, however, implies that even though individual phrases can be approached from a metric perspective, the fact that both pulse and metricity are constantly shifting disrupts a potential sensation of metricity by the listener. Therefore, even if phrases are locally metric, the sensation for the listener is that the *taksim* is, in fact, free-rhythm.

The idea of locally metric organisation proposed by Cholevas resonates with discussions held with musicians in Chapter 3, where the perception and conceptualisation of rhythm in *taksim* was explored. Some performers described their improvisations as guided by a sense of organisation within individual phrases, even as the overall structure remained fluid and free. This aligns with Cholevas's assertion that metricity can exist on a micro-level within phrases without creating an overarching sense of regularity for the listener. Moreover, musicians frequently highlighted how the shifting nature of pulse and phrasing contributes to the expressive and dynamic qualities of *taksim*, a feature that Cholevas's methodology effectively captures. However, as will be discussed in the third Chapter, perspectives on the topic can vary significantly between different musicians, which makes it difficult to arrive at a single and unifying statement on the topic.

In order to establish the parameters for the transcription of *taksim* improvisations, Cholevas defines the following characteristics as essential for understanding the rhythmical behaviour

of *taksim*: limited use of rhythmic values, locally metric organisation of phrases based on the combination of (odd) metre, speed changes within phrases and long notes at the beginning/end of phrases. The author concludes that the combination of these elements contributes to the sensation of a rhythmical ambiguity which is 'not a consequence, but a systemic condition, a desired and maybe pursued objective in the context of *taksim* performance' (Cholevas, 2022: 32-34).

Cholevas' work presents an extensive effort to characterise the rhythmical phenomena of *taksim*. In addition to the depth of the discussions proposed by the author, two important aspects mark this research: first, it has the goal of introducing a pedagogical tool for music students. Secondly, the analyses are presented from the perspective of an expert in the performance of *makam*. Considering the pedagogic nature of the research is important while posing potential reservations towards the work. One could argue, for instance, that a metric understanding of *taksim* phrases is not universally accepted within the community of musicians performing and teaching this music. Another potential point of critique is the fact that even if one accepts that *taksim* phrases can be considered locally metric, the way in which internal subdivisions are segmented can be very ambiguous. Cholevas acknowledges this point, mentioning that, in lessons, 'there are heated debates about the formation of the phrases and how the subdivisions of groupings are perceived' (Cholevas, 2022: 26). The author's solution to this problem is to recognise that, often, there might be more than one way of performing the phrases, which are dependent on the context of the performance or geographical/ethnic background of the performer (Cholevas, 2022: 29).

The fact that these analyses are grounded in the perspective of a performance expert in the field lends significant weight to the arguments presented. By drawing from his dual role as a practitioner and educator, Cholevas not only provides a methodologically robust framework but also bridges theoretical insights with practical applicability, making his contributions particularly compelling for both academic and pedagogical contexts.

2.6 Conclusion

The publications discussed in this chapter present the most relevant sources identified by this research on the topic of free-rhythm. The goal of this literature review is to gather fundamental concepts, structures and ideas which will lead to the construction of a consistent methodology to analyse free-rhythm music. While there are differences in terms of musical genre, terminology and general approach, several similarities should also be remarked. Firstly, the concept of pulse has a central role in most of the academic sources; only Tsuge (1974) and Arnon's papers (2008) do not delve into this topic. Each paper approaches pulse differently; while Widdess (1994), Holzapfel (2013), Clayton (2012) and Reckford's (1987) research investigated the existence of pulse, Roeder (2019) explores differences between durations with similar values, proposing a lexicon to address these differences. Cholevas (2022) departs from the understanding that phrases contain a pulse to propose a protocol to transcribe the music, whereas Orhiner (2016) and Will et. al. (2015) attempts to demonstrate how pulse is perceived by participants in an experiment.

The concept of metricity is also addressed in different ways by authors. Poetic metre is central to Tsuge (1974) and Reckford (1987), with the latter proposing a link between poetic metre and musical rhythm. Orhiner (2016) proposes transcriptions with a time signature to represent metricity, whereas Cholevas (2022) recognizes that internal subdivisions exist but can be perceived differently by different people. Clayton (2008) expands on different points of view on metricity, comparing different theories with the functioning of free-rhythm within the North Indian practice of *ālāp*. Earlier sources such as Sachs (1953) and the 19th Century and early 20th Century anonymous journal texts used different terminologies to compare the impact on the listener of metered or non-metered music, suggesting a strong correlation between metre and mechanization in opposition of freedom and expressiveness.

The similarity between concepts introduced by different authors should also be marked, even if the terminology used is often not the same. While Tsuge (1974) refers to a series of *organizational tools* to understand the function of rhythm within *Avaz*, Roeder (2019) employs the term *formative processes* to address rhythm's structural function. In relation to

the rhythmical movements taking place within musical phrases, Tsuge and Reckford (1987) use the term compression-relaxation, while Cholevas (2022) refers to speed changes within phrases, features that can bear similarities. Both terms could be understood within Roeder's terminology of durational projections, which can be used to classify types of rhythmical movements. The picture below presents a mind map identifying the relation between keywords present in the papers reviewed.



In conclusion, the literature reviewed highlights that metricity and pulse are central to a proper understanding of the phenomena of free-rhythm. These elements, however, should not be strictly interpreted as mechanisms that ground listeners within a fixed framework. Instead, they emerge as dynamic tools, consciously or subconsciously employed by musicians to establish and manipulate a sense of movement within their improvisations. This nuanced

perspective shifts the focus from defining rhythm in binary terms of 'metric' or 'non-metric' to explore it as a spectrum of possibilities that inform the structural dimensions of music. Positioning metricity as fluid and adaptable allows this chapter to establish a foundation for understanding how these elements operate in diverse musical traditions.

The findings presented here provide a theoretical framework for approaching free-rhythm, grounded in textual sources and analytical insights. To build upon a coherent analytical approach, it is essential to integrate this theoretical foundation with practical perspectives and empirical observations. Chapter 3 will extend this work by incorporating ethnographic insights to explore how musicians perceive and conceptualize rhythm within *taksim* improvisation. Examining the views of practitioners will allow to establish connections between theoretical constructs observed in this chapter and musicians' understanding of the free-rhythm. Building upon this, Chapter 4 will propose an analytical methodology designed to identify and interpret key rhythmic features in *taksim*. This methodology, informed by the combined insights of Chapters 2 and 3, seeks to provide a comprehensive lens through which to observe and characterise the rhythmic intricacies of *taksim* improvisation, thereby advancing our understanding of this complex musical phenomenon.

Chapter 3. Working with musicians: setting up the analytical tools

Everything in the universe has rhythm. Everything dances.

Maya Angelou.

3.1 Introduction

This chapter will continue exploring discussions around the idea of free-rhythm. If previously I have investigated the phenomena within a wide range of musical styles and through the lens of existing literature, the attention now will be narrowed to *taksim* improvisation from the point of view of musicians experts in this practice and established in Greece.

My first contact with the Greek scene of Eastern Mediterranean music was in 2015, when I attended my first modal composition seminar at *Labyrinth Foundation* with Ross Daly. At that point, I was a professional musician holding a bachelor's degree on classical guitar and performing regularly in the musical scene of São Paulo, Brazil. The knowledge that I had in *makam* music was a consequence of a few years playing with Brazilian colleagues interested in this music. After moving to the Netherlands in 2016, I began a more intense contact with the Greek community of musicians involved with this music; Alexandros Papadimitrakis and Michalis Cholevas, two of the musicians consulted in this research, are teachers at Codarts and the latter was the research coach and main instrument teacher for my master's research. Other musicians that participated in this research such as Chrysanthi Gkika and Thimios Atzakas occasionally visited to the institution for concerts and lectures. My interest in this musical style continued expanding during my first years in Europe, and I have occasionally visited Greece and Cyprus to attend workshops, perform in concerts and for a three month Erasmus exchange to Thessaloniki during my master, which expanded significantly my network with local musicians.

During the first years of my PhD trajectory, the consequences of the Covid-19 pandemic prevented me from visiting Greece, and I took online courses offered by Harris Lambrakis and Evgenios Voulgaris. The most intense interactions with musicians occurred during the fieldwork of my PhD, which took place between March and June of 2022. In this period, I was based in Athens, meeting regularly with local musicians. I conducted interviews, took private lessons and attended masterclasses and seminars related to *makam* and *taksim* improvisations. With each musician, my level of engagement varied substantially: I had weekly private oud lessons with Kyriacos Tapakis; with Perikles Papapetropoulos, Harris Lambrakis and Evgenios Voulgaris, lessons were also regular but spaced out every two or three weeks. I participated in one-week intensive seminars led by Ross Daly and Yurdal Tokcan, took occasional lessons with Alexandros Papadimitrakis and Chrysanthi Gkika and conducted an interview with Thimios Atzakas. Activities took place primarily in Athens, although some occurred in Patras (with Evgenios Voulgaris), Thessaloniki (with Thimios Atzakas) and Houdetsi, Crete (with Ross Daly and Yurdal Tokcan).

During my interactions with musicians, we explored ways in which they conceptualize, teach and perform *taksim* improvisations, with a particular emphasis in its rhythmic characteristics. This is not a frequent topic of discussion among musicians, and many of them had to take time to reflect on their thoughts before providing an answer. Nevertheless, all the musicians had something interesting to say on the topic, articulating clear and unique ideas often permeated by rich metaphors and musical examples.

Music lessons are fertile ground for such discussions; they often involve presenting different ways of playing similar phrases, and musicians have the opportunity to talk about these differences and demonstrate them through music. If a good connection is established between teacher and student, lessons can become an inspiring environment conducive to meaningful conversations. In that sense, it is relevant to explain my approach in lessons. I would always introduce myself as 'a musician that is conducting research on the rhythmical aspects of *taksim*'. This had the goal of positioning me not primarily as a researcher, but as a musician, and hopefully would make the nature of the conversation more organic. Each teacher has a particular teaching technique, and I tried to follow the natural pace and style of each teacher. It is possible to affirm that they maintained a teaching practice similar to what

they usually do during the music lessons, even if there would be an occasional shift of focus towards the rhythm of *taksim*. This was confirmed both by the musicians themselves and by other peers that took lessons with them. In that sense, at no point it felt that musicians were reaching out of their comfort zone to supply my demand to discuss rhythm. Most importantly, my years of practice with the oud and in the musical style of *makam* were crucial for the success of the fieldwork. Without being able to follow lessons, imitate musical phrases to a certain degree of accuracy and improvise in this style, it would not have been possible to initiate meaningful discussions and derive insights from the lessons.

In this dissertation, aspects related to the fieldwork of my research will be concentrated primarily in this chapter and in Chapter 5. In Chapter 3, I will explore musicians' perspectives on the main topics which emerged in literature discussions from Chapter 2: pulse, metricity, and the importance of the phrases as the primary units within *taksims*. The goal here is to delve into musicians' perspectives in comparison to opinions observed in existing literature to ensure that the subsequent proposition of analytical tools (Chapter 4) enables a coherent interpretation of the musical phenomena. In Chapter 4, we momentarily pause the investigation of fieldwork to explain the analytical tools constructed using information from Chapters 2 and 3, which will inform the analyses occurring in Chapters 5, 6 and 7. Chapter 5 resumes with fieldwork exploration by proposing analysis of the different methods for teaching *taksim* and various types of rhythmical procedures encountered within lessons.

Ultimately, this chapter contributes to a broader comprehension of the underlying rhythm structures within *taksim* and explores how such comprehension can inform the construction of a methodology for its analysis. As will be observed, rhythmical characteristics play a substantial role in determining the expressiveness of *taksim* improvisation.

3.2 Musicians' Discourses Around Rhythm in *Taksim*

During an introductory meeting of an online workshop about *makam*, Harris Lambrakis provided context to what we would discuss during the next sessions:

Phrases, *taksim*, pronunciation, they are all within a level which is difficult to discuss. I can describe a *makam* in a book. But how can I write a book about phrases? How can I write a book about *taksim*? How can I write a book about pronunciation? I can write a book about grammar - and this is how *makam* books are. *Makam* books are like grammar books. They have rules. But when we go in the pronunciation, in the language, it is impossible to write down exactly the pronunciation, and how many pronunciations there are. (Lambrakis, 2021. Personal communication).

This quote is significant in expressing something shared among many of the musicians I have consulted with: generally, it is far more common to find literature discussing the overall rules of a *makam*⁴⁵. The rhythmical elements of *taksim* improvisation can be categorized as related to the pronunciation, aspects which are not easily discussed. This knowledge is often transmitted practically (and intuitively) when the teacher performs a musical example with the specific rhythmic characteristic they intend to present to the student.

While rhythm within *taksim* is rarely explicitly addressed in conversations, this does not mean that discussions on the topic are absent or unattainable. On the contrary, I hope to demonstrate in this section that points of view might be diverse, but the musicians consulted articulate clear ideas on the functioning of rhythm within *taksim*. Discussions around the idea of rhythm within *taksim* allows for an exploration of concepts and insights that remain unexamined in existing *makam* theory literature. By documenting these perspectives, it becomes possible to bridge the gap between theoretical discourse and practice on free-rhythm, drawing connections between the observations presented in Chapter 2 and the practical understandings shared by contemporary performers.

The topics that emerged from conversations with musicians bear similarities with what have been observed in literature. For the sake of clarity, I organised the conversations around the following topics: (1) the presence and role of pulse within *taksim*, (2) the significance of

⁴⁵ By rules I am referring to the functioning of the *seyir* and the intonation and inflection that specific notes should have. See Chapter 1 for further discussions on the most common understandings of *makam* theory.

musical phrases in structuring improvisations, and (3) the varying interpretations of metrical phrases among different performers. This thematic structure facilitates a focused exploration of these interconnected ideas, drawing parallels between theoretical frameworks and the nuanced understandings articulated by the musicians.

3.3 *Pulse Within Taksim Improvisation*

Chapter 2 described how authors proposed to verify the existence of a pulse both by analysing free-rhythm recordings and by observing listeners' reactions to the music (Widdess, 1996; Holzapfel, 2013; Will et al., 2015; Ohriner, 2016). In conversations with musicians, it was possible to notice that the idea of a pulse somehow permeating the practice of *taksim* was not strange to most of the sources I consulted with. In a personal communication, Ross Daly expressed his opinion on the existence of a pulse within *taksim*.

I would say that phrases in *taksim* are without a meter but not without rhythm. There is an underlying pulse in a *taksim* which is an important presence. It's not evidently there; it's something unspoken, which is this pulse which is going on behind, which must be perceived by the musician. This gives a sort of a backbone to his *taksim* in many ways. Of course, the rhythm which we encounter in *taksim* is a clear... how would I describe that... it is a very good example of the elasticity of time. It's not metered time, it's not the time of a watch, it's a different type of time which has a great deal of elasticity, it's very flexible. But it's always present, so it's a very interesting form, the *taksim*. (...) It seems to me that in the Turkish form the *taksim* released itself from the metric or metered aspect and became more fluid, more elastic in many ways. But the pulse goes there behind it. (Daly, 2022. Personal communication).

This quote makes clear that, according to Daly, the pulse is an underlying structure which is perceived by the musician but not explicit in a *taksim*. Yet, as Daly continued to explain, the pulse can be present in his bodily movements during his *taksim* performances.

I quite often find myself tapping the foot while I'm playing a *taksim*. I do that without thinking, and quite regularly. Even though the *taksim* is quite free in

terms of meter, that sort of underlying pulse is always there. I feel it a bit like a circle [*makes circular movement with the hand*], not so much this sort of thing [*makes front/back movement with the hand and body*]. That's how I experience it, at least. (Daly, 2022. Personal communication).

Daly's remarks stress the importance of the constant sensation of a pulse during the performance of *taksims*, even if this pulse is a good example of what he refers to in his previous quote as the *elasticity of time*. Harris Lambrakis shares a somewhat similar view but with a different emphasis. While Daly stressed the importance of a pulse which is perceived by the musician, Lambrakis claims that the feeling of a pulse is not necessarily established by the musician.

We can look at the rhythm [of *taksim* improvisations] but it is very subjective. Rhythm will be felt differently by different people. There is an inner pulse in *taksim*, but it is something that you feel yourself. *Taksim* implies a relation [between] you and the exterior. (...) Every time we listen to a *taksim*, we connect with it in this way. We find an internal pulse and we go together with it. And the audience will create their own inner rhythmicity. (Lambrakis, 2022. Personal communication).

Here, Lambrakis presents the idea that the sensation of the pulse is within the listener's perception. This suggests a complementary perspective from what Daly previously suggested; if the sensation of a pulse is within the listener's mind and might differ depending on the listener, this means that the musician might be imagining a pulse while performing a *taksim*, but this pulse is not necessarily transmitted to the listener; the latter might have a different sensation of pulse.

Evgenios Voulgaris' remarks also point towards a flexibility of the pulse, but only as long as this flexibility does not change the overall character of the *taksim*. According to Voulgaris, the beginning of a *taksim* is fundamental to establish the overall sensation of a pulse that will follow.

I can tell you that there is a beat, but I don't know it before I start [*to play*]. The first phrase, most of the times, is the random connection with your moment. Then, if you are at that performance level, you follow it. You just follow it because you cannot avoid it. And [*the first phrase*] really is the one that tunes you. So if I start the *taksim* in an aggressive way [*sings an opening phrase within a high region with fast notes and a strong voice*], I cannot say [*sings a second phrase in a completely different atmosphere, within a lower region and slower, with different rhythmical characteristics*]. You can see that I'm joking. I mean, it's not serious. It's like I tried to tell you that I'm deep. And [*the combination of phrases does not work*] not because [*the two phrases*] are different, but [*because*] it breaks that flow. (...) There's no truth to my speech. It's like I'm a bad actor. (...) So this beat sometimes changes, actually it's like a heartbeat. (Voulgaris, 2022. Personal communication).

Voulgaris's remarks stress how the sensation of beat⁴⁶ is something that underlies the musician's performance and somehow binds the structure of the *taksim*. By presenting his examples, Voulgaris suggested that phrases with a different pulse sensation would not be fit to be played one next to each other; they would interrupt the feeling of flow characteristic of the *taksim*. The comparison between the musical beat and a human heartbeat reinforces how elastic this beat can be, connecting with Daly's remark that there is elasticity to a pulse within *taksim*.

In the previous quote, Voulgaris stressed the similarities between musical performance, acting and spoken language; similarly, Ross Daly compares music and language to explain his understanding of rhythm within *taksim*.

Our speech is not metered, but it does have a rhythmic aspect. Quite often, it's rooted in a sort of a pulse, a relationship with time. And when we hear people who speak with bad rhythm, it annoys us. Even though it's not evident in a metric sense, it is very evident as a presence, the aspect of a pulse. (...) If

⁴⁶ During the interview, Voulgaris used the words 'pulse' and 'beat' as synonymous. As much as one could argue for the conceptual differences between the two terms, in the context of free-rhythm music, they can be understood as elements that provide a regularity without necessarily inferring a meter. Therefore, I will respect the musicians choices of words and use 'pulse' and 'beat' interchangeably.

you hear a *taksim* with no pulse to it, it feels uncomfortable. (Daly, 2022. Personal communication).

By comparing the previous comments, it is possible to observe that Lambrakis, Daly and Voulgaris' opinions are not completely dissimilar; they all conceive *taksims* as permeated by something like a pulse. There are, however, significant differences in how this pulse is established. While Daly stressed the importance of the musician perceiving a pulse while they perform a *taksim*, Lambrakis reinforced the subjectivity of the pulse as an element established by the listener. Voulgaris's remarks combine these two perspectives; he begins his statement by mentioning his sensation of a pulse ('there is a pulse, but I don't know it before I start'), and continues his example with the listener's perspective as a reference ('If I say... **You** can see that I'm joking'). To him, the pulse is in the environment, and the musician will follow it, suggesting that they are carried by the moment. While the pulse might initially appear to be set by the musician, Voulgaris's view implies that it evolves in response to the surrounding context, making it a shared element between performer and environment.

Other musicians present different perspectives on the subject. Thimios Atzakas stresses the necessity of a balance between regular and non-regular rhythmic elements. When asked about the sensation of a pulse, Atzakas presented the following remark:

For me, this is an important thing in the rhythmical structure of the *taksim*. (...) It's a kind of alchemy – if your imagination is very strong, and you are over emotional, over poetical, then there is the danger that you might lose the mechanical key of *taksim*, which keeps it in unity. If you lose the way on the other side, and you are too rhythmical, too structured, then you have the opposite result. Again, you don't have unity, and you don't have a narrative. Because this is a narrative, *taksim* is a narrative. It is a very well organized narrative. You have a story, an overture for the story, a prelude, which tunes the ears of your audience, to be ready to hear the story. And then, you have the main story, the connections with other stories, you have the respect to the ancestors of the story, and you have your personal storytelling. (Atzakas, 2022. Personal communication).

Here, it is possible to infer that, according to Atzakas, regularity derived from rhythmical elements can afford a strong sensation of structure to the *taksim*. However, if regular elements are excessively employed, the *taksim* might lose the unity and feeling of narrative. Therefore, rhythmically regular elements are a part of the composition of a *taksim*, but it is necessary to balance them with the other category mentioned by Atzakas – ‘poetic and emotional elements’, which, consequently, would be ‘less rhythmical’. A good balance between these categories creates an adequate narrative for the *taksim*. At first, Atzakas’ quotation might seem to contradict previous statements by Daly, Voulgaris and Lambrakis; these musicians argued that there was an overall feeling of a pulse, something inherently regular (although flexible), throughout the whole *taksim*. However, I would argue that Atzakas’s opinion is not necessarily conflicting with that of his colleagues. It could be possible to maintain a pulse sensation while balancing what Atzakas refers to as ‘poetic, emotional’ and ‘rhythmical’. In any case, Atzakas’s opinion demonstrates a critical element: there needs to be a balance between rhythmical and non-rhythmical elements, and perhaps this sensation of pulse cannot be too apparent in the performance. It is also significant to highlight that Atzakas’ remarks are in a similar direction to what was observed in the beginning of Chapter 2 in the early literature sources and Sachs (1953), where the mechanical regularity of the metre was opposed to the transcendental qualities of freedom.

Chrysanthi Gkika shares a similar point of view; when asked if she felt the presence of a pulse during a *taksim*, her answer was straightforward:

No, never. I couldn’t say that I could do [tap] with my feet, no. (...) I am thinking, however, about creating a moment with a pulse, with some action, (...) something that could be more rhythmical. But I always try to tone this down with opposite phrases.

Q: When you say opposite, do you mean phrases which are not very regular?

Yes, and in most of my *taksims*, I don’t know why it comes naturally. I try to play, to start very plain, with not many things. Easy, long notes, not many

ornaments. And then develop with that. (...) So I wouldn't say that I start with a pulse.

Q: But then when it gets rhythmical, do you think about the pulse?

A: Well, if I start doing what I said in the beginning, there is a pulse. But I'm never thinking of creating these phrases because of the pulse or to put a pulse in the phrase that I created. So I can understand that there is a pulse there. (...) But I would never prepare for this to happen. (Gkika, 2022. Personal communication).

Gkika's initial remark seems to present a clear opposition to Daly's initial statement that there is always a pulse throughout a *taksim*. But as the conversation continues, it is possible to conclude that she understands that a pulse might arise from phrases, even if this is not something she consciously tries to do. Gkika's statements align with the idea that a *taksims* balance elements with a pulse and elements in the 'opposite direction' (what Atzakas would refer to as 'poetic', 'emotional'), without a clear rhythmical structure.

By following the discussions presented above, it was possible to observe different perspectives on how musicians claim to perceive and conceive pulse within *taksim*. The main statements can be summoned as follows:

1. Some musicians have a constant and regular (although flexible) internal pulse permeating the entire performance of a *taksim*;
2. The audience might establish a subjective internal pulse while it is listening to the *taksim*;
3. Opening rhythmical phrases can be used to establish the overall sensation of pulse within the *taksim*;
4. A *taksim* is conceived by balancing elements that are more and less rhythmical;
5. There might or might not be a pulse in different moments of a *taksim*, but the musician does not anticipate or plan this.

It is very, very difficult to write about this if you don't play it. You can't just treat it theoretically because this is a tradition which is actually resisting theorization for over a thousand years. They have tried in many ways to make it sort of fit into one theory. It's basically a very idiomatic musical tradition (Daly, 2022. Personal communication).

This does not mean that Daly completely rejects these *makam* books – the musician did mention that they can be useful in certain aspects. However, for him, the best way to approach this music is through the instrument. This perspective aligns with remarks made by other musicians, such as Lambrakis, who likened *makam* books to grammar books—useful for providing foundational knowledge but insufficient for capturing the nuanced, lived experience of performing and understanding *makam*. For these musicians, theoretical texts serve as reference tools rather than definitive guides, reinforcing the idea that the essence of *makam* is best grasped through practical exploration and oral tradition.

One of the problems identified by musicians is that theory books tend to emphasize the pitch division of intervals and the sequence of flavours. This hinders a fundamental aspect of this music, which is the fact that this music works essentially as *a collection of phrases*. Therefore, according to these musicians, it makes more sense to understand the *makam* phenomenon not as a series of intervals, but to focus on understanding how the phrases are constructed and connected. According to Evgenios Voulgaris, phrases are of central importance because it is only within a complete phrase that this music can transmit its meaning:

The phrase, for this kind of music, is very important. (...) What does the speech have? Phrases. You can say 'well, it has words', but the *phrases are the ones that carry the meaning* [highlight by the author]. Is it possible for you to understand the phrases? Yes, it is. Is it possible for you to understand the words one by one? No, it is not possible. Because I could say that I would see this syllable as belonging to this word, or to the next word. I have many accents, and all the accents could represent one word. So let's say you can find all words. What can you do with this? Nothing. (..) So I use words, but what motivates me is the phrase, because the meaning always motivates me. (Voulgaris, 2022. Personal communication).

Once again, the analogy between music and language is proven to be useful. Here, Voulgaris exemplifies how musical phrases are similar to sentences in spoken language; in language, the meaning is only understood by combining words into a sentence, in the same way that the musical meaning⁴⁷ is only perceivable when combining notes into a phrase. Ross Daly makes this clear when he explains how students should learn new material to be able to perform *taksims*:

To get the material to do a *taksim*, it's not enough just to know the theory (...). You have to know the phrasing, and that comes out of all the compositions. When you play lots and lots of compositions, you develop a repertoire of phrases and then draw on that [material] to work creatively and make your own *taksims* and your own improvisations. Even your own compositions after all that phrasing. So it is a never ending process of acquiring more and more and more phrase material. (Daly, 2022. Personal communication).

According to Daly, the ability to perform *taksims* stems from a student's engagement with existing compositions, where the main goal is to distil the most essential musical elements—namely, the phrases. This process involves an analytical approach to studying compositions, enabling the student to internalise and recontextualise these phrases within their own improvisations. By doing so, the student not only learns the technical structure of *makam* but also begins to develop a personal connection to the repertoire.

But how to define what is a phrase in this context? Daly proposes a definition which highlights the importance of the communal understanding of the material in question:

'A phrase is a unit of melodic material which conforms to an agreement of a community. That what is considered to be a phrase in North England may be

⁴⁷ However, Voulgaris is clear in stating that, differently to language, music does not have an objective syntactical meaning: '[In language,] we can always say "the table is white" and each words have a function. In music we don't have this - it is an analogy, but not the same thing.' (Voulgaris, 2022. Personal communication).

very different of a phrase in South India. But what is important is that is recognizable in a community. (Daly, 2024. In conversation at *10+1 talks*).

Understanding phrases as the central phenomenon of *makam* introduces a significant conceptual shift in the study of this music: it underscores the need to observe phrases in *makam* from a multitude of perspectives. Considering its importance in the overall construction of phrases, rhythm emerges as one fundamental aspect to pay attention to. From an analytical standpoint, segmenting the music according to its phrases becomes crucial for obtaining musically meaningful data. This segmentation, as explored in Chapter 4, allows for a deeper investigation into the rhythmic structures and their relationship to the melodic and formal elements of *taksim* improvisation.

3.5 ‘Rhythmic Phrases’ – Exploring Metricity in a Free-Rhythm Environment

Having briefly observed how musicians emphasize the importance of phrase construction in this music, it is now possible to explore how the concept of rhythmic phrases is utilized by musicians. Before proceeding, it is helpful to clarify the terminology being employed in this section. The term ‘metric’ was introduced in Chapter 2 to explain the internal configuration of phrases. If a phrase is composed of durations that are proportional to each other, the phrase’s pulse might be imbued with a sense of hierarchical structure, which is established by the phrase’s accents, creating strong and weak beats. Such feature can impart a metric quality to the segment, and phrases with this characteristic can be perceived with a higher sense of metricity. Among musicians, this is commonly referred to as ‘rhythmic phrases’. While a more extensive discussion on the topic will be presented in Chapter 4, it should be mentioned that the existence of rhythmical phrases does not mean that the *taksim* will be felt as intrinsically metric; a phrase can be as short as a few seconds, and the subsequent phrase will typically exhibit features that alter the rhythmic character of the music. Because of this, even though phrases are ‘locally metric’ (Cholevas, 2022: 32), there is no time for a recurring metric sensation to be fully established, and the music retains a non-metric quality.

Examining the nature of such phrases — both at the macro and micro levels — provides valuable insights into how rhythm develops within a *taksim*. At the micro level, the proportional relationships between the durations of notes can help to uncover the internal organization of a phrase, offering clues about how a sense of motion or balance is created. At the macro level, understanding how phrases interact with one another, especially in terms of rhythmic variation in the end of sections, sheds light on how *taksim* evolves dynamically over time. While a detailed analytical examinations of these features will be presented in chapters 5 and 6, this section will discuss musicians perceptions over the concept of rhythmical phrases.

During the lessons, several musicians did not use the word metric often to refer to the phenomena described here, preferring terms such as ‘rhythmic’, ‘pattern’, or ‘regular’. Perhaps this term was avoided because of the connotation that it carries; if *taksims* are famously non-metric, why would one discuss metric phrases? Another reason for avoiding the term metric is its similarity to the word μέτρο, which in the Greek language is used as synonym for time signature. However, considering the context of the conversations, this dissertation acknowledges that the terms are all referring to the same musical feature and respects the terms used by the musicians, which will be understood as synonymous with ‘metric’⁴⁸.

Some teachers highlight the metric structure of phrases during lessons to help students learning these phrases. This is the case with Kyriacos Tapakis: he often divides phrases into groups of two and three notes with similar durations⁴⁹ to help his student to properly learn the phrases’ inflection. By doing so, Tapakis is highlighting the proportional values of the phrase, therefore suggesting a brief hierarchical rhythmic configuration in the music. This process of segmentation and rational comprehension of the phrases is designed to assist the students. However, Tapakis establishes clear boundaries for this pedagogical tool.

It is nice to have a rhythmical reference, but you cannot learn *taksim* by doing this [imbuing metrical values to the phrase] very strictly. It is good to mention

⁴⁸ For a discussion on why this dissertation have chosen to use the term ‘metric’, see chapter 4.

⁴⁹ We will provide a detailed analysis of how rhythmical phrases are subdivided in chapter 5.

and observe a few of these rhythmical phenomena for the student to understand that there is something rhythmical, but not in a strict manner. (Tapakis, 2022. Personal communication).

This quote from Tapakis prompts a reflection on the ‘need for balance’ mentioned by Atzakas, this time applied in a pedagogical context. It is possible to infer that if a student makes excessive use of the pedagogical tools proposed by Tapakis, it will lead to only producing phrases which are on the spectrum of metricity, and phrases without this characteristic would be missed. Unlike Gkika’s earlier remarks, which emphasized contrast between distinct phrases to create dynamic variation, Tapakis’s perspective introduces the possibility that balance can exist within individual phrases, where rhythmical and freer elements are combined. This perspective highlights the importance of moderation in employing metric analysis, treating it as one among many tools for developing a nuanced understanding of rhythm.

Ross Daly offers a contrasting perspective; for him, what is important is to learn the phrases as they were originally played, without the attempt to establish (even if provisionally) a clear metric framework.

I think it’s just a sort of a mental copy paste. When someone teaches you in that way, and you find this in the Iranian or Azeri form – it is bit by bit. And then they put the whole thing together. I suppose some teachers must stress the rhythmic aspect, the pulse which has to be there. I don’t know if all teachers do that. That’s generally how they learn, by memorizing large tracts of information. Once you did that, you have to digest it and be able to work with it in a creative sense. And that’s the difficult part.

Q: So you don’t need to metricise them when you are learning the repertoire?

No. It’s probably better not to, actually. But when you do use all that material in your own improvisation, you will first of all establish a pulse on which to build all that. But it will be not metric. It’s really abstract, rather strange,

actually when you think of it. But that's what we do. (Daly 2022. Personal communication).

This quote allows us to delve into Daly's creative process while working with rhythm in *taksim*. The musician prefers not to think about the internal rhythmical configuration of phrases, relying on his musical expertise and memory. However, this process depends on the establishment of a foundational pulse, which serves as the anchor from which phrases are drawn and shaped. This perspective highlights the centrality of pulse as both a generative and grounding force, allowing phrases to unfold naturally while maintaining coherence.

Evgenios Voulgaris chooses to employ a different terminology, using the word 'pattern' to refer to rhythmical patterns. In the following quote, Voulgaris compares *taksims* that make use of rhythmical patterns and *taksims* that do not.

The pattern gives you the movement. Like the poetry with a rhyme. The other thing [a *taksim* that does not use as many rhythmical patterns] is more narrative. For me, both of them give what they give. They are options, up to the way you feel and what you want to do. For instance, in your improvisation, when you need to install a specific atmosphere, it depends on what is your motive. Is there a popular dance that follows? Are we in a taverna, in a church? (Voulgaris, 2022. Personal communication).

Voulgaris highlights the adaptability of rhythmic patterns, emphasizing their use as a tool to shape the atmosphere the musician intends to convey. 'Rhythmic' *taksims* are usually associated with traditional dances and the lively setting of tavernas, where regular pulses and metrical structures align with the social dynamics of such environments. Conversely, *taksims* characterized by a freer rhythmic quality tend to be linked with an introspective environment, reflecting the contemplative atmosphere of spaces such as churches. This opposition will be explored in Chapters 6 and 7, when the analysis delves into how rhythmic features of *taksim* performances align with their social and cultural contexts, shedding light on how specific rhythmic characteristics contribute to the expressive goals and situational demands of each setting.

Harris Lambrakis comments on this topic establish a clear relationship between the use of rhythmic patterns and the establishment of a pulse.

I recognise the rhythmical patterns, and I use them for understanding the general pulse of the *taksim*. To feel that he [the *taksim*] started, he developed and he concluded. And this is the general structure. The rhythmical phrases help me to have this feeling. The big picture and the small elements. From the small elements, (...) I move to the bigger picture. But I see rhythm in both. In the small and the big picture. (Lambrakis, 2022. Personal communication).

Here, we can observe a contrast with Daly's ideas. For Daly, the pulse serves as the foundational framework, with phrases unfolding naturally within its bounds, without the need for a deliberate metrical awareness. Lambrakis, on the other hand, approaches the relationship between phrases and pulse from the opposite perspective: he uses the inner rhythmic qualities of phrases to understand the overarching pulse of the improvisation. To Lambrakis, while rhythmic phrases can afford a local sense of periodicity (what Lambrakis refers to as 'small elements'), they also contribute to unveiling the overall sense of pulse (what Lambrakis refers to as the 'big picture') that the *taksim* will evolve into. This layered understanding of rhythm suggests that metricity operates on both micro and macro levels, shaping the improvisational flow while simultaneously grounding it in a cohesive sense of pulse.

3.6 Conclusion

This chapter has explored the complex nature of rhythm within *taksim* improvisation from an emic perspective grounded in the practical experiences and discourses of established musicians in Greece. The fieldwork has uncovered a broad spectrum of interpretations concerning the presence and function of pulse and metricity within *taksim*. Regarding pulse, three types of intentionality are observed; some musicians perceive a constant yet flexible internal pulse; others view the pulse as a fluctuating element that can vary according to what

is required in the moment; another perspective understands pulse as dependent on the listener's perception.

These perspectives share commonalities with ideas observed in literature from Chapter 2. Widdess (1994) described one example of an *ālāp* improvisation in which both the performer and analytical data suggested that there is a constant but flexible pulse; Holzapfel (2013) arrives at a similar conclusion presenting several *taksim* improvisations and a varying degrees of pulse flexibility. Although the concept of pulse as a fluctuating element was not thoroughly discussed in literature, it is important for Cholevas's concept of locally metrical phrases (2023) and for Reckford's discussions (1987) on compression-relaxation moments within *avaz*. Experiments by Ohriner (2016) and Will et. al. (2015) explored the emergence of pulse sensation in listeners exposed to free-rhythm music, with the latter suggesting that listeners can establish a sense of pulse even when faced with irregular temporal structures.

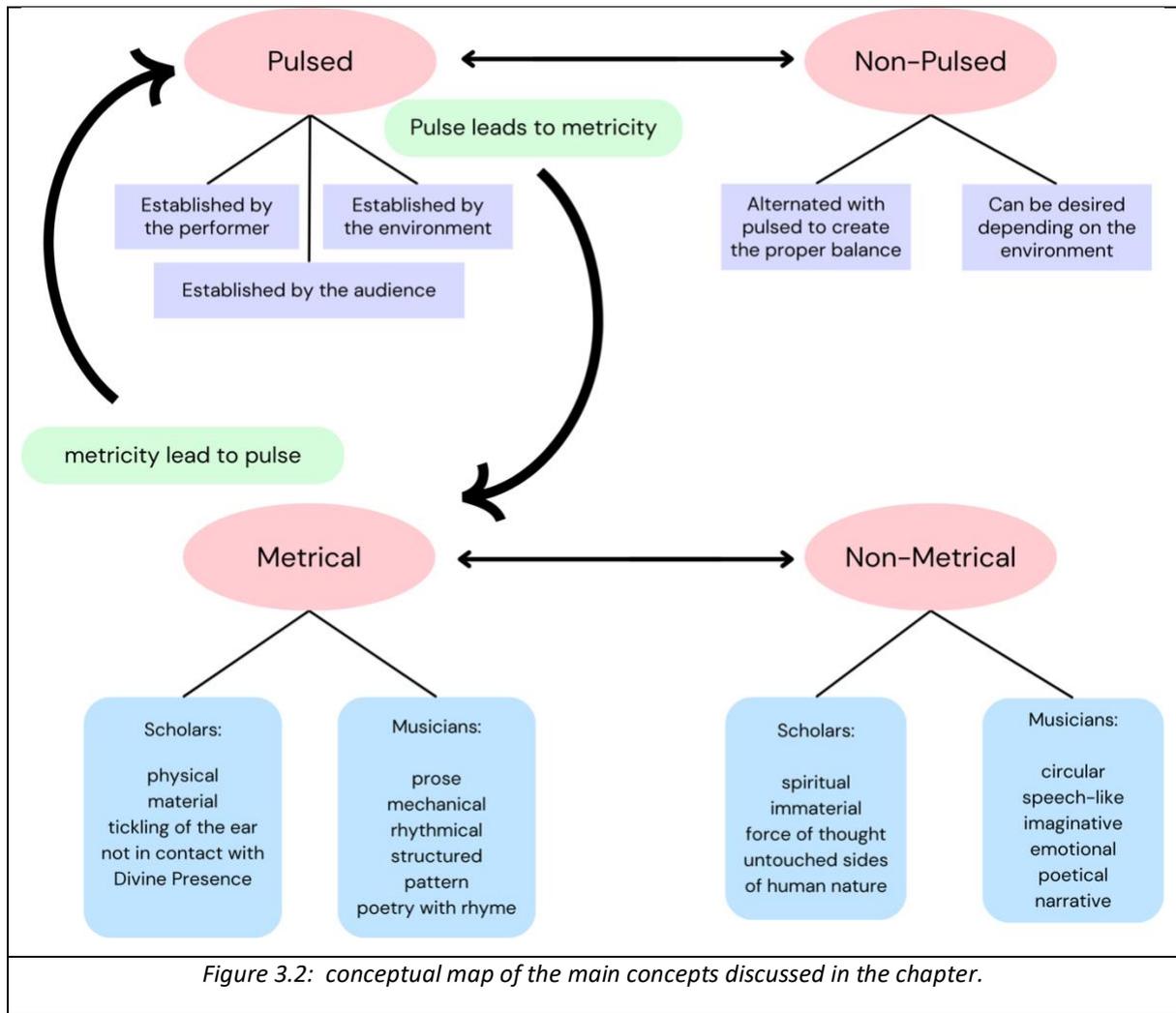
Similar to what was presented by Tsuge (1974), Reckford (1987), Cholevas (2023) and Roeder (2019), the concept of 'phrase' emerges as the foundational unit, with its internal rhythmic construction significantly influencing the music's narrative. These authors highlight how the rhythmic behaviour within phrases — whether through the balance of compression and relaxation presented by Reckford (1987), the localized metric qualities proposed by Cholevas (2023), or the durational projections described by Roeder (2019) — might serve as a framework for understanding larger-scale structures. This resonates strongly with the perspectives shared by musicians in this chapter, particularly in their reflections on pulse and metricity.

For instance, Daly's approach to pulse as a foundational element upon which phrases emerge aligns with the idea that phrases have a structural function in guiding the improvisation. Similarly, Lambrakis' remarks on how rhythmic phrases unveil both localized periodicity and the overarching pulse demonstrates how micro- and macro-level rhythmic structures can be explored. While Tsuge (1974) and Reckford (1987) emphasize the generative role of poetic meter and density in phrase construction, musicians like Voulgaris extend this notion by connecting the internal rhythmical features of phrases with the broader emotional and atmospheric qualities of *taksim*.

Concerning metricity, it is noteworthy to recall the early writings discussing free-rhythm presented in Chapter 2. Previous authors had used the terms ‘spiritual’, ‘immaterial’, ‘force of thought’, ‘untouched sides of our nature’ to refer to non-metrical aspects of music. To this lexicon, we can add the terms used by the musicians consulted in fieldwork: ‘circular’, ‘speech-like’, ‘imaginative’, ‘emotional’, ‘poetical’ and ‘narrative’. Previous authors used the terms, ‘material’, ‘physical’, ‘tickling the ear’ and ‘not in contact with Divine Presence’ to refer to metrical music, to which we can now include ‘prose’, ‘mechanical’, ‘rhythmical’, ‘structured’, ‘pattern’, ‘poetry with rhyme’ as mentioned in this chapter. Although the limited sample of participants precludes definitive conclusions regarding these associations, there is a clear parallel in how these two distinct groups of individuals articulate their perceptions of metricity or its absence in music.

It is also interesting to contrast Cholevas’ concept of metricity with the perspectives presented by musicians consulted in this chapter. Musicians offered different opinions on how much phrases can be understood as metric, in a spectrum that varied from never acknowledging any internal metricity (Ross Daly) to acknowledging that some phrases can be understood as metric to assist students (Kyriacos Tapakis). Cholevas, on the other hand, suggests viewing all phrases *as locally metric* to propose a pedagogical tool to visualise and study *taksim* improvisation. Naturally, his conception was proposed in the context of creating aiding tools for the study of the practice, which does not necessarily mean that all phrases are inherently metric; one might choose to present them as such to facilitate the teaching environment, but this is not something to be applied during the performance of a *taksim*. Nevertheless, Cholevas’s proposition expands even further the range in which musicians can understand the spectrum of metricity within *taksim* improvisation.

Figure 3.2 provides a structured summary of the main concepts explored in the discussions. The green boxes present different ways in which pulse and metricity can be connected. The purple boxes highlight key features associated with both pulsed and non-pulsed phrases. The blue boxes categorize terms commonly linked to metrical and non-metrical phrases, offering insight into how musicians and scholars conceptualize rhythmic structure in *taksim*.



But how can this diverse range of opinions inform the construction of computational tools to analyse rhythm within *taksim*? First, it should be acknowledged that regardless of their opinion, all musicians did recognize the idea of pulse and metricity to be somehow connected with the practice of *taksim* – even if this recognition signified that some element was not desirable in a determined context. This leads to the conclusion that pulse, meter and phrase segmentation should be considered as fundamental parameters for analysis, which will be further detailed in Chapter 4. Secondly, it should be acknowledged that if these parameters are included in the methodology, their detection should be constructed as to capture and represent a wide range of phenomena, from very non-metrical and non-pulsed, to very pulsed and metrical.

Ultimately, this chapter provides a critical foundation for the development of computational tools and methodologies to empirically study rhythm in *taksim*. These tools, which will be explored in Chapter 4, aim to reflect the nuanced and context-dependent nature of rhythm as articulated by the musicians, offering new pathways for analysis of this rich improvisational tradition.

Chapter 4: Towards a Computational Analysis of Rhythm in *Makam* Music

*The computer can't tell you the emotional story. It
can give you the exact mathematical design, but
what's missing is the eyebrows.*

Frank Zappa.

4.1 Contextual overview and aim of the chapter

The previous chapters introduced both ethnographic and academic perspectives related to *makam* and free-rhythm music, drawing on insights from musicologists and musicians. These discussions established key conceptual frameworks for understanding free-rhythm in the context of *taksim* improvisation. Through an examination of existing scholarly literature and conversations with expert practitioners, it became evident that while there is no singular, unified perspective on rhythm in *taksim*, there is a shared recognition of certain fundamental elements that shape its structure. In particular, the role of pulse, the different understandings of metricity, and the use of phrases as primary organizational units emerged as essential aspects in understanding how rhythm functions in this context. These perspectives provided contextual foundations, offering a range of viewpoints on how rhythm is perceived, articulated, and experienced within this musical tradition.

Building upon these discussions, this chapter explores the application of computational tools as means to generate empirical data and visual representations for the analysis of rhythm in *taksim* improvisation. Developing this process comes with significant obstacles, as the inherent flexibility of free-rhythm music has long posed difficulties for systematic analytical approaches. Unlike metrically structured music, where rhythm can be readily quantified using established methodologies, the temporal fluidity of free-rhythm music complicates its representation and measurement. Moreover, there is a general lack of shared terminology

within both scholarly and performance traditions, making it difficult to define, compare, and quantify rhythmical features in a standardized manner. Considering these challenges, computational methods offer an opportunity to approach free-rhythm in a new way — not as a rigid framework, but as a dynamic phenomenon that can be explored through quantitative and qualitative perspectives.

This chapter will explain how, with reference to the literature review and ethnographic research, computational tools were explored to create an analytical approach for rhythm in *taksim*. It begins with a brief discussion on computational methodologies in music analysis, situating the approach within broader trends in rhythm research. Next, it presents a review of relevant literature on rhythm in *makam* music, identifying key theoretical perspectives that inform the proposed method. In sequence, I will present an examination of how computational tools have been applied in previous analyses of *makam*, providing context for their adaptation in this research. Subsequently, the process of constructing the analytical tools will be detailed. This includes data preparation, outlining the criteria used for onset detection, phrase segmentation, and section segmentation. Finally, the chapter presents the key analytical outputs derived from this process — pulse estimation, metricity measurements, plot visualization, and small-scale rhythmic analyses — demonstrating how these features contribute to identifying underlying rhythmic structures and patterns within *taksim* improvisation.

4.2 Approaches to computational analysis

Computational tools can offer powerful means to assist in the analysis of musical material, equipping musicologists with empirical evidence on how specific musical aspects are performed. Clayton (2023) proposes various ways in which such tools can be employed⁵⁰, arguing that computational tools can help musicologists assess whether current practices are consistent with existing theories. In this context, the key factors considered by the analysis

⁵⁰ The cited paper discusses role of computational analysis in Hindustani music. The issues faced in this context share similarities with those in *makam* music for several reasons; both are based on highly elaborate melodic development, with practices established through many centuries and an extensive corpus of theory. Given these parallels, Clayton's perspective on Hindustani music is relevant for the study of *taksim*.

are provided by an existing body of literature – typically an existing music theory – and the musicological work uses empirical data to discuss how performances relate to existing theories. Clayton describes this as a ‘top-down’ approach (2023: 174).

Another way of employing computational tools is through a ‘bottom-up’ approach, where the musical material is investigated to discover patterns using data (Clayton, 2023: 174). This approach is suitable when the researcher’s investigation is not connected to an existing theory, which may occur either due to the lack of an existing theory or the need to highlight a musical aspect not explicitly covered by one. The goal in such cases might be to reveal cognitive processes underlying the music, or patterns that may be captured by existing theories (Clayton, 2023: 174).

Finally, Clayton presents a ‘critical’ approach, which combines computational analysis with a critical attitude typical of the humanities (Clayton, 2023: 173). This perspective connects the findings from computational analysis to broader musicological and theoretical discussions. A critical investigation allows for deeper observation of discrepancies between theoretical concepts and practice and might lead to new proposals for improving theoretical concepts by testing them against performance practice. This approach could involve using elements of a top-down perspective, departing from existing theoretical concepts but extrapolating them to investigate gaps between theory and practice. Conversely, it might incorporate elements of a bottom-up approach, identifying patterns and then discussing how the findings relate to previous knowledge.

As observed, there is a lack of well-established theoretical models specifically addressing rhythm in *taksim* that could serve as a direct foundation for this study. I am, however, drawing from conversations with musicians and sources gathered from different free-rhythm styles. The reports from multiple musicians, even if at times conflicting, are used to form the ‘theoretical framework’ that guided the construction of the analytical tools. Discussions presented in Chapter 3 led to the understanding that it is possible to conceive pulse as present in some form, even if opinions on the nature of how it is formed and who is establishing it may vary. Similarly, the idea of some degree of metricity within phrases is a concept recognised by the musicians and, because of this, it is included as a key parameter in the

analysis. These factors highlight characteristics of a ‘top-down’ approach to this methodology, but one where its core framework was constructed during this research combining ethnography and literature review.

The tools developed in this chapter will be applied to examine both contemporary and historical recordings of *taksim* improvisations. While the ‘top-down’ approach played a crucial role in constructing the analytical tools, the analysis itself will adopt a different strategy; rather than relying on predefined theoretical categories, it will use empirical data retrieved from performances of *taksim* improvisation to derive insights. This will involve recordings representing different stylistic approaches to *taksim* improvisation. Observing rhythm across diverse performance contexts will contribute to an understanding of what types of patterns can be observed in different situations. In this sense, the research also adopts a ‘bottom-up’ approach, where performance — rather than pre-existing theoretical models — serves as the primary basis for defining the key analytical parameters.

Finally, a critical aspect of this research concerns the perspectives of musicians regarding contemporary theoretical models of *makam* music. Musicians consulted expressed scepticism towards contemporary theoretical models of *makam* music, arguing that *makam* should be understood from a phrase-based perspective, rather than using the more common scalar perspective. Given this, constructing analytical tools that prioritise phrase structure offers a novel approach to conceptualising *makam* theory — one that emerges directly from performance practice. By centring analysis on how musicians shape phrases in real-time, this study contributes to a broader reconsideration of theory as something grounded in practice rather than imposed through abstract frameworks.

4.3 Computational analysis, makam music and previous analytical developments

Much of the research combining computational analysis and *makam* focuses on the intonation of notes within the *makam* system, a topic of extensive discussion for centuries.

From a historical perspective, During (1985) and Wright (1978) discuss the intonation propositions of the ‘Systematist School’ and the relationships between *makam* and the Persian *dastgah* system. Feldman (2023) presents an extensive discussion of Cantemir’s proposition for a ‘*makam* scale’, while Yarman (2008) presents an overview of different intonation propositions. Discussions on intonation changed drastically in the early 21st century, when the use of computational tools allowed for more precise analyses of the topic. Akkoç (2002) and Karaosmanoğlu (2006) demonstrated the inaccuracy of the ‘24 tones Pythagorean model’, introduced by the musicologists during the early Republican period as the ‘correct intonation of Turkish music’. This intonation system aimed to highlight characteristics associated with the Anatolian region and diminish the Byzantine and Arabic aspects of this practice – a political decision to justify *makam*’s existence during a period when its ‘non-Turkish’ character threatened its survival (Yarman, 2008: 10-18). Yarman’s dissertation (2008) used recordings by established masters to demonstrate that the ‘Arel-Ezgi-Uzdilek’ intonation system is inadequate for capturing the melodic inflexions used in *makam* music, proposing an intonation system of 79 tones. This proposition aimed to combine theory with practice by constructing a *kanun* specially designed for this intonation. However, this system has not become widely used.

But intonation is not the only element to receive a computational analysis regard. More recently, the CompMusic project produced extensive literature on the use of computational tools to analyse *makam* music and other non-Western traditions. The project created the platform *Dunya*, a large dataset for categorising audio recordings by style, *makam*, *usul* and performer (Atli et al., 2017). Within this project, Bozkurt et al. (2014) reviewed the use of computational tools in *makam* music, proposing six general areas of interest: tuning analysis, melodic analysis, automatic transcription, automatic *makam* recognition, rhythm analysis, and studies on timbre and instrumentation. While a systematic review of all categories is beyond this dissertation’s scope, it is useful to pinpoint some musicological findings from the project related to rhythmical aspects of *makam*.

Serra (2017: 37) notes that findings from the CompMusic project demonstrated that metrical contraction is systematically applied in certain *usuls* (Holzapfel & Bozkurt, 2012). Holzapfel’s study on *taksim* improvisation (2013) suggests that rhythm in *taksim* can be established

through a regular pulse, highlighting stylistic differences between improvisations from Mesut Cemil and Cemil Bey⁵¹. The author argues that while Cemil Bey maintained continuous pulsations for up to 50 seconds, Mesut Cemil presented more irregular pulses. This contrast may stem from differences in individual playing style or reflect broader stylistic shifts within the tradition over time. Holzapfel (2015) also presented a paper investigating how the surface rhythm of compositions relates to their underlying *usul*, suggesting that the relationship between compositions and the *usuls* that they entail can be analysed using computational tools.

From a broader perspective related to *makam* and computational analysis, Serra argues that there is a lack of identified and recognised musicological problems suited for computational methodologies, which is essential for the field to develop a clear identity and focus (Serra, 2017: 39). Considering this challenge, the work developed by the CompMusic project has contributed to the field by creating a large dataset to study *makam* music and by presenting methodologies for computational analysis and musicological findings that contribute to new perspectives on the functioning of the *makam* system.

Various studies, including those discussed in Chapter 2, have introduced analytical approaches that inform the computational methods proposed here. Widdess (1994) presents an analysis of an *ālāp* improvisation that combines empirical data with a collaborative framework, where the performer actively participates in the analytical process. By manually marking onset durations and investigating whether a sensation of pulse is present in the music, Widdess demonstrates how subjective perceptions of rhythm can be examined empirically. This combination of performer insight and data analysis is particularly relevant to the current methodology, as it reinforces the need for a multi-layered approach that considers both computational and human-centred perspectives. Roeder (2019) proposes an investigation of inter-onset intervals (IOIs) using Hasty's concept of durational projection, presenting a detailed classification of different types of gestures. This perspective is reflected in the examination of small-scale rhythmic elements presented later in this chapter. Cholevas's dissertation (2022) contributes further by proposing the concept of locally metric

⁵¹ A more extensive discussion on findings from this paper is presented on the Chapter 2 of this dissertation.

phrases — phrases that, while not establishing a recurring metric framework, exhibit internal proportionality in their rhythmic structure. This notion is particularly relevant to this research, as it allows for an analytical approach that acknowledges moments of internal metricity within an otherwise non-metric context.

4.4 Objectives of the Computational Methodology

This chapter introduces analytical tools with different objectives. First, it aims to accurately detect the rhythmic elements of pulse and metricity in performance recordings of *taksims*, building on discussions with musicians presented in Chapter 3. As detailed in the previous chapter, the terms ‘pulse’ and ‘metricity’ are used here in a specific context, distinct from their common theoretical definitions. The process of detecting these features is outlined in the following section, where I explain how onset detection is carried out, the rationale behind segmenting phrases into sub-phrases and the methodology for dividing larger sections of the performance. These steps ensure a comprehensive and replicable process for collecting data on rhythm in *taksim* improvisations.

After establishing the method for data collection, I will present the tools employed to obtain reliable measurements of pulse and metricity based on the data collected. This part of the chapter will explore existing methods of pulse detection and discuss the procedures implemented to ensure the reliability of the data gathered. Additionally, I will introduce the baseline metrics used to evaluate the level of metricity in phrases and sub-phrases and explain how these metrics contribute to the overall analysis.

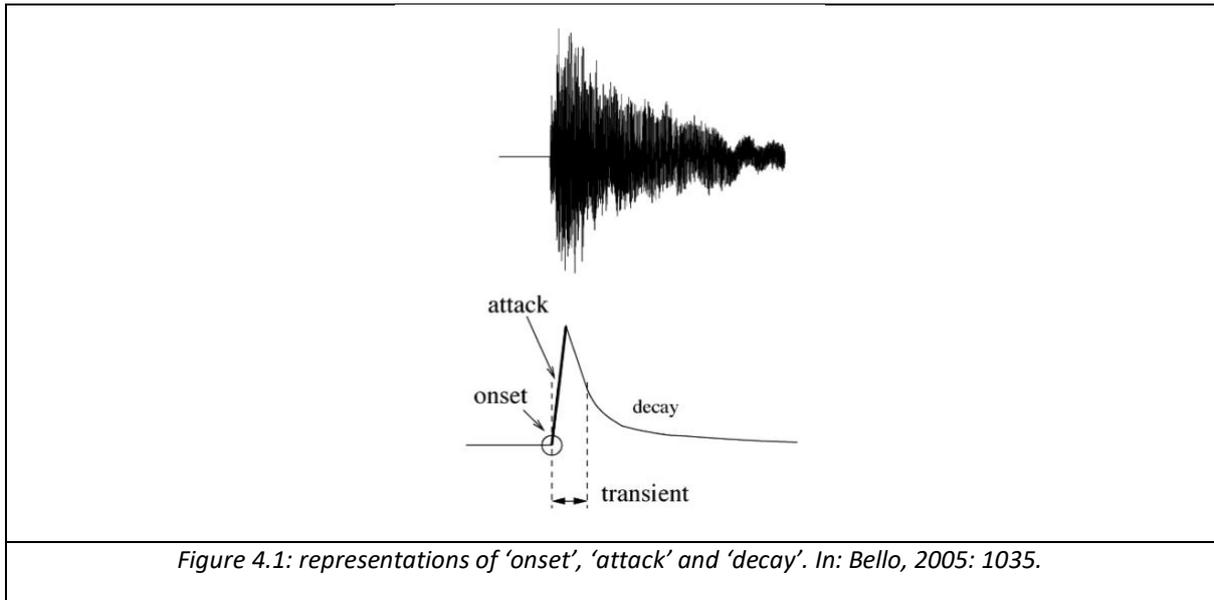
Finally, I will demonstrate how the collected data is visualised, providing insight into the rhythmic characteristics of *taksim*. This includes detailed explanations of the plots presented, such as a large-scale rhythm plot, a comparison between cadential and non-cadential phrases and small-scale observations, highlighting how each feature allows for the interpretation of the rhythmic behaviour within the improvisations.

While previous studies have explored rhythm in free-rhythm practices through manual transcription and timing, a more systematic and scalable approach has remained largely unexplored. The methodology developed in this chapter builds on these earlier contributions by proposing computational tools to extract rhythmic features in a consistent and reproducible manner. By applying a structured analytical framework to a larger dataset, this study aims to refine and expand the current understanding of rhythmic organization in *taksim*, offering new analytical possibilities that could be adapted to other free-rhythm traditions and inform broader discussions on rhythm in improvisational music.

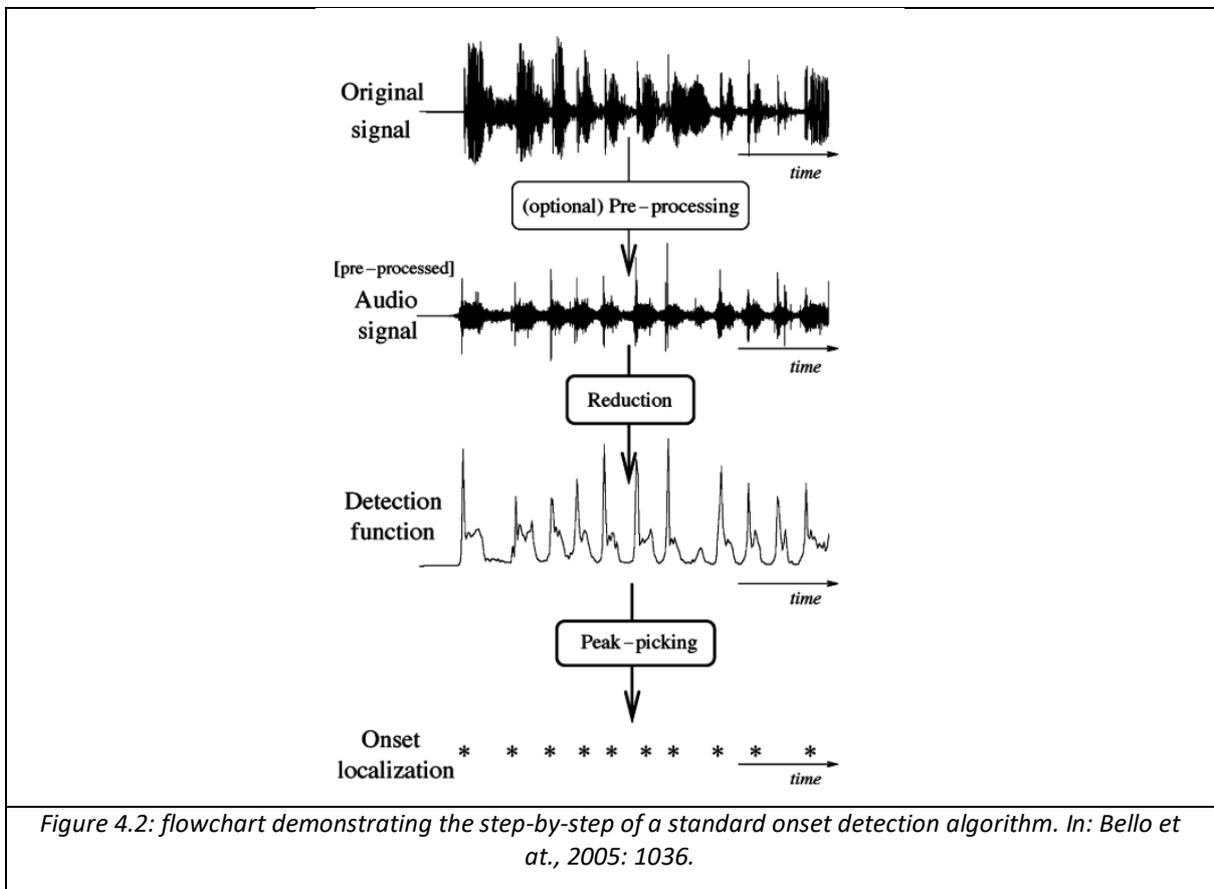
4.5 *Onset Detection: Techniques and Challenges*

The first stage in using computational analysis for the rhythmic aspects of *taksim* is to measure the distance between each note of a recorded performance. This process involves challenges in detecting notes efficiently, as well as a certain degree of ambiguity in deciding what qualifies as a note for subsequent analysis. It is a process that contains a degree of subjectivity and, therefore, cannot be fully automated and requires further explanation.

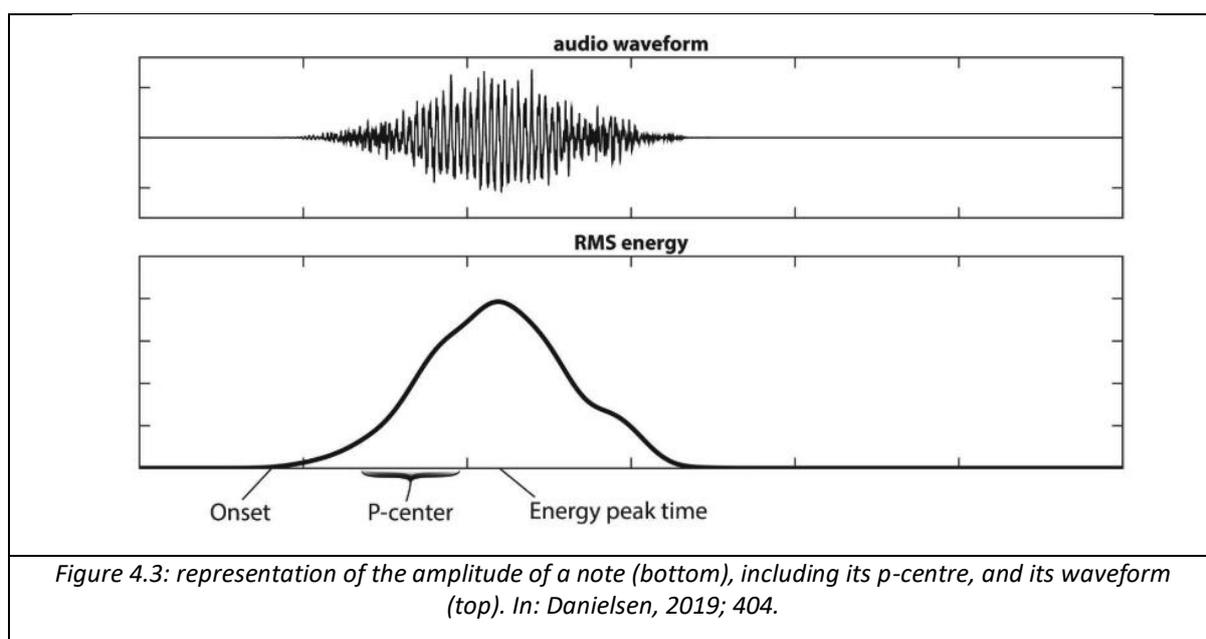
Bello et. al. (2005) distinguishes the ‘attack’, period in which the amplitude of a note increases, ‘transient’, a region including the attack and the early decay of the note, and ‘onset’, a ‘single instant chosen to mark the temporally extended transient’ (Bello et al., 2005: 1036). Typically, an onset coincides with the start of the transient, as seen in the next figure. While the attack of a note is an interval of time, the onset is a single point, making it ideal to use in data analysis. Therefore, computational analyses typically measure the distance between the onsets of notes.



An onset detection algorithm automatically locates attacks present in a recording and identifies their onsets. The distance between two onsets, commonly referred to as Inter-Onset Interval (IOI), is generally used to measure the distance between two notes. Figure 4.2 presents the flowchart of an onset detection algorithm.



However, there are different ways of defining when a note is perceived to begin. Gordon (1987) established a distinction between an onset and its ‘perceptual attack time’, a concept expanded upon by Danielsen et al. (2019). The salience of this distinction depends on the type of sound source; sources such as voice and bowed string instruments typically present a larger difference between the beginning of the onset and its perceptual attack time. In contrast, instruments with a fast attack, such as the piano and percussion, present smaller differences. The sound source also affects the relevant parameter for detecting the perceptual time. For example, while loudness is generally the key parameter, other factors such as vowel onset, vowel quality, and consonant structures can also impact the perceptual attack time in speech (Villing, 2010: 18). Following Wright’s research (2008), Danielsen et al. refer to the instant of perceptual attack as the P-centre, proposing that P-centres are not fixed moments in time but function as ‘beat bins’ of a perceptual area (Danielsen et al., 2019: 403).



As mentioned in Chapter 1, one reason for focusing this research on the oud is that, as a plucked string instrument without resonating strings, the onsets produced by it tend to be less ambiguous to detect in comparison to bowed strings and voice. This happens because the duration of the amplitude rise during plucked string attacks is extremely small – typically of 2-5 milliseconds. Due to the narrow time interval between the onset and the peak of amplitude, the distance between the physical onset and the note’s P-centre is also extremely

small. As will be discussed later in the chapter, a difference of a few milliseconds would not significantly alter the outcome of the calculations here. Because of this, I have decided to use physical onsets (the beginning of the attack time) as the parameter to define the beginning of a note. This choice presents the additional advantage of enormously reducing the complexity of both automatic and manual detection, which allows for a more extensive corpus of *taksim* improvisations to be investigated.

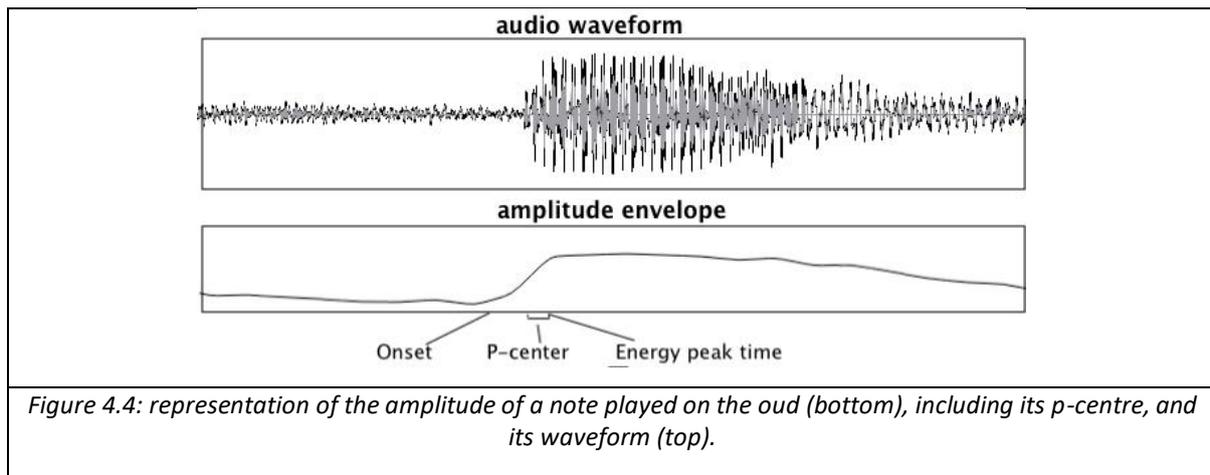
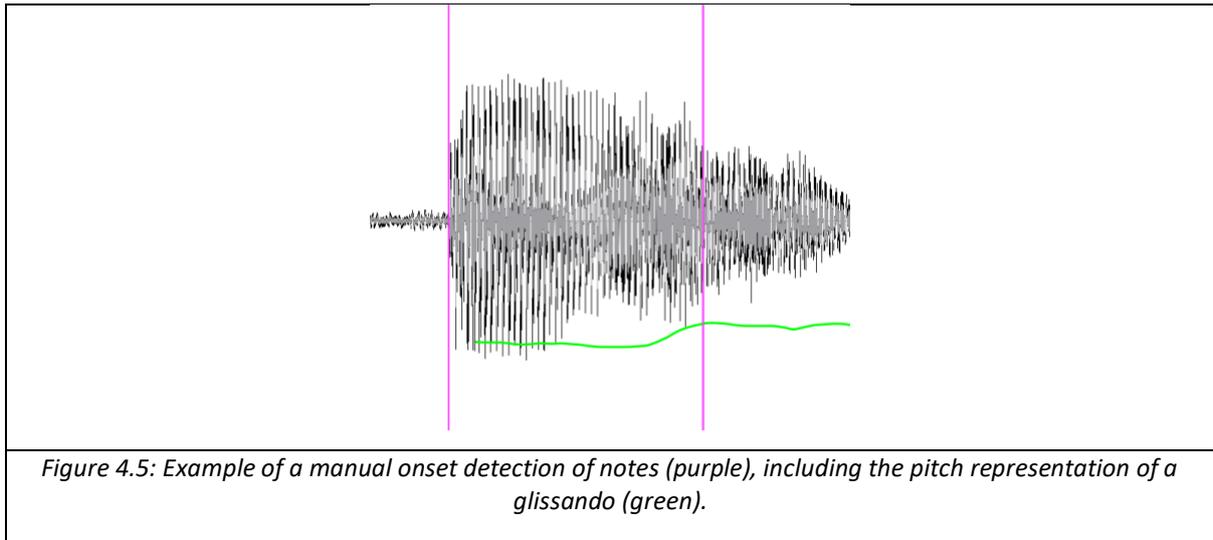


Figure 4.4: representation of the amplitude of a note played on the oud (bottom), including its p-centre, and its waveform (top).

Nonetheless, even though most attacks do not present ambiguity in identifying onsets, there are situations presenting complexities. As *taksim* is a highly ornamented musical style, some recurring gestures present challenges to the process of onset detection and require further explanation.

- Glissando

Although most notes on the oud are played with a right-hand stroke, creating a clear attack, there are instances when the musician slides into a note without a right-hand stroke, creating ambiguity about the precise location of the new note's beginning. In such cases, I have placed the attack at the moment when pitch stability is achieved in the intended note. Figure 4.5 presents a visual representation of a glissando note, where the horizontal green line represents the note's pitch, and the purple vertical line indicates the segmentation of the onset.



- Tremolos

Tremolos are not commonly used in the Greek and Turkish oud styles, being more often associated with Arabic *taksim* (Royer-Artuso, 2015: 111). Nevertheless, they occasionally appear in the recordings studied, especially by musicians influenced by Arabic music, such as Kadri Şençalar (Baloğlu, 2022: 1836). In phrases where tremolo is used, I do not mark every right-hand attack, as it would be virtually impossible to obtain precise measurements. This does not obstruct the understanding of rhythm within the phrases; tremolo typically involves performing several notes in rapid succession, and the detection can still occur when the note changes.

- *Çarpma*

Çarpma is a typical ornamental technique similar to grace notes in Western music. The musician performs a light attack on the note above the main intended note, shortly before playing the intended note (Bozkurt et al., 2015: 804). This can be executed with either a right-hand stroke or a left-hand tap on the string. *Çarpmas* are typically very fast, ranging from approximately 40 to 105 milliseconds. The speed of this ornament poses two challenges for onset detection: at very fast rates, the process of onset annotation inevitably becomes more imprecise. This happens because small variations of a few milliseconds are inevitable due to

human limitations on perceiving attacks close together⁵². While small variations will not significantly impact the measurement of longer IOIs, they will become problematic when IOIs are as short as 60 milliseconds. Additionally, marking very fast *çarpmas* highlights a level of detail that might obscure more prominent rhythmic features, making the reading of the overall metricity and pulse of the section less clear. Considering these challenges, I have limited the annotation of *çarpmas* to notes with IOIs longer than 70 milliseconds. This threshold was determined empirically; in intervals shorter than 70 milliseconds, small distortions are difficult to perceive, and the challenges explained here make the detections unreliable.

This research explored several tools for automatic onset detection, with a focus on selected plugins available in the software Sonic Visualiser: University of London's Note Onset Detector (Duxbury et al., 2003), Aubio Onset Detector (Brossier et al., 2019), and the University of Alicante's Note Onset Detector (Valero-Mas et al., 2015). These plugins offer a wide range of methods for onset detection, including High-Frequency Content, Spectral Difference, Phase Deviation, Complex Domain, and Broadband Energy Rise. Each method is more efficient in detecting onsets depending on the nature of the recording: the type of instrument, quality of the recording and the distance between the microphones and the instrument is a determining factors in selecting the most suitable method for onset detection. A trial-and-error approach led me to primarily use the University of London Note Onset Detector with the 'Complex Domain' function. The 'sensitivity' setting had to be adjusted, depending on the signal-to-noise ratio of the recording.

After the automatic detection using the Note Onset Detector plugin, it is necessary to confirm whether the onsets were correctly identified, a process which is conducted manually by the researcher. This is done by listening to the recording, aurally verifying if the onset is accurately marked, and manually adjusting the marking if there is a glissando, *çarpma* or tremolo.

⁵² Bello et. at. (2005). For more information on the topic, see B. C. J. Moore, *An Introduction to the Psychology of Hearing*, 5th ed. New York: Academic, 1997.

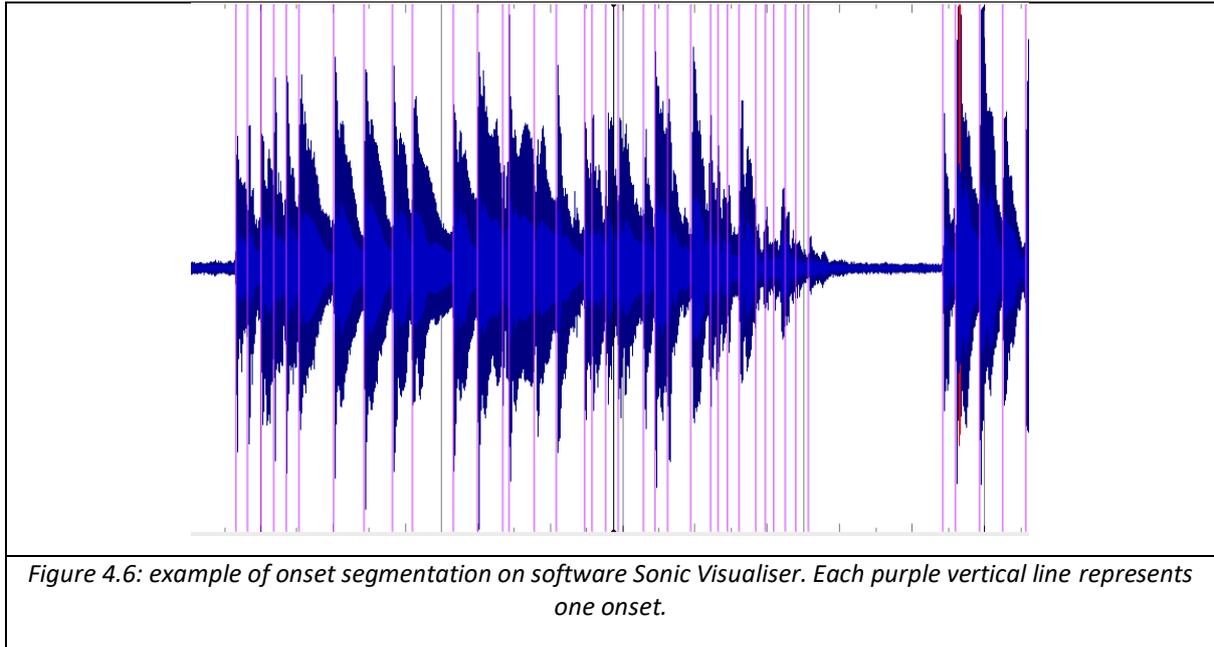


Table 4.1 presents the percentage of manually adjusted onsets across the selected recordings⁵³. It shows that the level of adjustment required can vary significantly, influenced by factors such as the recording quality, room acoustics, and the musician’s style. Additionally, bowed string instruments tend to pose more difficulties in this process. Even though this process carries some degree of subjectivity, it is loosely replicable, and the procedures identified in this section aim to augment the degree of replicability.

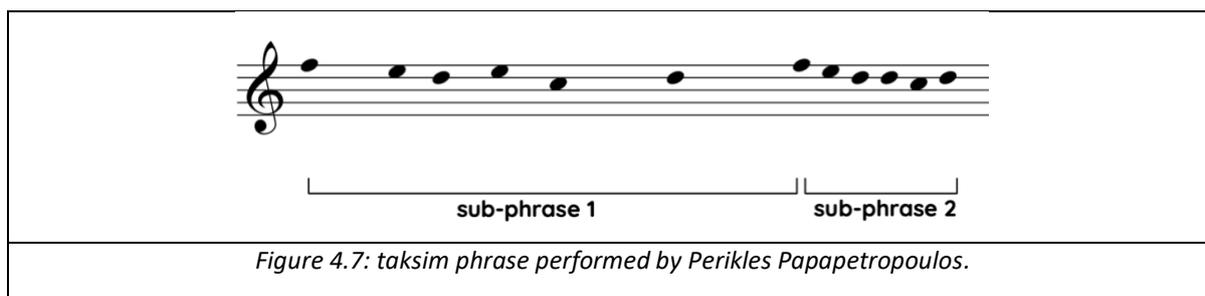
Musician	Makam	Type of Instrument	Instrument	Manually adjusted onsets
Cinucen Tanrıkorur	Uşşak	Plucked String	Oud	6.1%
Evgenios Voulgaris	Nikriz	Plucked String	Oud	14.3%
Evgenios Voulgaris	Uşşak	Plucked String	Oud	8.0%
Kadri Şençalar	Saba	Plucked String	Oud	15.8%
Kadri Şençalar	Hizazcar	Plucked String	Oud	12.9%
Kadri Şençalar	Rast	Plucked String	Oud	22.5%
Kyriacos Tapakis	Uşşak	Plucked String	Oud	8.8%
Kyriacos Tapakis	Rast	Plucked String	Oud	2.5%
Kyriacos Tapakis	Uşşak	Plucked String	Oud	12.8%
Perikles Papapetropoulos	Hicaz	Plucked String	Lavta	26.6%
Yurdal Tokcan	Nihavent	Plucked String	Oud	1.0%
Chrysanti Gkika	Hicaz	Bowed String	Istanbul Lyra	62.0%
Ross Daly	Hüseyini	Bowed String	Tarhu	59.1%
Sokratis Sinopoulos	Hicaz	Bowed String	Istanbul Lyra	11.8%

Table 4.1: percentage of manually adjusted onsets.

⁵³ Table 4.1 presents a combination of field recordings I made and publicly available *taksim* improvisations, selected from material I was exploring at this stage of the research. Unlike Chapters 6 and 7, which focus exclusively on the oud, it includes both plucked and bowed string instruments and shows that the range of manually adjusted onsets can vary both within a single instrument and across different instruments.

4.6 Segmenting Phrase and Sub-Phrase in Taksim Improvisation

As discussed in previous chapters, understanding phrases as the basic unit that conveys information is central to the musician's understanding of the functioning of *makam* music⁵⁴. This means that an analytical method using an entire recording to produce statistical features (e.g., histograms with bins of preferred durations) would not provide the most relevant information. It is crucial to find the best ways to detect and present the rhythmic characteristics occurring *within the phrases*. In this sense, it is important to note that different rhythmic features may occur inside what musicians establish as 'a phrase'⁵⁵, and such features would need to be observed separately using the tools presented here. Figure 4.7 illustrates this in a phrase performed by Perikles Papapetropoulos using proportional durations (i.e., the space between notes is proportional to the time interval between notes).



Even though the segment presented here is understood as a single phrase by its performer, it is clear from the distance between notes in the transcription that there are two distinct rhythmic features in the phrase: sub-phrase 1 presents notes with uneven distances, including longer notes, whereas sub-phrase 2 presents faster notes with similar durations⁵⁶. In such cases, segmenting the phrase into sub-phrases contributes to a proper identification of its

⁵⁴ Phrase division in *makam* music has also been investigated from a computational perspective. Karaosmanoğlu et al. (2014) introduced a symbolic dataset of Turkish *makam* compositions, segmented into phrases by expert annotators.

⁵⁵ For a detailed discussion on musician's understanding on the definition of a phrase, see Chapter 1 and Chapter 3.

⁵⁶ The segmentation of the phrase into sub-phrases was explicitly done by Papapetropoulos during the lesson; the musician would play the first segment, wait for me to repeat it, and then proceed playing the second segment.

rhythmical characteristics in the coming sections. Being so, it is therefore necessary to explain how the process of segmenting phrases into sub-phrases should be conducted.

The goal of establishing criteria for segmenting phrases is to obtain the best representation of the key features of pulse and metricity. For this, I propose segmenting phrases according to two rules: (1) if a segment exceeds 14 onsets and/or (2) when there are rhythmic changes taking place in the music. The first rule was established after verifying that producing larger segmentations results in a lower resolution of the rhythmic information (as explained in the following section). Additionally, dividing longer segments into sub-phrases facilitates the visualisation of the intended features, even if the rhythmic characteristics do not change. The second rule is self-explanatory: if the goal is to observe rhythmic features, phrases need to be segmented according to these changes for proper analysis. There are two main categories in which rhythm can change:

- **Changes in the overall pulse of the phrase/sub-phrase (accelerando or rallentando).**

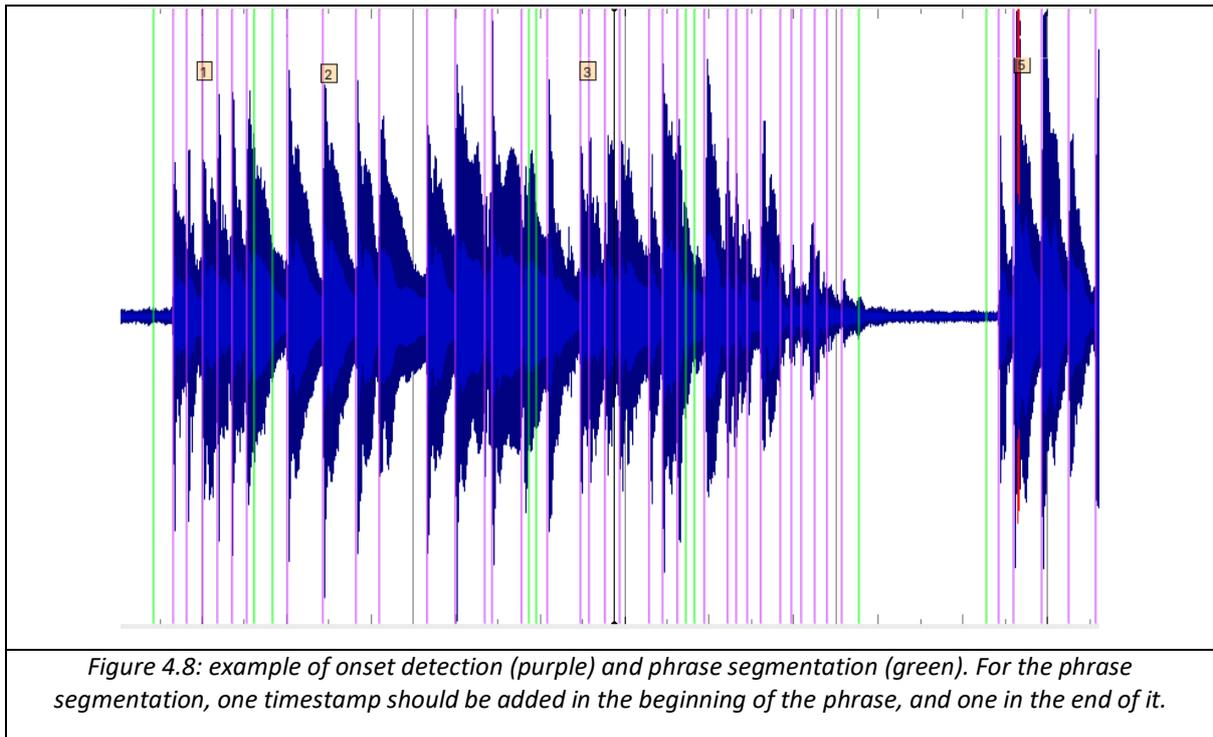
Once a sense of pulse is established, a segmentation is placed if there is a change in the overall pulse of the segment. If the change is abrupt and the next tempo is constant, the segmentation is straightforward and easy to conduct. If the change is gradual over a long section, the segmentation should create phrases between 4-9 onsets of similar sizes for comparison, always aiming to respect the musical accents performed by the musician⁵⁷.

- **Changes in the rhythmic characteristics of the phrase/sub-phrase.**

Segmentation should occur if a phrase maintains its overall pulse but presents a new rhythmic feature. Examples of musical changes include shifting from a moment with sparse notes to a very dense moment or any changes in the types of rhythms used. These changes can also be gradual and not very contrasting. In this case, the segmentations should be created by producing sub-phrases relatively similar in size.

⁵⁷ Section 4.8 will further discuss the differences in accuracy for phrases of different sizes, which justify the sizes of phrases here proposed.

The process of phrase segmentation is also conducted in Sonic Visualiser by adding a second time-instant layer and manually marking the beginning and end of each sub-phrase. Similar to the onset detection process, it is a loosely replicable process requiring a certain level of experience with this music.



Once the entire improvisation is segmented, the layer of phrase segmentation is exported into a .csv file prepared in the following format.

phrase	Start (s)	End (s)
1	0.176	3.64
2	3.853	6.144
3	6.216	8.58
4	8.658	11.334

Table 4.2: example of how data from phrase segmentation is presented.

This feature is essential as the table is used in combination with the .csv file containing the onset timestamps. By combining information from onset detection and phrase segmentation,

the researcher can then measure the IOIs of segments within phrases, which will be crucial for further calculations.

4.7 Large scale Segmentation of Taksim Improvisation

After marking the onsets and segmenting phrases, the next step is to proceed with a large-scale segmentation of the piece. As mentioned in the introduction, *taksims* are formally structured by the *seyir* of the corresponding *makam*. This means that according to the widely used theoretical books in the practice of *makam* (Aydemir, 2010; Signell, 1984) the musician is expected to construct phrases that reinforce certain melodic degrees of the *makam* in a prearranged order. However, musicians consulted during this dissertation question how strict the musician should be in adhering to the theoretical conception of the *seyir* while performing a *taksim*.

The *seyir* is something interesting. Every piece has a *seyir*. In order to speak, to develop the *makam Uşşak*, you need some phrases, and every phrase has a target [note]. The flow of this phrase is what defines the *seyir*. But this is a dynamic process, in the sense that there are many choices that you can do. And all those choices are still within an *Uşşak*, as long as they are within the limits of the *makam Uşşak*. It is like sharing what happens emotionally through these melodies, through the speaking. But [in the academic circles] they are treated like holy recipes that you have to follow, and the best complement that you can take is a ‘bravo’ from the one that examines you. (Voulgaris, 2024, personal communication).

Following Voulgaris’s argument, the logic of the section segmentation should not propose divisions according to the theoretical definition of a given *seyir*, but instead, respect what the musician is performing in the improvisation. Therefore, a *section segmentation should be created every time that the musician presents a phrase with a resting point on a given note*. Creating these divisions allow for the observation of rhythmic features on a higher structural

level and helps to understand an important feature: the different rhythmic behaviours of phrases in the beginning, middle, and end of sections.

The process described here presents the most efficient way to prepare data in a process which is, at the same time, reliable and replicable. While conducting this research, the process of data preparation for a 2-minute *taksim* (from onset detection to section segmentation and data preparation) takes between 3-5 hours, depending on the familiarity of the researcher with the process. This time-consuming process limits the number of *taksims* that one researcher can investigate, but it is also a rewarding challenge: by marking onsets, phrases, and section segmentations, one becomes more attuned to the rhythmic phenomena occurring and familiar with the musicians being studied.

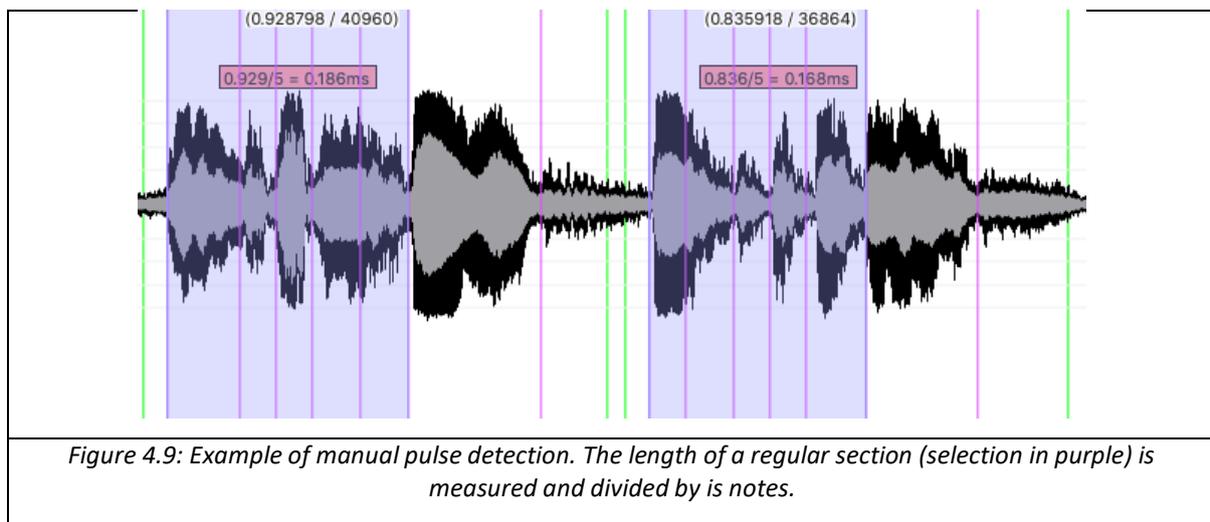
4.8 *Estimating Pulse in Free-Rhythm Music*

Pulse estimation, also known as beat tracking, is a feature that has been explored by research using Music Information Retrieval techniques. Important authors on the topic include Dixon (2001, 2007), who proposed algorithms that can handle expressive timing variations in music performances. Lartillot et al. (2007, 2008) introduced the 'MIR Toolbox', a package for MatLab that includes options for pulse estimation. Böck et. al. (2016) presented 'Madmom', a set of signal processing tools in Python which includes beat-tracking algorithms. Srinivasamurthy and Serra (2014) conducted experiments with beat tracking in the context of non-European cyclical music, particularly Carnatic music.

The process of pulse estimation involves using onset detection functions, with techniques such as autocorrelation or Fourier analysis to identify periodicities within the onset data. However, as with onset detection, the effectiveness of pulse estimation tools varies across different musical genres and styles. For instance, they tend to perform better in music with clear periodic structures and regular beats. The free-rhythmic nature of the music investigated here poses additional challenges to this task, as the relevant musical structures

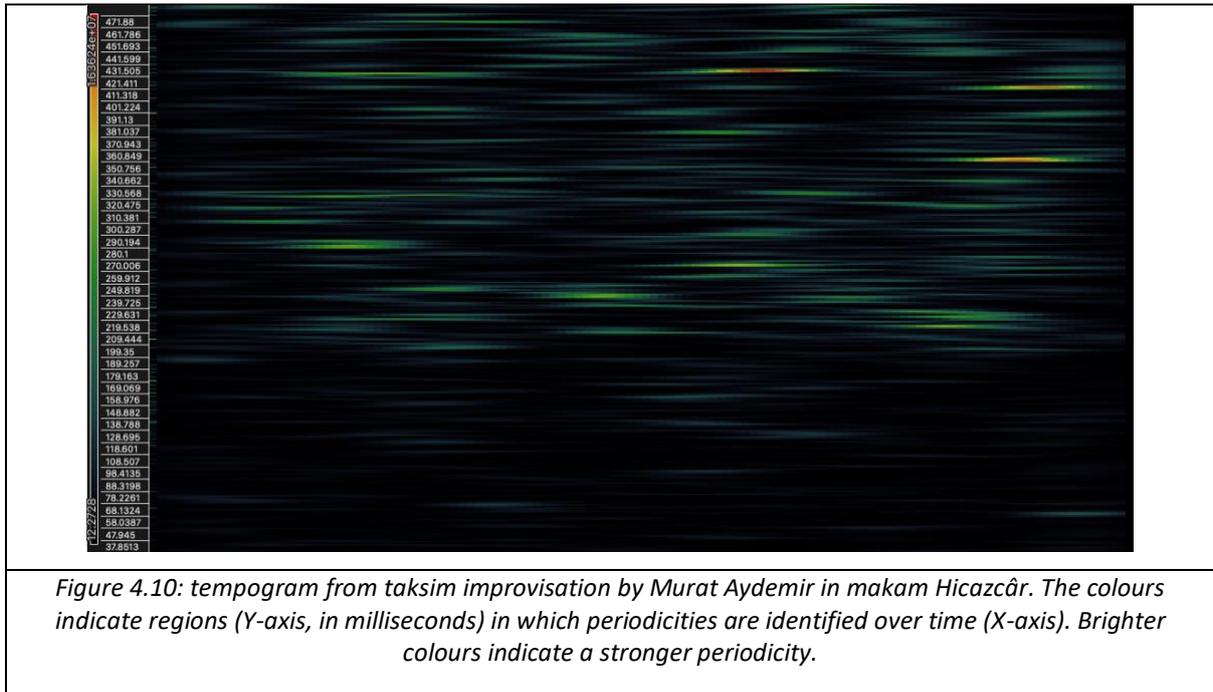
(i.e., phrases and sub-phrases) occur with varying lengths, and the method for calculations needs to be able to detect periodicity amidst a very irregular environment.

To compare the accuracy of different pulse estimation methods, I manually annotated the pulse of 61 sub-phrases and compared the manual results with several methods of pulse estimation. Manual periodicity detection involved identifying a segment of a sub-phrase where a pulse could be discerned, then dividing the segment's length by the number of subdivisions it contained⁵⁸. In the next example, each segment highlighted in dark blue consists of a section with five internal subdivisions. The duration of the two segments is divided by the number of notes the phrase contains, and the outcome indicated inside the orange box presents the pulse calculation of the phrases.



This research tested 'Cycle Tempogram', a VAMP plugin for Sonic Visualiser that extracts local tempo and beat information from audio recordings (Grosche et al., 2010). Tempograms are based on two methods for detecting periodicity: Fourier transform and autocorrelation. With this plugin, the user can select a limited range of time and window lengths, and the software proceeds to calculate local periodicities.

⁵⁸ This method for manually pulse detecting was presented by Michalis Cholevas during tutoring sessions of my master studies and has been previously used in academic works such as Cholevas, 2022: 29.



When applied to free-rhythm *taksims*, tempograms present varied outcomes. In most improvisations, it is possible to observe a certain level of periodicity. To a certain extent, such periodicities were similar to the manual calculations conducted. However, it is not possible with this plugin to freely adjust the durations over which the calculations will occur, which would be necessary to observe the phrases according to the segmentation explained in previous pages. Furthermore, the method of autocorrelation did not prove to be the most accurate in this context. Due to these limiting factors, I decided not to continue working with this tool.

Ravnani & Norton (2017) introduced relevant analytical tools to measure and compare temporal structures in human speech and animal vocalisations. Their paper presents a comprehensive introduction to various quantitative techniques for rhythm and timing analysis, aiming to identify the most appropriate techniques to test different hypotheses. As discussed in Chapter 2, there are clear similarities between the rhythmic behaviour of speech and free-rhythm music, making this paper suitable for presenting an adequate set of tools in the context required here.

The authors made public the codes used for various periodicity detection methods in MatLab, along with a data package as an example. They introduced the following methods for

measuring rhythmic complexity: histogram, nPVI, Kolmogorov–Smirnov D (K-S test), pulse GAT, autocorrelation, and Fast Fourier Transform (Norton & Ravnani, 2017: 7-10):

- **Histogram**

Histograms organise groups of datapoints into ranges of bins. They are used for pulse detection by segmenting IOIs into bins, counting the number of occurrences per bin and calculating the density of each bin. The size of the bins determine the resolution of the information: narrow bins provide higher resolution, while larger bins may present less accurate information. Histograms offer a straightforward representation of regions where higher incidences of IOIs occur but are not sensitive to structural changes. For instance, a permutation of the order of IOIs would change the rhythmic structure but would not be detected by this method (Ravnani & Norton, 2017: 7).

- **Normalised Pairwise Variability Index (nPVI)**

The normalised pairwise variability index (nPVI) was originally developed to measure rhythmic variability in spoken languages. It was proposed in the context of music studies by Patel & Daniele (2003), discussing the different outcomes from speech in English compared to French. nPVI measures the temporal variability of a sequence of IOIs, but considers only information relative to adjacent intervals. Therefore, it takes into consideration only three intervals, which is insufficient to represent most of the rhythmic phenomena observed in free-rhythm music.

- **Kolmogorov–Smirnov D test**

This method compares the distribution of a sample in relation to the distribution of a reference sample. It measures the largest difference between the two distributions, offering a way to statistically assess how different an observed IOI distribution is from a hypothesised or normal distribution. In speech, this measure can be used to compare different languages by assessing the normality of the intervals between syllable nuclei (Jadoul et al. 2016).

However, it does require an existing 'normal standard' for comparison, which is unsuitable for the current context.

- **Pulse GAT**

Pulse GAT uses a 'generate-and-test' approach, creating a series of potential low-frequency pulse grids and measuring the deviations of each event in relation to these pulses. The generated pulses are then shifted until the best fit is found. This method is computationally intensive, as it requires testing multiple pulse hypotheses until an optimal fit is achieved. Practically, it yields similar results to Fourier Transform, but it is less frequently used due to its high computational power demand.

- **Autocorrelation**

Autocorrelation reveals repeating temporal sub-patterns within a series of IOIs by correlating a time-series with a copy of itself at different time lags. In the context of rhythmic analysis, it can be used to detect recurring rhythmic structures within free-rhythm music by measuring how closely sub-patterns align within a musical fragment.

Holzappel (2013) has employed autocorrelation to investigate rhythm within *taksim* improvisation. In his experiment, the author used windows of 3 seconds and hop sizes of 0.5 seconds from one window to the next, following the methodology used in Holzappel & Stylianou (2011). Practically, this means that only notes which are less than 3 seconds apart from each other cannot be compared, which hinders potential similarities between notes in a phrase longer than 3 seconds. Furthermore, the method provides a similarity ratio as its outcome, and therefore little information about the pattern itself (Ravignani & Norton, 2017: 9).

- **Fast Fourier Transform**

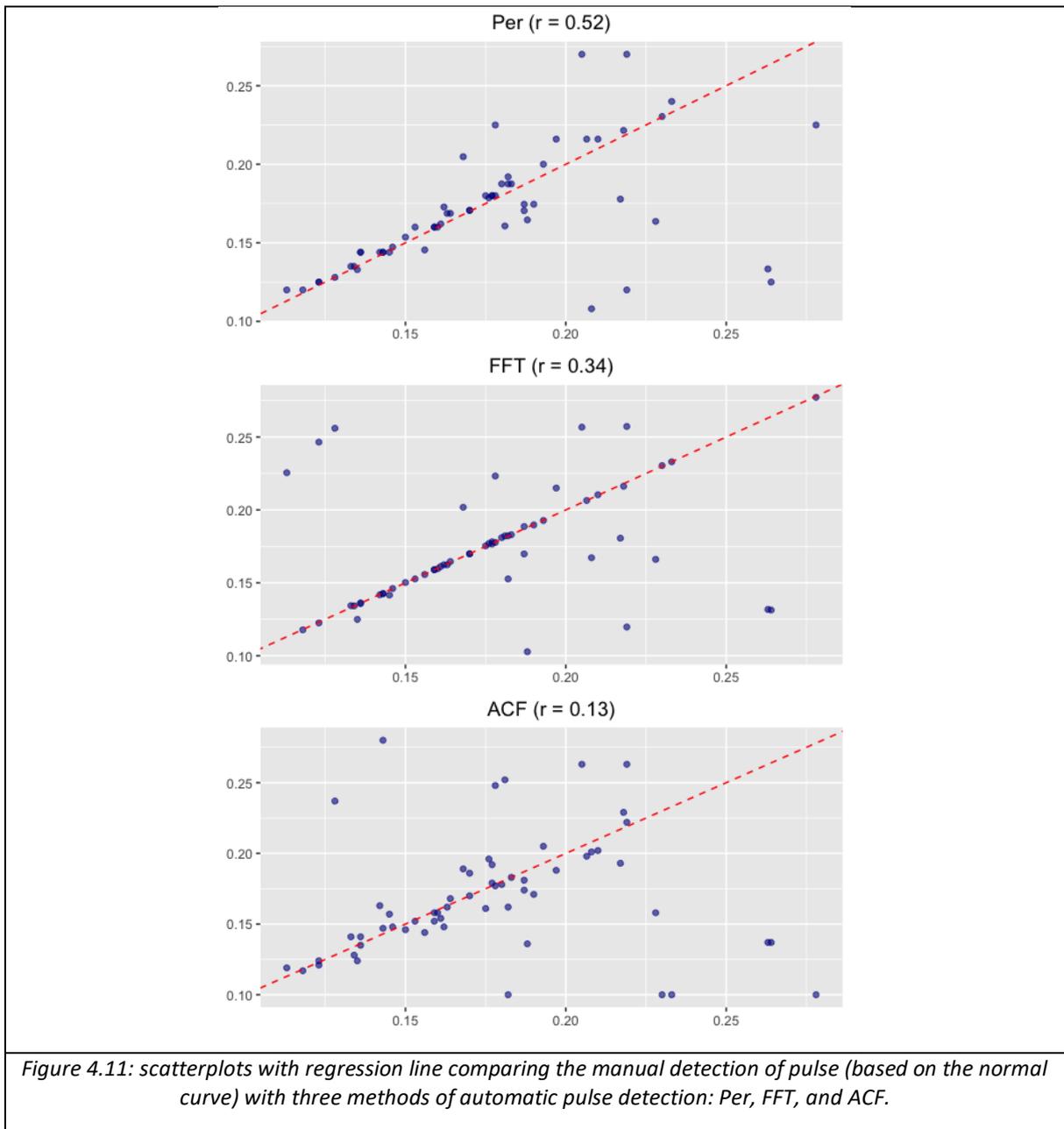
Fast Fourier Transform (FFT) is a method in signal processing for decomposing a complex waveform into its constituent frequencies. When applied to an onset detection function,

Fourier transform converts time-domain signals into the frequency domain, presenting repeated patterns as peaks at certain frequencies corresponding to the time intervals of such events. It is a fast and common method for periodicity detection, though it may return several best-fitting pulses in different ‘octaves’. Such problem can be addressed by limiting the range of the pulse to be detected.

While experimenting with the methods presented by Norton & Ravnani, the nPVI, K-S test, and Pulse GAT methods were discarded as they did not efficiently represent or measure the phenomena occurring in free-rhythm music. Subsequently, this research compared the most promising pulse estimation methods to determine the most reliable one for the current context. For this, I used the R package ‘Onsetsync’ (Eerola & Clayton, 2024). In addition to autocorrelation (Acf), and Fast Fourier transform (FFT), the package includes one additional method for pulse detection: periodicity (Per)⁵⁹.

The table below presents four plots comparing the manual pulse observation and the methods of autocorrelation (ACF), histogram, Fast Fourier Transform (FFT) and periodicity (Per).

⁵⁹ For more information on the technical aspects of characteristics of the ‘spectrum function’ for periodicity detection, see R Core Team, 2024.



Running a Pearson correlation coefficient comparing the automatic detection methods with the manual one demonstrated that the function 'Per' was the most accurate in detecting the individual phrases' pulses.

Method	Pearson Coefficient
Per	0.520
FFT	0.339
ACF	0.128

Table 4.3: Pearson Coefficient comparing the accuracy of automatic methods of periodicity detection in relation to the manual detection.

The results align with expectations, as autocorrelation can at times detect a pulse as twice of half of its tempo. The Pearson correlation coefficient of 0.520 suggests a moderately strong positive linear relationship between manual annotation and the use of the 'Per' function, which justified the decision to use this function for pulse estimation detections.

The manual annotation of pulse estimation also allowed an additional observation: the ratio of difference between manual and automatic annotation for phrases with different numbers of onsets. As we can observe in table 4.4, segmentations with between 4 and 14 onsets presented acceptable differences between the manual and automatic pulse estimation (now using the periodicity function), leading to the adoption of this bandwidth when creating segmentations.

	Phrases compared	Average difference
Phrases with 3 Onsets	4	17.66%
Phrases with 4 Onsets	10	3.44%
Phrases with 5 Onsets	7	3.31%
Phrases with 6 Onsets	7	2.11%
Phrases with 7 Onsets	4	6.33%
Phrases with 8 Onsets	11	7.33%
Phrases with 9 Onsets	3	4.58%
Phrases with 10 Onsets	11	7.79%
Phrases with 11 Onsets	0	N/A
Phrases with 12 onsets	3	0.43%
Phrases with 13 Onsets	0	N/A
Phrases with 14 Onsets	1	1.58%
Total phrases	61	
	Total average difference	5.46%
	Total average difference excl. 3 Onsets	4.10%

Table 4.4: average difference between manual and automatic pulse estimation in phrases with 3-14 onsets.

The R-package Onsetsync offers another fundamental significant advantage in the current context: it allows for the manual selection of the length of individual sub-phrases within which the calculation will occur. Thus, by preparing the data as specified in the previous section, it is possible to calculate periodicity estimations for each of the phrase's segmentations required. This allows the creation of a list detailing the sub-phrase number, pulse estimation, the number of onsets contained in the phrase, and the time location at which the sub-phrase begins.

Phrase	Pulse (seconds)	Onsets	Sub-phrase start (seconds)
1	0.192	6	6.0
2	0.107	3	7.2
3	0.157	11	8.2
4	0.173	8	12.7
5	0.200	4	14.7

Table 4.5: example of output from R-package onsetsync presented as '.csv' file including phrase number, pulse, number of onsets of the phrase and its start.

4.9 Quantifying Metricity in Taksim

In addition to the sub-phrase's pulse, another parameter provided by the Onsetsync package is a value determining the 'level of metricity' of sub-phrases. In music theory, metricity is often understood as the organization of musical events around recurring strong and weak beats, forming a hierarchical structure that provides a framework for rhythmic organization⁶⁰. This is particularly evident in compositions governed by *usul* patterns in *makam* music or in metered Western music, where rhythmic cycles provide a clear and predictable foundation.

However, *taksim* improvisation does not conform to this traditional notion of metricity. By definition, *taksim* improvisations lack an overall constant rhythmic cycle and do not adhere

⁶⁰ See Chapter 2 for ethnomusicological-informed perspectives on the topic, and Chapter 3 for musician's perspectives on the subject of metricity.

to a fixed periodic structure. Chapters 2 and 3 presented perspectives from musicians and existing literature on how to understand the concept of metricity in the context of *taksim*. While there is no consensus on the topic, it was observed that some musicians consider individual phrases to be metrical (what Cholevas refers to as ‘locally metric’); others might highlight metric characteristics of phrases for educational purposes (e.g., Kyriacos Tapakis); others prefer not to highlight the metrical characteristics of phrases (e.g., Ross Daly). It was also noted that a phrase’s pulse can be considered to have been established by the listener (Harris Lambrakis) or to emerge spontaneously when the musician begins performing (Evgenios Voulgaris). The discussions supports the claim that a sense of metricity within *taksim* can emerge from the internal proportional relationships between note durations within phrases. While a phrase may not establish a conventional, regular metric, its internal rhythmic organization can still exhibit patterns of regularity that suggest a certain degree of metricity.

This research understands metricity not as a consequence of recurring downbeats within rhythmic cycles but *as the degree to which note durations within a phrase maintain proportional relationships*. Rather than measuring how beats align within a metrical framework, the methodology assesses how durations relate to each other within a given phrase — whether they follow predictable proportional patterns or fluctuate more freely. A phrase with evenly distributed durations will exhibit a higher level of metricity, whereas a phrase with highly irregular and unpredictable durations will have lower metricity.

In conversations with musicians, at times the word ‘metricity’ was sometimes replaced by ‘regularity’ or ‘periodicity’, particularly when discussing *taksim* styles more associated with a higher degree of metricity. In this research, I have decided to adopt the term ‘metricity’ for this parameter. Initially, this term might cause some confusion: how can free-rhythm music, which is defined as essentially non-metrical, present a degree of metricity? The decision to retain this term stems from several reasons. First, it more accurately describes the phenomenon it represents. Words such as ‘regularity’ or ‘periodicity’ could refer to different types of regularity, such as pulse or even a generally undefined sense of regularity. More importantly, the term ‘metricity’ clarifies that I am referring to the level of metrical feeling

within a phrase, which, through the combination and superposition of different phrases, maintains the sensation of free-rhythm in the piece.

Therefore, in the context of the analyses provided here, the metricity level is defined as *the degree to which note durations maintain proportional relationships within a (sub)phrase*. Segments with a larger presence of such features are described as more metrical, whereas segments with fewer of these features are less metrical.

This section will establish an objective measure to assess the concept of metricity in sub-phrases. The level of metricity is obtained by calculating the amplitude of the peak measured by the periodicity function in the Onsetsync package (Eerola, 2024, personal communication). According to this measurement, phrases with higher peak amplitudes present a stronger sense of metricity and therefore score higher on the ‘metricity rate’. Conversely, phrases with lower peak amplitudes score lower on this measurement.

To test whether these calculations would yield a reliable range of metricity measures, I conducted a preliminary comparison between *taksim* phrases with contrasting rhythmic characteristics. For the less metrical style of *taksim*, a particularly non-metrical *taksim* by Cinucen Tanrıkorur was measured. To observe a *taksim* with metrical characteristics, an improvisation by Kadri Sençalar, an oud player known for having a style imbued with more regular rhythms, was measured (Baloğlu, 2022; 1534)⁶¹. In a comparison between 82 sub-phrases of each improvisation, Tanrıkorur’s *taksim* presented an average metricity of 5.0, whereas Sençalar’s improvisation provided a value of 13.9.

The data obtained by this calculation suggest that the algorithm is accurate in rating higher a *taksim* that contains more metric characteristics. To solidify this evaluation, it was necessary to run these calculations over a larger number of sub-phrases to assess what would be a typical range of values for *taksims* with different rhythmic styles. Analyses conducted with

⁶¹ An extensive discussion on the different styles of *taksim* improvisation, with a focus on Tanrıkorur’s and Sençalar’s styles, as well as a detailed introduction to these musicians is further developed in Chapter 5 of this dissertation. Several examples of phrases with different degrees of metricity are also introduced then. At this point, the aim is simply to present the values obtained in the calculation to describe the methodology which will be employed further in the research.

835 sub-phrases from 21 *taksim* improvisations demonstrated that this tool is consistent in providing reliable data to measure metricity⁶². In the most metrical sub-phrase tested (Kadri Şençalar, *Uşşak Taksim*, sub-phrase 80), the metricity rate was 48.58. The lowest score for the metricity rate was from Cinucen Tanrıkorur’s *Uşşak taksim*, sub-phrase 100, with a value of 0.79. However, these two segments were outliers; most sub-phrases produced a metricity rate value between 3 and 18, which allowed for a clear numerical indication of how a phrase should be perceived in terms of metricity.

Once the metricity level of a phrase is calculated, the researcher is equipped with the main parameters used to assess the large-scale rhythmical features of *taksim* improvisation: onsets are identified, phrases and sections are segmented, and pulse and metricity are calculated. All the information obtained is then compiled into one .csv file according to the following structure:

Sub-phrase	Pulse (ms)	Metricity	Onsets	Sub-phrase start (s)
1	180	5.46	6	1.564
2	223	8.98	9	5.645

Table 4.6: example of data generated from calculations of pulse and metricity.

In this section, I have outlined the step-by-step process required to establish parameters and quantify rhythmic features on a large scale for phrases in *taksim*. This methodology represents a significant advancement in the systematic measurement of rhythmic characteristics, integrating insights from the literature review, ethnographic discussions with musicians, and computational analysis. In the following section, I will demonstrate how this data is structured and visualized, ensuring a clear representation of rhythmic features. Additionally, I will introduce further calculations that enhance the analytical depth of the study, allowing for a more nuanced examination of rhythmic variation in *taksim* improvisation.

⁶² See Appendix 9 for the measurement of all the *taksim* improvisations used in this research.

4.10 Visualisation of Rhythmic Data: Plotting Pulse and Metricity

To visualise all the data collected by the aforementioned process, a plot is produced presenting all the key features described so far. Each sub-phrase is represented by a data point (1, 2, 3, etc.). The X-axis indicates time in seconds, whereas the Y-axis indicates the sub-phrase's pulse in milliseconds. The level of metricity of a sub-phrase is presented by the size of the data points. Larger squares represent a higher level of metricity, whereas smaller squares represent a lower level of metricity. The colour of the data points indicates the number of onsets in the sub-phrase. Darker colours indicate sub-phrases with a larger number of onsets. Sections are separated by vertical grey lines and classified by capital letters in bold text (**A, B, C, etc.**). Cadential phrases are represented in the plot with the symbol '*'.

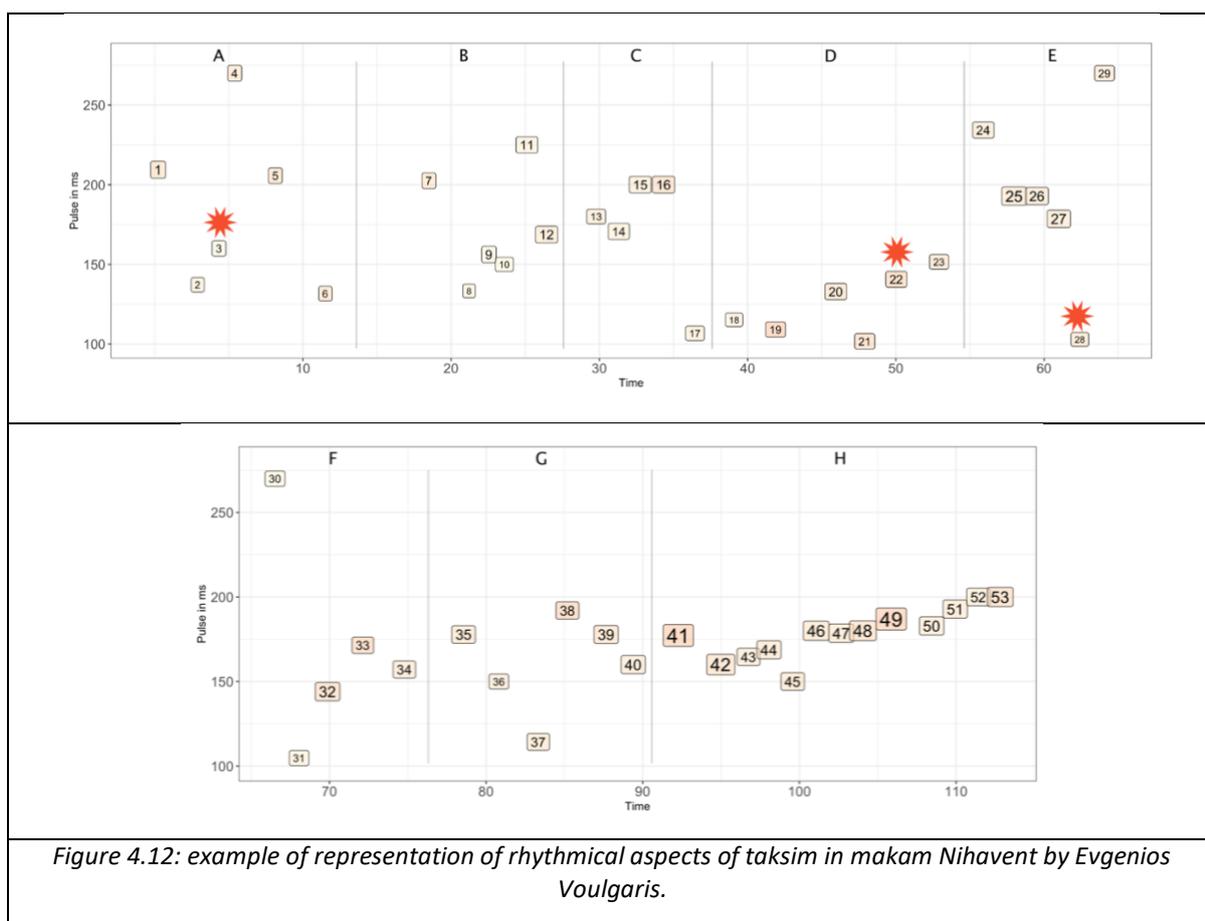


Figure 4.12: example of representation of rhythmical aspects of taksim in makam Nihavent by Evgenios Voulgaris.

In figure 4.11, it is possible to observe the most critical points indicated by previous conversations on the topic. For instance, one can determine whether phrases present a

steady, regular pulse (such as in section **H**), or very irregular and constantly shifting pulses (such as in sections **A** and **B**). It is also possible to observe sections with a relatively regular curve of *rallentando* in their pulse, albeit consisting of less-metric sub-phrases (section **D**).

These visualizations play a critical role in identifying and categorizing rhythmic phenomena across the large-scale structure of *taksim* improvisations. By representing variations in pulse, metricity, and phrase organization, the generated plots allow for a comprehensive assessment of rhythmic features that might otherwise remain imperceptible through auditory analysis alone. Additionally, these plots facilitate direct comparisons between different performances, highlighting stylistic tendencies and individual approaches to rhythmic organization. Beyond large-scale analysis, further calculations will be introduced in the following sections, providing additional layers of insight into rhythmic behaviours and the interaction between pulse, metricity, and phrase structure.

4.11 Pulse and Metricity Estimation in Sections

Once the measurement of metricity and pulse estimation within phrases is established, additional calculations can assist in observing large scale rhythmic behaviours. It is possible to calculate the average and standard deviation of metricity and pulse for phrases within entire sections. Observing the standard deviation is useful as it presents the level of variation in pulse and metricity within the section. This information aids in observing how the overall structure behaves and in comparing basic rhythmical features within different sections of *taksim* improvisations. Table 4.7 exemplifies how this information is conveyed.

Section	Average pulse (ms)	SD pulse	Average metricity	SD metricity
A	151	27.3	14.4	9.4
B	154	17.2	11.5	5.4
C	141	35.7	9.8	6.8
Average	155	31.2	10.5	6.1

Table 4.7: example of representation of section's pulse, metricity, its average and standard deviations.

4.12 Cadential phrases – Comparing Pulse and Metricity

An important feature that helps clarify the structure of the *seyir* is the use of what is referred to as cadential phrases. This term is extensively employed in the literature on *makam* music (e.g. Aydemir, 2010: 21; Stubbs, 1994:130; Feldman 2023: 226), and is also used by musicians consulted in the research. Cadential phrases are ones in which the musicians will conclude a musical idea on a clear target note of the *seyir*. It is not a completely objective parameter, and often such phrases are followed by another phrase concluding on the same note, reinforcing the notion that a section is being concluded. It should be mentioned that this feature is not mandatory in all the sections of a *taksim*. At times, musicians conclude sections without presenting a strong cadential phrase, and this is generally accepted as a correct *taksim* performance. Cadential phrases are also not necessarily at the end of a section, as musicians can prolong the conclusion of a section with additional phrases. In this research, I have marked all the phrases that I perceived as clear cadential phrases, and a comparison between cadential and non-cadential phrases can be made using box-plots.

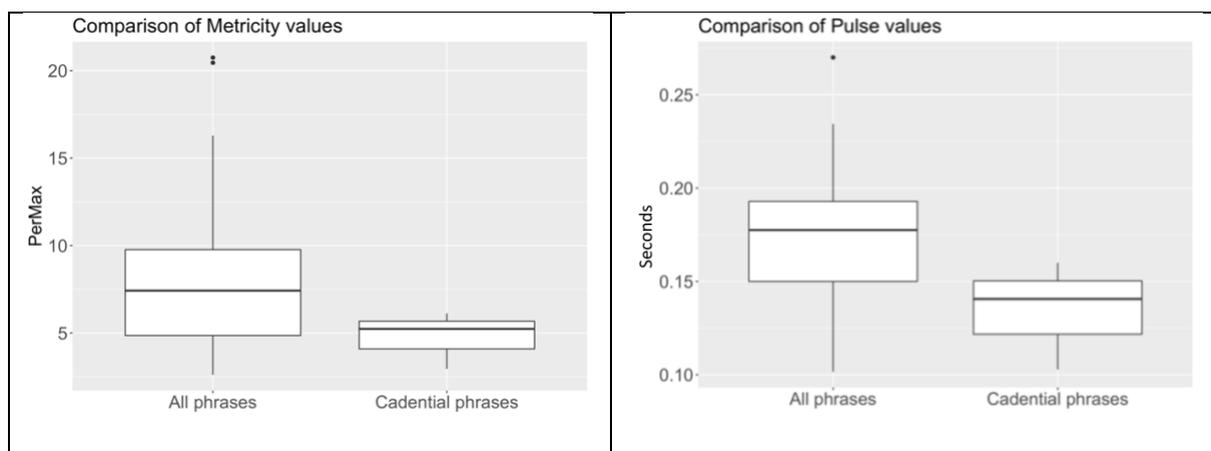
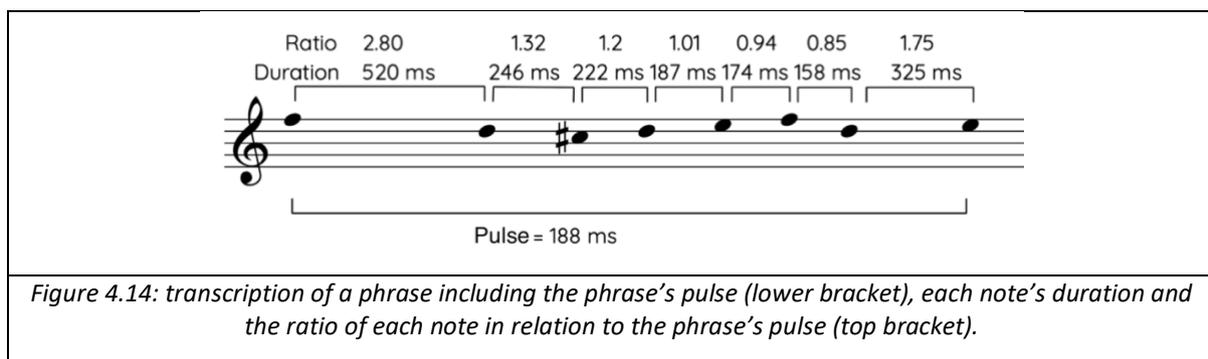


Figure 4.13: box-plot comparing metricity and pulse distributions in cadential and non-cadential phrases.

4.13 Observing small-scale rhythmical features

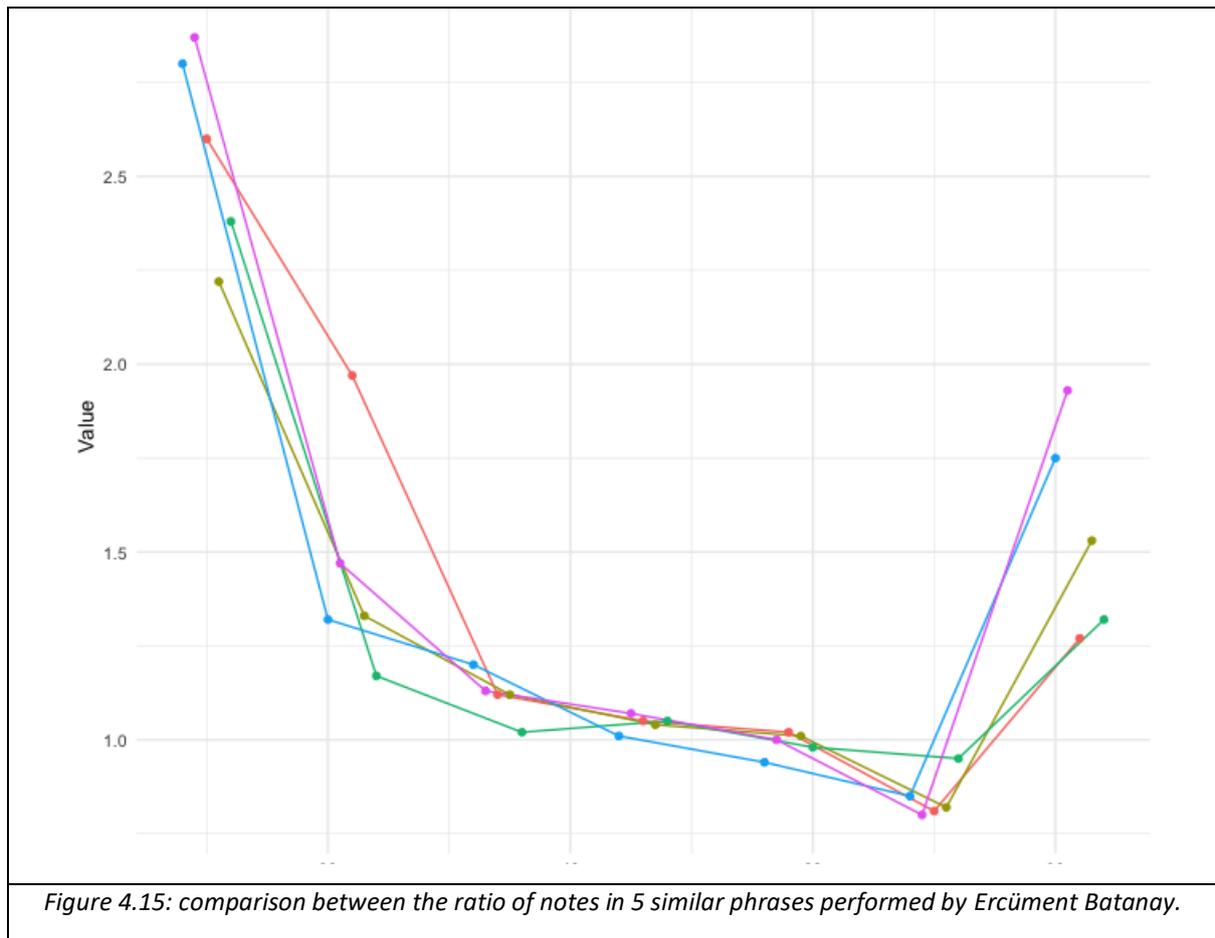
The last feature proposed by this analytical procedure is an observation of micro-timing aspects of *taksim* improvisation. To do so, once again we start from the understanding that musical phrases contain, at least to a certain degree, a pulse that can be measured by the aforementioned procedure and considered as a momentary reference in terms of tempo. Following the discussions presented in Chapters 2 and 3, once we assume that phrases are imbued with such a pulse, it is possible to compare the duration of each note with the overall phrase's pulse, obtaining a value indicating the *ratio between the note and the phrase's pulse*. To facilitate visualisation, this ratio can be transcribed into a music score in which the distance between notes is proportional. The upper bracket presents the duration of the note in milliseconds and the ratio between this note and the phrase's pulse. The lower bracket (Per) presents the duration of the phrase's pulse in milliseconds.



With the proposed method, notes from different phrases might present the same value but present different durations, depending on the pulse of the given phrases. However, the ratio presented here allows for a clear comparison between phrases in terms of their rhythmical characteristics.

One important practice within *taksim* is the usage of *stereotypical phrases* (Cholevas, 2021; 67). These phrases are often (but not exclusively) employed by musicians when opening or closing a section of the *seyir*. It is not uncommon to observe the same phrase being played by the same musicians, sometimes even in the same improvisation. Despite how similar the phrases might be, inevitably there are rhythmical changes between each iteration of the

phrase, which can be investigated using the ‘ratio-to-pulse’ measurement. In the graphic below, we can observe five presentations of a phrase by Ercüment Batanay⁶³. The Y-axis indicates the ratio between each note and the phrase’s pulse. It is possible to observe that, not only are the profiles of curves similar, but the larger differences between the phrases are located at the beginning and end of the phrase, when the musician is playing longer notes.



4.14 Conclusion

This chapter introduced a computational methodology for analysing pulse and metricity in *taksim* improvisations, establishing a structured framework for examining rhythm in a quantitative manner. The approach delineated here combines ethnographic insights, literature review, and computational techniques, ensuring that the analytical tools remain

⁶³ The phrase is presented in the following *taksims* from Batanay: Hicaz, Hicazcâr, Kürdilihicazkâr and Hüseyini.

grounded in musical practice while offering new ways to interpret rhythmic structures. This methodology integrates both bottom-up and top-down approaches, allowing for an analysis that is informed by empirical data while maintaining conceptual alignment with existing theoretical and ethnographic insights.

The process of onset detection, phrase segmentation, pulse and metricity estimation was outlined: onset detection was conducted with a combination of manual and automatic methods. Subsequently, phrase and sub-phrase segmentations were defined based on criteria optimized for pulse and metricity detection, facilitating a structured understanding of rhythmic development across different phrase lengths. Using the R package *Onsetsync*, Fast Fourier Transform (FFT) was employed to determine pulse within phrases, and the estimation of metricity was derived from this method of pulse detection. These computational tools and analytical techniques provided a systematic means of segmenting and quantifying rhythmic structures in *taksim* improvisation.

A key contribution of this chapter was the development of visual representations that allow for the interpretation of rhythmic features in *taksim* improvisations. By transforming numerical data into visual plots, this approach enables a clearer understanding of how rhythmic elements are constructed. Large-scale rhythm plots were designed to represent changes in pulse and metricity across entire improvisations, while small-scale analyses provided more detailed insights into phrase's rhythmic structures. Additionally, comparisons between cadential and non-cadential phrases were included to explore structure shifts in key moments of the *taksim*. These visualizations do not merely serve as a representation of the computed values, but actively contribute to the analytical process, allowing patterns in pulse, metricity, and phrase structure to emerge. This is particularly relevant in free-rhythm music, where conventional notational frameworks often fail to capture the nuances of expressive timing and phrase development.

The next chapters will apply this methodology to historical and contemporary *taksim* performances, evaluating the effectiveness of the analytical tools developed here. Chapter 6 will focus on *taksim* performances by oud masters from the 20th Century, examining how rhythmic strategies differ among musicians and how stylistic characteristics can be observed

with the methodology proposed here. Chapter 7 will extend this analysis to contemporary performers, exploring how rhythmic structures evolve in different performance contexts. But first, Chapter 5 will return to fieldwork-related discussions by presenting how musicians discuss and transmit *taksim* in the context of music lessons, now equipped with the analytical tools to observe these practices in more detail.

Chapter 5 Pedagogical Approaches to *Taksim* Improvisation: Insights from Greek Musicians

There are things that are not meant to be talked about but meant to be done, and those things in relation to which purely expressive language appears so secondary, so unconvincing, so miserably inefficacious, are the most important and most precious things in life. Are their names not love, poetry, music, liberty?

Vladimir Jankélévitch. 'Do Not Listen to What They Say, Look at What They Do'. (essay, 1959).

This chapter presents an emic perspective on the process of learning *taksim* improvisation from Greek teachers. While Chapter 3 examined musicians' conceptualizations of pulse, metricity, and the roles of the musician, listener, and environment, the present chapter extends this discussion by investigating how these rhythmic structures are applied and articulated in practice. By analysing music lessons, this chapter explores how rhythm in *taksim* is taught, internalized, and transmitted, providing insight into the ways pedagogical approaches shape the development of improvisational skills.

Chapter 3 and the current chapter have a clear connection, as both deal with musicians' perspectives on rhythm in *taksim*. The division into two chapters was necessary as they serve distinct structural functions within this dissertation. Chapter 3 established a foundation for understanding musicians' perspectives on rhythm, which informed the development of the computational tools introduced in Chapter 4. Now, having outlined the methodology for analysing rhythm in *taksim*, I return to the musicians' perspectives—this time with a set of analytical tools that enables a more structured examination of their practices.

While Chapter 3 was focused on musician's discourses, the goal here is to connect the discourses with the performances that take place in a learning environment. However, even though aspects of music teaching will be discussed, the focus here is not the pedagogy of

these methods. The interest lies in how verbal and nonverbal discourse can contribute to a broader understanding of the underlying functioning structures of rhythm within *taksim*, shedding light on how rhythm is internalised, transmitted, and reinforced during lessons.

This chapter begins by discussing an important source on the process of learning *taksim* improvisation (Poulos, 2006), which provides relevant context for understanding the pedagogical frameworks that shape musicians' approaches. I then examine specific teaching techniques and examples drawn from music lessons, analysing how phrases are introduced, explained, and demonstrated in practice. This analysis will highlight different ways in which rhythm is structured, perceived, and applied in the context of *taksim*, offering insights into the relationship between conceptual knowledge and embodied practice.

5.1 Musicians in lessons: innovation and heritage on Turkish musicians

In his PhD dissertation, Poulos (2006) presents an investigation on the relationship between innovation and heritage within the practice of *taksim* improvisation in Turkish music. The author focuses on the lineage of *tanbur* players that begins with Tanburi Cemil Bey in the late 19th and early 20th century and continues with Refik Fersan, Mesud Cemil, Necdet Yasar, and Murat Aydemir. Poulos offers important discussions related to existing written sources on the topic, but perhaps the work's greatest contribution – at least concerning the focus of this dissertation – is its large collection of ethnographic material from fieldwork. The author took numerous lessons from different musicians (both from inside and outside the aforementioned lineage) and investigated the process of learning (and teaching) *taksim* improvisation in different educational contexts.

Taksims are a fertile subject to discuss the concept of innovation and heritage; while it is expected that the student is familiar with the style of a particular tradition that is being followed, they cannot simply copy existing improvisations. The student should be capable of incorporating elements from the tradition into their playing while at the same time

progressively building a personal style (Poulos, 2006: 93). Within the tradition of Turkish Music, much of this knowledge is transmitted through the oral teaching transmission named *Mesk* (Behar, 2006). Another fundamental element to the process of learning *taksim* is recordings: the possibility to endlessly repeat an improvisation revolutionized the process of learning *taksim* improvisation, and recordings from masters of previous generations – particularly from Cemil Bey - set the standard by which innovation had to be defined as early as in the second quarter of the 20th Century (Poulos, 2006: 53). As Poulos argues, recordings transformed the performers into an ‘absent teacher’⁶⁴, and consequently the finalized musical performance into a teaching material. This allowed the generation that studied from 1940’s onwards to ‘come across more detailed descriptions of the acquisition of improvisational skills, now conceptualized as a distinct process in the learning experience of a musician’ (Poulos, 2006: 149). In light of existing recordings, it was possible for teachers to proceed with comparative aesthetic remarks regarding different styles of *taksim* performance. While describing lessons that the author took with Murat Aydemir, Poulos states:

[Murat Aydemir] can do comparative aesthetic remarks because of the ability of recordings to capture sound features of various historical points and preserve them. As recordings passed to the following generations, these features were subjected to constant re-interpretation and conceptualization by musicians, contributing in the formation of a historical perception of transmission. These, together with the knowledge disseminated through oral transmission, formed a body of knowledge that musicians inherited as tradition. (Poulos, 2006: 29)

As will be observed in this chapter, even though the musicians consulted here are not from Istanbul and did not benefit from an intense interaction with the *mesk* system, they did integrate recordings, another integral element to the process of learning *taksim* improvisation, into their teaching and studying practice.

⁶⁴ For further discussions of the concept of ‘absent teachers’, see Ter Haar et al. In: Koslovsky, & Schuijjer, 2023.

Poulos argues that during the Ottoman period, most written sources do not present a distinction between the process of learning *taksim* and the *mesk* system (Poulos, 2006: 65). This changes after the 20th Century, combined with different institutionalized lines of musical studies and the emerging of recorded improvisations. As learning improvisation becomes an independent aspect within learning *makam*, the author notices the difficulties in discussing these topics: 'Although learning how to improvise has become a distinct part of the learning process there is not an articulate terminology referring to the actual process of improvisation' (Poulos, 2006: 67). As discussed by Clayton (1996), Frigyesi (1994) and other authors on the topic of free-rhythm, the lack of a terminology is also reflected in the analytical challenges for this music. In his dissertation Poulos proposes transcriptions where the distance between notes is proportional to the durations or notes, and notes are stemless. Most of his analyses are centred on conveying meaning and interpreting what musicians taught him during field work. Poulos's analyses compare the *seyir* of *taksims* from different musicians, exploring how the concept of lineage can relate to what is being observed.

While Poulos' methodology and topic are closely related to this research, it is important to state elements which set this research apart. The first is the goal of each research. Here, the aim is to propose ways of analysing the rhythmical features of *taksim*, addressing the challenges that emerge when studying a style of music which is free-rhythm, whereas Poulos centres his investigations on the concept of lineage and innovation within Tanbur players. The second difference is the object of investigation; Poulos is centred around Turkish musicians which are in the epicentre of Turkish Music in its most classical iteration. These musicians are representative of the most central aspect of this tradition. This research, on the other hand, is investigating musicians who come from 'the Greek school', which is connected with the musicians from Istanbul – many musicians from this 'school' take lessons in Istanbul – but has its own particular characteristics⁶⁵. As mentioned previously, due to the fact that the Greek musicians are not exactly 'insiders' to this music, they did not follow a typical *mesk* trajectory of accompanying a master for many years to learning the tradition of *makam*⁶⁶. During their

⁶⁵ See the introduction of this dissertation for a discussion on the 'Greek Style' within *makam* music.

⁶⁶ This does not mean the musicians lacked apprenticeship-style learning in other traditions (e.g., *rebetiko*). It clarifies that they did not take part in *mesk* with Turkish *makam* masters, placing them on a different learning path from their Turkish contemporaries.

period as students, they did follow lessons with many of the most important masters in this style, but these lessons were not as regular as those for local musicians. Because of this, they had to find personal solutions in order to continue progressing in the style (Kallimopoulou, 2006: 135-137). As a possible consequence of this phenomenon, these musicians are equipped with a series of different teaching techniques⁶⁷, and some of which will be presented in the coming section of this chapter. In that sense, this research contributes to the discussion of heritage and innovation presented by Poulos by presenting this topic in a different context, and by proposing quantifiable ways of measuring and discussing the rhythmical features of *taksim*, which can likely be considered one of the ‘innovative aspects’ of *taksim* improvisation.

5.2 Musicians in lessons: rhythm and *taksim* in the pedagogical context

As in virtually all modes of learning, imitation is a crucial part of the transmission process from the musicians I have consulted with. Each individual presented different teaching styles, alternating between individual and group lessons and working with recordings of improvisations, existing exercises or musical material improvised in the moment by the teacher. This section will focus on examples presented in lessons by Perikles Papapetropoulos, Alexandros Papadimitrakis and Kyriacos Tapakis. In all these cases, lessons were individual, and I approached the musicians explaining that my intention was to enhance my skills as a performer of *taksim*. The examples provided here are by no means an attempt to depict a complete lesson with the musicians, but a focus on the ways in which each of the musicians dealt with the rhythmical aspects of the *taksim*.

⁶⁷ This opinion is expressed by a several musicians and music students which are not from Turkey; I have often heard the opinion that they prefer to take lessons with musicians which are not insiders of a musical style, as they feel that these are equipped with a larger set of tools to teach the music. Musicians which are born into a given musical tradition might be excellent performers, but can lack the tools to teach it to students.

5.3 Imitating the teacher's phrases

Before I began the lesson with Perikles Papapetropoulos, I mentioned my wish to improve my skills in performing *taksim*. After we tuned our instruments, Papapetropoulos asked me to play something, which I did. He made some remarks about my technique, suggesting exercises to improve the stability of my right hand and proceeded by playing phrases in his *lavta* for us to enter the atmosphere of the *makam* in which we would work – *makam Uşşak*⁶⁸. Shortly after this, Papapetropoulos signalled me to repeat the phrase he had just played while maintained a drone on his *lavta*, a process that he repeated and lasted throughout most of our lesson. Occasionally, Papapetropoulos would repeat a phrase emphasising one aspect I did not play properly. This could be, for example, a note that should contain a more intense vibrato or repeating one note that I missed in the phrase. While reproducing the phrases, he often emphasised with his body or facial expressions notes that I should play with more emphasis. Typically, Papapetropoulos would only proceed to the next phrase once I could play the phrase correctly.

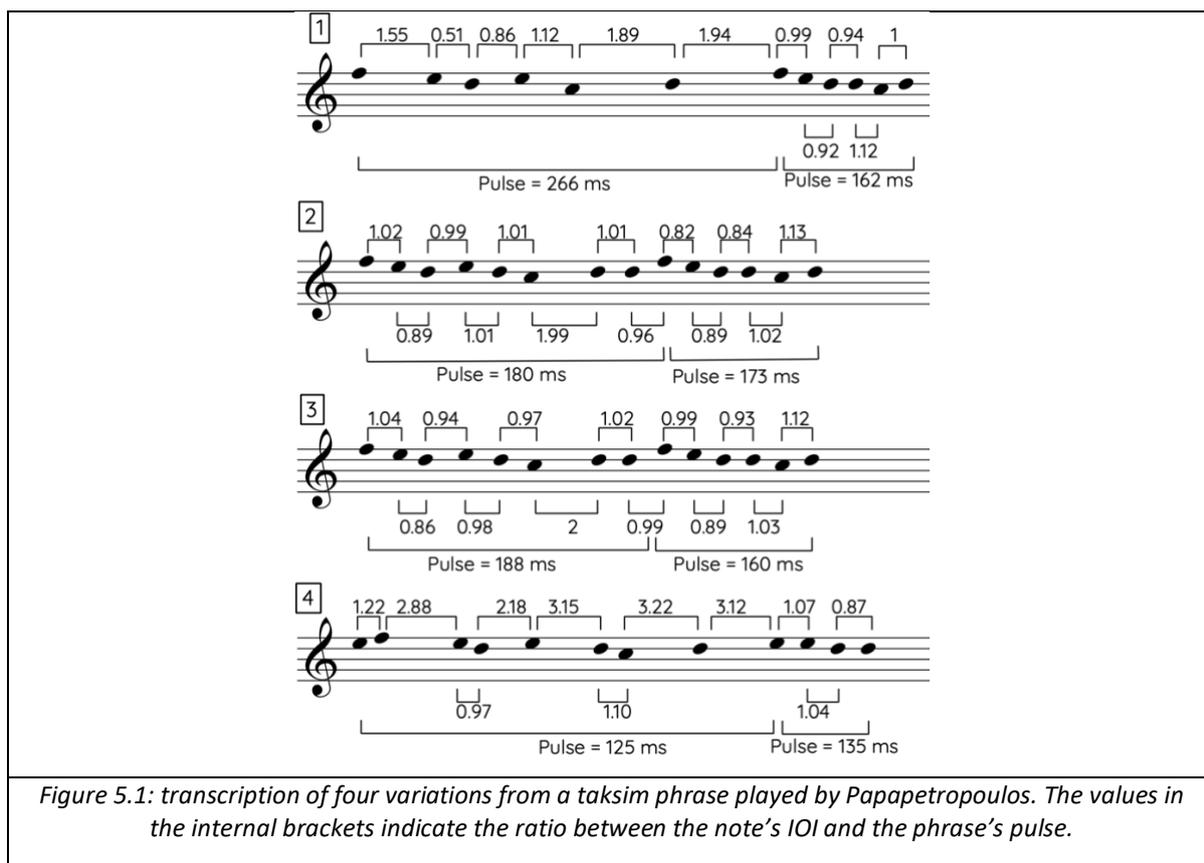
The imitation exercises were done in the context of specific *makams*, and Papapetropoulos presented phrases he recalled by heart. He was not explicitly drawing on one particular style or musician. Because of this, the lesson was perceived as him transmitting his personal musical vocabulary. Papapetropoulos presented the phrases following the development of the *seyir* required by the *makam*. However, in many situations, he would remain in one part of the *seyir*, showing phrases with similar melodic characteristics that contained slight rhythmical or melodic variations. In these cases, Papapetropoulos presented alternatives for phrases employed in one specific part of the *taksim* (something in the lines of 'you could play it like this, but you could also play it like that'). As we will observe, the presentation of similar phrases allowed for an interesting comparison of possible variations within a specific context.

⁶⁸ The name of the degrees – *dügâh*, *segâh*, *uşşak*, etc - can be used to determine one specific note or a *makam*. When referring to a note, we will use the work with lower case, followed by the Latin equivalent. When referring to a *makam*, we will make the first letter uppercase. The word "*makam*" will always be lowercase. [this text will be expanded and will be a part of the introduction of the dissertation]

In the next section, I will present examples of phrases and variations performed by Papapetropoulos to introduce some of the rhythmical possibilities of this style. Three different usages of rhythm were observed within teaching lessons with Papapetropoulos: Phrases variations in the context of imitation, identical phrase imitation and phrase variations based on a small melodic fragment.

5.3.1 *Phrases variations in the context of imitation*

Papapetropoulos started playing an opening phrase that rested on the note *neva* (D), something that can be expected in *makam Uşşak* as long as the next phrase concludes on the tonic *dügâh* (A). Rhythmically, the phrase is divided into two parts with a setting that resembles an antecedent/consequent. The first part rests on the note *çargâh* (C), while its conclusion rests on *neva* (D). After Papapetropoulos played this phrase, he asked me to repeat it. However, once I played the phrase as he would expect, he performed it once again with small rhythmical and melodic variations, presenting alternatives on how to use a similar material. Rhythmically, we can observe in figure 5.1 a wide variation between each presentation. These variations occur both on the tempo of the pulse in which Papapetropoulos is performing the phrase (lower brackets 'Pulse') and on the regularity of the notes in relation to the phrase's pulse (lower and upper brackets).



The rhythmical changes in the different versions of the phrase provide insights into the creation of variations in real-time. In the first presentation, the phrases' rhythm begins with non-isochronous distances between notes. In the second and third presentations of the theme, such feature is less present, and the notes are relatively isochronous – as is similar their relative periodicity. However, the melodies pass through a variation in its first part, adding a *neva* (D) between the *huseyni* (E) and the *çargâh* (C). The fourth phrase includes isochronous notes and a shorter presentation of the second phrase without the notes *acem* (F) or *çargâh* (C). The effect of the intense isochronicity presents difficulties in perceiving a clear periodicity in the phrase. This is notable not only when listening to the segment, but also when comparing the values of the notes in brackets: ⁴ contains values further from whole integers (1,2), therefore from the phrase' pulse. Additionally, rhythmic changes in the first part of ⁴ somehow modify the phrase's overall character; notes *acem* (F), *neva* (D), *huseyni* (E), and *çargâh* (C) now have a longer duration and, therefore, a higher prominence. Of all the presentations, ⁴ is the one that feels more strongly as a free-rhythm. The long durations

on the first part of the phrase create a feeling of suspension which is resolved by the regularity of the last four note, ending on *neva* (D).

The different presentations of the phrase indicate how broad rhythmic variations can be within a similar melodic material. There is a rhythmic contrast between phrases with a stronger sense of regularity - [2], [3] - and phrases where this regularity is not as clear - [1], [4]. The long *çargâh* (C) in the middle of all sections creates a clear separation between the two parts, which also have different characteristics; while first section of the phrases' rhythm can vary significantly, the concluding sections tend to have similar rhythmical characteristics and little melodic variation. The regularity observed in all the second sections reinforce a sensation of antecedent/consequent in the section, in which the regularity of the ending part contributes to a sensation of conclusion in the phrases.

5.3.2 *Phrase imitation without variation*

In other moments of the lesson, however, Papapetropoulos's examples followed an opposite direction: he repeated phrases several times with or without variations between each presentation. The aim of these repetitions was for me to play correctly one fast-tempo phrase, which I was not playing adequately. In this case, a phenomenon contrary to what was seen in the previous example is observed: it is noticeable how small is the variation between the different performances of the phrase. Figure 5.2 presents a phrase that was performed by Papapetropoulos five times in different tempos.


<i>Figure 5.2: transcription of taksim phrase played by Papapetropoulos.⁶⁹</i>

⁶⁹ Because of the similarity of the phrases, I chose to display only one transcription, as all would present very similar features. The way of presenting the similarities is described in sequence.

Because of the similarity between each presentation, the rhythmic characteristics of each version of the phrase can be best observed if analysing the duration of each onset. In figure 5.3, each phrase is represented by a different colour. In the left image, each note is plotted in relation to the average pulse of the phrase, and it is possible to observe the similarity of the contour. In the right image, each note is plotted with its duration in seconds as the Y axis, and it is possible to observe that the phrases are performed in a relatively wide span of pulses.

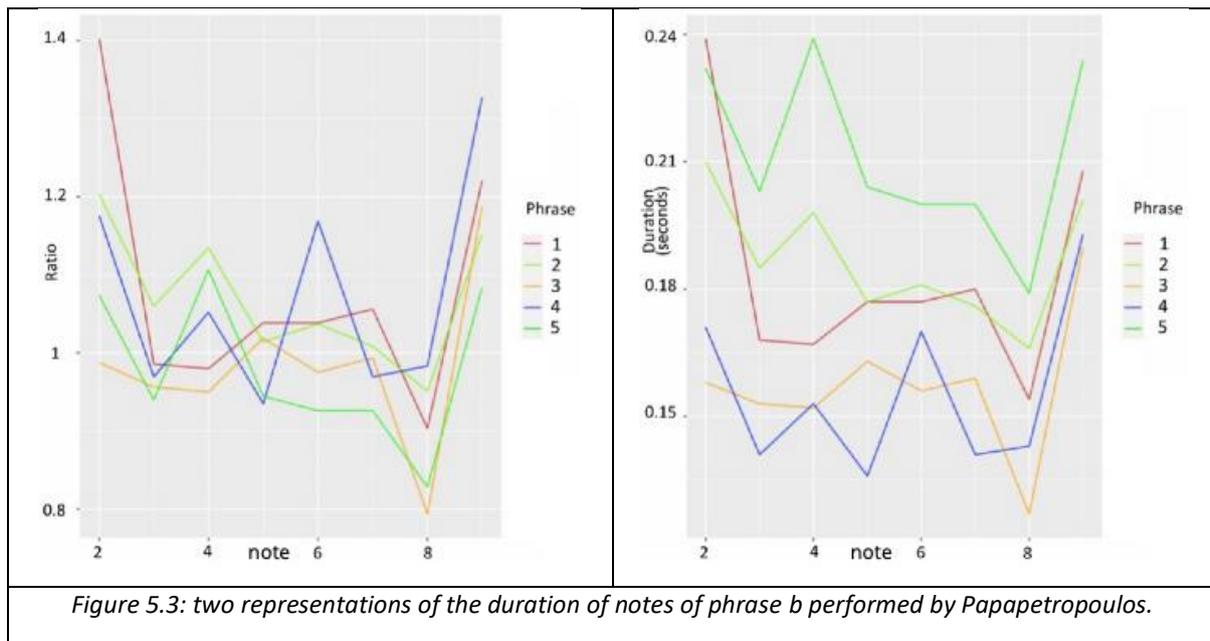


Figure 5.3: two representations of the duration of notes of phrase b performed by Papapetropoulos.

Figure 5.3 allows a clear view of the note's ratios inside the phrases, showing consistent similarities. This happens even though the average tempo of each presentation of the phrases varies significantly, ranging from 200-146 BPM. Here, it is interesting to observe that the most regular section is the middle of the phrase, with the beginning and ending having longer notes further from the phrase's tempo. It can be observed that several phrases possess a sort of 'zig-zag pattern' which presents a subtle but significant rhythmical feature.

5.3.3 Phrase variations based on a small fragment

While learning in the context of imitation, Papapetropoulos also presented alternatives to developing phrases based on a small melodic fragment. These variations emerged rather spontaneously at the beginning of our third lesson – this time, working on the *makam*

Huzzam. After playing a few phrases, Papapetropoulos found a phrase that he decided to insist on, asking me to repeat the following fragment.

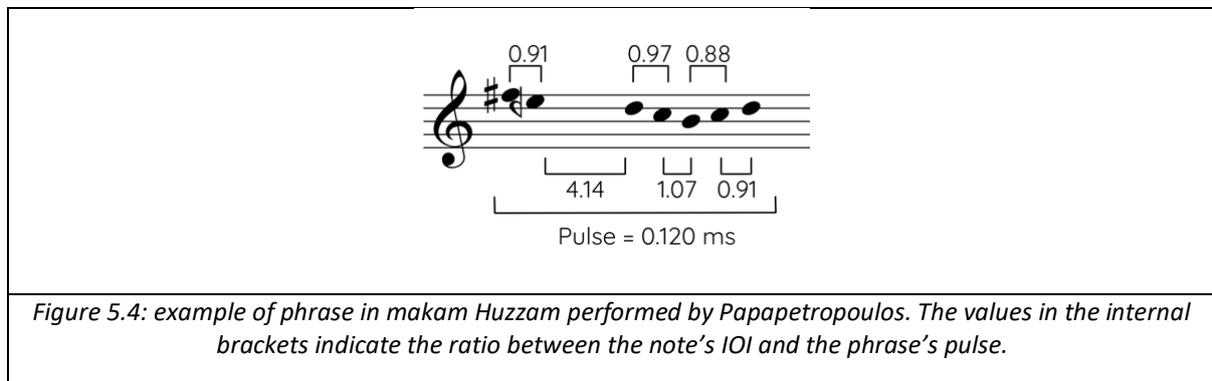


Figure 5.4: example of phrase in makam *Huzzam* performed by Papapetropoulos. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.

The phrase observed in figure 5.4 exemplifies an important way of emphasizing 'target-note' – in this case, the note *neva* (D): before resting on the note that the musician wishes to arrive (the target note), the musician emphasizes the adjacent notes in the scale. In this example, Papapetropoulos does so by resting for a longer period on *dik hisar* (Ed) and by repeating the *çargâh* (C).

Once this small fragment was assimilated into my playing, Papapetropoulos began playing phrases which distorted and expanded on the initial basic fragment. As he remained rooted in the note *neva* (D), it is possible to observe different melodic and rhythmical procedures employed by the musician.



Figure 5.5: variations over phrase in makam Hicaz performed by Papapetropoulos. The values in the internal brackets indicate the ratio between the note's IOI and the phrase's pulse.

Once again, it is noticeable the wide range of rhythmical features presented – from relatively isochronous phrases to larger, flexible phrases. One point which remains constant in his phrases is that, similarly to the examples in the section ‘phrase variation in the context of imitation’, Papapetropoulos chooses to finish all phrases with relatively isochronous notes. Additionally, notes with longer durations tend to have a larger degree of variation in relation

to the phrase's pulses, indicating that the pulse is determined by the fastest notes, and not by longer durations.

After performing several variations within the same region, Papapetropoulos started to perform phrases where the melodic emphasis slowly shifted towards *gerdaniye* (G), as seen in the last phrase from figure 5.5. This is a sign that this region of the *makam* was sufficiently explored, and it was now possible to move on to the next part of the *seyir*.

Sections in which different phrases are repeated within the same region were an important characteristic of Papapetropoulos's lessons. The musician explained the reason for this in the end of one of our sessions:

If you search the books, they will tell you that 'here, you should go to Re playing this and that note'. Ok, [*sings a simple phrase as it would be required, but with a faint sound and no rhythmic variation*]. What does that mean? There is nothing to it. What is essential to express the *makam* is to produce a good sound, which will bring you to the atmosphere of the *makam*. The notes are not sufficient to demonstrate this. (Papapetropoulos, 2022, personal communication).

I interpret Papapetropoulos's use of the word 'notes' here as referring exclusively to the pitch dimension of the note, which implies that it is not possible to adequately express the qualities of a *makam* without being able to understand other essential aspects of the sound – aspects which eludes explanations provided in books on the subject. By performing several variations over one phrase, the musician presented rhythmic and melodic possibilities that can be used in order to bring the sound qualities of a segment of the *seyir* to life. Papapetropoulos also observed a distinction between fast and slow phrases which reflects on the different types of usage of rhythm:

It is much more difficult to play properly a slow phrase than a fast one. A fast one anyone can do, you just work on your technique and it is there. A slow phrase requires you to create the atmosphere with glissando, vibrato,

çarpma, and they need to be done properly. This is much more challenging.
(Papapetropoulos, 2022, personal communication).

This remark is relevant because as observed in his examples, phrases with a fast pulse tend to exhibit a more regular rhythmic configuration than slower ones. The fact that faster phrases carry a stronger sense of regularity compared to slower passages is not surprising, as previous research has consistently demonstrated this feature across various musical traditions⁷⁰. Papapetropoulos not only reinforces this observation but also highlights the particular challenges of crafting slower phrases, suggesting that their irregularity is not merely a byproduct of expressive freedom but an essential characteristic that shapes the stylistic identity of *taksim*. This aligns with discussions in Chapter 2, where studies on free-rhythm traditions have pointed to the deliberate use of durational flexibility as a means of generating expressivity and contrast within improvisation (Reckford, 1987: 157). By underscoring the difficulty of constructing slow phrases while maintaining coherence, Papapetropoulos indirectly points to their significance in defining the nuanced rhythmic language of *taksim*, positioning them as integral to its stylistic depth rather than as deviations from an underlying regularity.

The exercises presented here illustrate a learning strategy based on imitation, where the teacher performs phrases with a range of melodic and rhythmic variations within the same region of the *seyir*. This approach allows the student to assimilate different possibilities while remaining within the stylistic framework established by the teacher. Once a section has been explored through multiple variations, the teacher moves on to the next stage of the *seyir*, gradually expanding the student's understanding of its progression. In this way, the exercise serves as a structured exploration of the *seyir*, where the student is not only introduced to technical execution but also guided through the expressive potential of each segment. This reinforces the idea that, within this pedagogical context, the development of improvisational skills is closely tied to learning how different regions of the *seyir* can be shaped rhythmically and melodically. With this in mind, the next section turns to a different perspective on *taksim*

⁷⁰ See Bernardon, 2006; Danielsen et. al., 2023; Datseris et. al., 2019.

instruction, providing further insights into how rhythm and phrase construction are conveyed in teaching.

5.4 *Constraining the melodic range*

The lesson with Alexandros Papadimitrakis began with an exercise to improve musical vocabulary within a narrow melodic framework. In this exercise, the student is required to create phrases using only three or four notes of a given *makam*. With such a limited constraint, it is not surprising that the student's phrases soon start to feel repetitive and uninteresting. According to Papadimitrakis, this is a part of the process, and the student should continue with this exercise as much as he can, 'until he feels bored and that he really doesn't have anything else to say'. The exercise of constraining the melodic range is important for establishing and developing typical motives:

There are typical motives, which for the language [of *makam* music] are like a word⁷¹. Try gradually to have them conscious – these motives mean something to listeners that are experienced. So, define the motives that are three notes above your target [note]. Define them, and observe these motives on yourself and other musicians. (Papadimitrakis, 2022, personal communication).

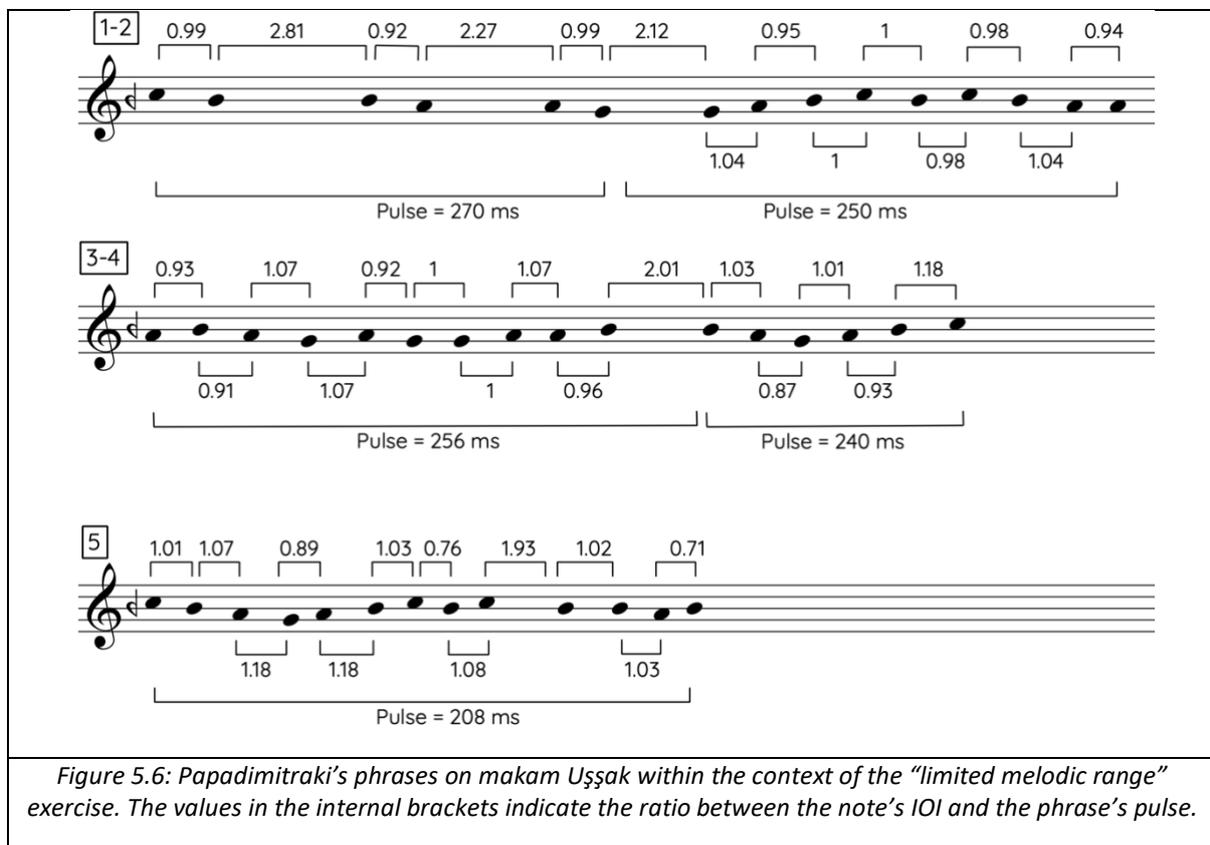
To Papadimitrakis, these motives are of fundamental importance in constructing the *taksim*. Even when this 'constraining exercise' is expanded, and the student can play in a wider melodic range, the small region in which the original motives were developed remains utterly important.

[once you have expanded your melodic range], what you say to your listener is the same thing, but with more words. The flavour is the same - the flavour that you have presented is in these three notes. Everything else is there to

⁷¹ Evgenios Voulgaris also presents a similar comparison connecting words, phrases and meaning In the core of the process of understanding *taksim* (see Chapter 2).

support these three notes. And I feel that when you are limited in these three notes, and your target is very specific, everything becomes easier – and clearer to your listener. (Papadimitrakis, 2022, personal communication).

After attempting to perform the exercise of melodic constrain, I was interested in observing Papadimitrakis' playing in this exercise. My main interest was to understand how rhythm would behave in his phrases under such a narrow melodic constraint, and if rhythm would become more complex to compensate for the lack of melodic range. Figure 5.6 presents Papadimitrakis' first phrases within the context of this exercise.



In these melodies, the notes tend to have regular durations in relation to the phrases' pulse; most durations lie within a margin of $\pm 10\%$ of the phrase's pulse (values 1 or 2 in the brackets). The only exceptions to this are the beginning of , with two longer notes, and the end of [a5](#), with a concluding phrase on the note segâh (Bd). The gradual accelerando of the longer notes in [a1](#) should be highlighted, as well as a consistent accelerando in the overall phrases, with the phrase's pulses starting at 270ms and ending at 208ms.

Although the note lengths are relatively stable around the phrase's pulses, other factors come in foreground in order to break the sensation of regularity: the musician uses accents to create phrases with unexpected durations and emphasis on specific notes. In the figure 5.7, the notes emphasised by Papadimitrakis are marked with the symbol ♩ . The combination between the regular subdivisions (notes with similar values) and uneven accents creates a rhythmical feeling of phrases with different subdivisions. While analysing the section, it is possible to suggest a time signature to each phrase in order to illustrate how irregular phrases can add to the feeling of rhythmical ambiguity.

Figure 5.7: representation of time signature division of Papadimitrakis's phrases.

In this section, it is possible to distinguish three different rhythmical factors which are in play to compose the section: (1) notes with relatively regular durations, (2) irregular accents which establish phrases with different lengths, and (3) a gradual accelerando which establishes an overall sense of direction to the section. It is, therefore, possible to suggest that, here, Papadimitrakis maintains the sensation of free-rhythm by composing with these three factors: even if a certain sense of stability is achieved with the regular pulse, the phrase's accents come to disturb this feeling and maintain the free-rhythm environment.

However, Papadimitrakis also makes clear that this practice is not similar to what happens when the musician performs a *taksim* to an audience.

[With these exercises, you are] not building up a *taksim*. These are exercises that help to discover vocabulary. And you can use it in your structure if you want. But these are more like improvising exercises because, at the end of the day, you don't want to be thinking at all. If you are on *neva* (D), you can play anything, but if you play a phrase like this in the end, you won't feel that you are lost, which is important. Of course, the goal is not to think about these things in the end; if you do your homework in advance and several times, in a way, you know where you could go and where you could not. (Papadimitrakis, 2022, personal communication).

As Papadimitrakis makes clear, the rhythmic patterns observed above were clearly presented in the context of an exercise within a lesson. But how does the usage of rhythm in lessons compares to Papadimitraki's playing in the context of a full *taksim*? Before the end of our lesson, I asked him to perform a *taksim* to have a comparison between his playing in the context of exercises and in a complete *taksim*⁷². Table 5.1 presents the pulses and regularity of the lesson's phrases and of the *taksim*'s sections.

Lesson					Taksim				
	Pulse (ms)	SD_Pulse	Metricity	SD_Metricity		Pulse (ms)	SD_Pulse	Metricity	SD_Metricity
Average	211.05	39.96	6.62	3.24	Average	189.94	43.23	6.92	4.33

Table 5.1: comparison between lesson and taksim from Alexandros Papadimitrakis.

It is possible to observe that while the average pulse of the phrases from the lesson is significantly slower than the pulse from the *taksim*, the metricity and standard deviation from pulse and metricity did not present a large difference. This suggests that phrases might be performed slower during lessons for pedagogic reasons, but the overall metricity of phrases is not changed. One possible reason for this is that, as we have observed in figures 5.5 and 5.6, the style of *taksim* that Papadimitrakis was teaching presents relatively regular levels of

⁷² A detailed analyses of Papadimitrakis's *taksim* is presented on Chapter 7.

metricity, therefore, the musician does not need to change the phrases and simplify them for pedagogical reasons.

The analysis of Papadimitrakis' lesson revealed a structured approach to creatively exploring narrow regions of the *makam*. By constraining the melodic range, the exercise encourages the development of essential motives while maintaining a relatively stable rhythmic framework. The use of regular phrases provides a foundation for exploration, allowing expressive variation through accents and subtle tempo shifts rather than drastic rhythmic changes.

Building on this perspective, the next section examines how another musician approaches rhythm and phrase construction, offering a contrasting view on the relationship between phrase structure and rhythmic fluidity in *taksim* improvisation.

5.5 *Imitating phrases of existing taksim improvisations*

The lessons with Kyriacos Tapakis started with him asking me to play a piece. After I played a segment of *Cargıcar Pesrev* by Tatyos Efendi, he made some remarks regarding my right-hand technique, and presented exercises I should do to improve the stability of the right hand. Tapakis explained that he usually begins his lessons with new students by going through existing compositions within a specific *makam*. Only after working on the repertoire, he typically begins developing *taksim* techniques. However, since he could see that I was not a beginner, we could start straight into working on *taksim* improvisations.

Tapakis asked which style of *taksim* I would like to work with, presenting two alternatives: Cinuçen Tanrıkorur's style, which comes from the classical *makam* tradition and tends to have more free and non-metric phrase, and Kadri Şençalar's style, which is closer to what he referred to as a 'folk' *makam* tradition, and with a stronger presence of metric phrases and a

sensation of a pulse⁷³. Considering this dissertation's interest, we began working on Tanrıkorur's *taksim* style.

The learning process proposed by Tapakis started with listening to the *taksim* we would study. In sequence, Tapakis stopped the recording and played the phrase he wished to teach. If I failed to play the phrase appropriately (which usually happened), Tapakis would repeat the phrase, either slowing down the tempo or highlighting the element I was failing to reproduce. This is not dissimilar to the process of imitation employed by Papapetropoulos. However, a few differences are crucial; first, Tapakis is transmitting knowledge which comes from an existing master, and not from his personal musical vocabulary. This means that the material to be learned is pre-existing, and his task as teacher is to explain how the student can achieve the same result. Here, the teacher acts as an intermediary between an existing knowledge from the tradition and the student, which, without the teacher's technical explanation, does not have the technical skills to understand how the intended sound is produced. Secondly, the level of detail of Tapakis' explanations was higher: he would remain for a long time on one phrase to explain how to produce the correct ornamentation, glissando, finger position and rhythmic feel present in the phrase⁷⁴.

According to Tapakis, the process of learning existing phrases is the first step in order to learn how to perform a *taksim*.

I use four steps in order to learn *taksim* improvisation. The first is to learn the phrases of existing *taksims*. In my opinion, you don't have to learn and memorise all the *taksim*. It is better to learn individual phrases, so you can create your own style from this. Learning phrases helps to understand the functioning of the *makam*. The second step is to learn the *seyir*. Then, to listen to a lot of *taksims*. And finally to listen to other *taksims* and compare the *seyir* that they have. And write down these *seyir*, to see where he goes, the type of

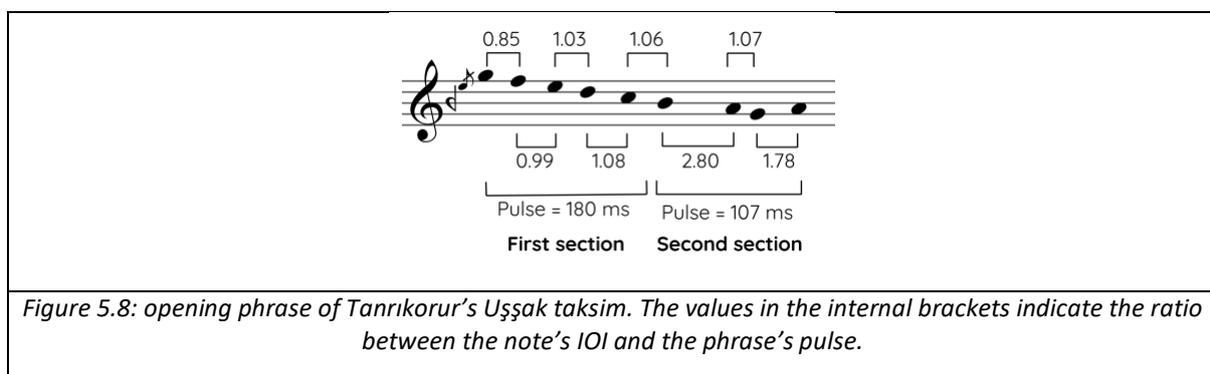
⁷³ Further details related to Tanrıkorur and Şençalar, as well as discussion on the concept of 'folk' and 'art' *taksims*, will be further elaborated on chapter 7 of this dissertation.

⁷⁴ I should highlight that the detail of technical explanations from Tapakis' sessions likely come from the fact that I was playing the oud, the same instrument as Tapakis, but not the instrument from Papapetropoulos, which is the *lavta*.

modulation that the musician can do. These are the things that I believe are necessary. After that, you need to let all this knowledge go to your playing without a rational approach, to go without thinking. (Tapakis, 2022. Personal communication).

Tapakis' option for learning 'individual phrases' instead of entire improvisations means that he selects short segments between one and four seconds, and he is attentive to every technical detail of the phrase. There are good reasons to justify this strategy of learning *taksims*. While learning individual phrases, the student is assimilating what was observed in Chapter 3 as the basic unit of expressions, and is able to create their own personal vocabulary combining these phrases. If the student learns an entire *taksim*, they are memorizing the discourse of an established musician, but might not open enough space for their own creativity to flourish. It should be highlighted, however, that this is not an unequivocal topic. According to Poulos, many musicians, especially from older generations, did have the practice of memorizing entire *taksims*. This includes Necdet Yasar, Mesud Cemil, Rusen Ferit Kam and Mehmed Emin Bitmze. Musicians such as Murat Aydemir and Necati Çelik, on the other hand, are against the practice of memorizing entire *taksims* (Poulos, 2026: 188).

The level of detail in Tapaki's explanations allow clear insights on how he understands rhythmically Tanrıkorur's phrases. The picture below presents the transcription from Tanrıkorur's opening phrases in his *Uşşak Taksim*.



Tapakis divided the phrase into two parts: first part includes the first five notes (from *gerdaniye* (G) until *carghah* (C)) and the second part includes the last four (from *segâh* (B) until *dügâh* (A)). This division makes sense from a technical perspective – the first phrase uses

a specific type of *çarpma* which requires a separate way of studying – and from a rhythmical perspective: while the first phrase has relatively regular durations, all gravitating around the duration of 180ms, the second part has durations which are more challenging to insert into a metric context. The distinction between the rhythmical characteristic of the two parts became clear when Tapakis explained how he subdivided each note of the phrase.

[referring to the first part of the phrase] I think this phrase like a two plus three [sings the phrase with the words 'one, two/one, two, three']. Then, the rhythm stops there... how do you say... [sings the second part using the syllable "tam" in the notes] I don't know how to divide the second part of the phrase.
(Tapakis, 2022. Personal communication)

Similarly to what was observed in chapter 3, Tapakis is not reluctant to explicitly 'metricise' the first part of the phrase - that is, to divide the phrase in groups of two notes and three notes. In fact, this is a part of his teaching process, and Tapakis often asks students how they would 'metricise' specific *taksim* phrases aiming to see if the student's understanding of the local divisions is adequate⁷⁵. This is similar to the process proposed by Cholevas (2023) discussed in chapter 2. However, it is also clear that this process cannot be applied to all phrases; some segments (such as the second part of the phrase in picture 10) are slowed down for pedagogic purpose, but studied through repetition without a clear subdivision in mind –similarly to the process described by Ross Daly in Chapter 3. One could claim, therefore, that in this context, Tapakis is comfortable transitioning between the different positions regarding the rhythmic understandings of phrases; in some sections, it might be useful to adopt a metric perspective, in others, not. Regarding the example provided, one could claim that the second part of this phrase is largely responsible for the sensation of free-rhythm, as it breaks the expectations of a pulse established by the phrase's first part.

Tapakis also makes clear that the idea of metricity was not something conscious neither in Tanrikorur's performance nor in his days as a student, when he went through the process of

⁷⁵ During our lessons, I was curious whether Tapakis was emphasizing rhythmical aspects because he knew my interest on the topic. Tapakis reply was very clear: 'I do it with all students. With these kind of phrases, I do this frequently, to ask students to tell me how do they hear these rhythm'.

learning *taksims*; he identifies this strategy as a teaching technique which can be helpful for his students.

The phrases are very elastic; it is difficult for a student to understand from this metrical [perspective]. So the metric is just a reference. Especially on this kind of *taksim*, because of how elastic this is. Tanrıkorur has an elastic tempo, [it] fluctuates a lot. He is not thinking in terms of tempo subdivision. These are just phrases that he knows very well from his background. When I was studying, I was also not thinking about this. Only later I started to think about these subdivisions.

Tapakis' learning process can be retraced through a structured sequence of steps: first, the student listens to an existing phrase; then, the teacher decodes or adapts a 'non-metric' phrase into a more digestible form—either by slowing it down, adding a metric framework, or both; finally, once the student has internalized the phrase in this simplified form, they are guided toward performing it at its original tempo. By following these steps, the student becomes familiar with idiosyncratic movements and, consequently, with the style of the master.

5.6 Conclusion

This chapter presented distinct approaches on teaching *taksim* improvisation, focusing on its impact for the understanding of how rhythm functions within this practice. Perikles Papapetropoulos presented possibilities of rhythmical and melodic variation within a similar melodic material without resorting to facilitating procedures like slowing down or segmenting the phrases. In his teaching approach, the immediacy and responsiveness of the student to the master's demonstrations are crucial, and the musician presented phrases in relatively fast tempo using both metrical and non-metrical features, although leaning towards the metrical phrases especially in fast passages. Papapetropoulos emphasised the challenges posed by performing phrases in a slower tempo, as these required a set of expressive tools such as *çarpma*, glissando and vibrato. In the analyses, it was possible to observe that slower phrases

also tend to feature less metrical characteristics, and Papapetropoulos' remarks strengthen the association between irregularity and a stronger expressive feature.

Alexandros Papadimitrakis introduced an exercise that constrained the melodic material to just a few degrees of the *makam*. This forced the student to adopt a more creative approach, creating and further developing their motivic material. In Papadimitrakis's examples, phrases tended to present a higher metricity level; however, the sensation of regularity was disrupted by features such as local and broader accelerandos and the usage of irregular accents. In his examples, the irregularity is therefore established less on a local, smaller level, but more intensely in a higher hierarchical level, which potentially creates a different type of temporal sensation.

Kyriacos Tapakis's lessons focused on meticulously copying existing phrases from masters in the oud, which he did by delving into the mechanisms and techniques that need to be practiced in order to achieve the intended sound. This practice brings a very analytical, almost surgical regard: phrases are slowed down and decoded into subgroups (often with 'locally metric' characteristics), even if this was not the original intention of phrase's originator. By doing so, it is possible to observe Kyriacos's understanding on the phrase's rhythm, which might have a pedagogical purpose, and is informative on how this musician understands the internal subdivisions of rhythm in *taksim*.

The observations made in this chapter build upon the conceptual discussions explored in Chapter 3, where musicians articulated various perspectives on rhythm, pulse, and metricity in *taksim* improvisation. The lessons examined here offer practical demonstrations of how these concepts manifest in pedagogical contexts. For instance, the distinction between metric and non-metric phrases, a recurring theme in Chapter 3, is reflected in Tapakis' pedagogic strategy of slowing down phrases, but introducing metric subdivisions only if the phrase's structure is compatible with such a feature. This resonates with the broader discourse on locally metric phrases, a concept that emerged in both musicians' discussions and analytical frameworks.

Papadimitrakis' approach provides further insight into how metricity can be manipulated within a pedagogical setting while maintaining the stylistic fluidity of the *taksim*. His strategy of using irregular accents within a relatively metric environment serves as a means of preserving the sensation of free-rhythm, even when the phrases themselves exhibit a high degree of internal regularity. This aligns with discussions in Chapter 3 regarding the ways in which musicians balance predictability and flexibility in rhythmic structuring. The presence of stable subdivisions, coupled with unexpected accentuations, challenges the perception of strict metricity and contributes to the impression of rhythmic fluidity. Furthermore, as observed in Papapetropoulos's lessons, the tendency for faster phrases to exhibit more metric qualities, while slower phrases allow for more irregular durations, reinforces insights drawn from the musicians' discourse, suggesting that rhythmic expressivity in *taksim* is stronger in phrases with slower notes. These pedagogical approaches thus provide a tangible link between discussions and practical learning strategies, demonstrating how musicians internalize and transmit rhythmic structures in ways that explore the improvisatory nature of the style.

The purpose of this chapter has been to obtain examples of how musicians perceive and convey the rhythm of *taksim* in practice through their distinctive teaching approaches and pedagogical techniques. Each approach, whether rooted in immediate imitation, motivic constraint, or meticulous replication, reflects a personal understanding of rhythm that contributes to the broader discourse of improvisation in this tradition. Simultaneously, this chapter has begun to explore the analytical possibilities offered by the methodology presented in Chapter 4, demonstrating its potential to present subtle variations in *taksim*. This groundwork sets the stage for a more detailed application of these analytical tools in Chapter 6 and Chapter 7, where the methodology will be further expanded to provide a comprehensive examination of the large-scale rhythmic features in full length *taksim* improvisations.

Chapter 6. Rhythmic Styles in *Taksim* Improvisation: A Comparative Analysis of Three Masters from the 20th Century

Tradition is not the worship of ashes, but the preservation of fire.

Gustav Mahler

6.1 Introduction

This chapter focuses on analysing the rhythmic characteristics of *taksim* improvisations from 20th century oud players. Chapter 5 discussed rhythmic elements of *taksims* presented within a learning environment, including analyses of several musical phrases. These phrases were selected based on their relevance as specific examples and were presented as isolated cases, without broader structural investigation into the improvisations. In this chapter, I aim to propose a *systematic* way of addressing large-scale rhythmic features in *taksims* by comparing different improvisations using a similar set of tools.

Before delving into the analyses, it is important to clarify the motivation and objectives behind this approach. Free-rhythm music, as discussed in earlier chapters, presents unique analytical challenges due to the lack of established terminology and suitable tools for systematic exploration. Although recent years have seen some noteworthy analyses of free-rhythm (e.g., Ohriner, 2016; Roeder, 2019), these remain limited to isolated case studies and have not been applied to a broader corpus. This dissertation seeks to bridge this gap by proposing a systematic method for analysing free-rhythm.

However, the motivation to pursue this work is not solely due to its relative novelty. As discussed in Chapter 2, free-rhythm music often embodies some of the most idiomatic and characteristic features of a given musical style. This is particularly true for *makam* music, where *taksim* serves as a moment for the musician to demonstrate their understanding of a

given *makam* while also establishing a connection with their surroundings. A *taksim* connects the musician with the audience and the environment, inviting listeners to access a glimpse of the musician's inner world. By proposing a systematic method for analysing the rhythmic aspects of *taksim*, I aim to enable comparisons across different styles of improvisation and to identify characteristics typical of particular styles. Additionally, through this systematic analysis, I hope to demonstrate that the methodology proposed here is effective for identifying and categorising different uses of rhythm within *taksim*.

As observed in previous chapters, discussions around rhythm in *taksim* often centre on a dichotomy: on one side are *taksims* characterised by a stronger sense of rhythmic regularity, which are associated with the 'taverna' style of improvisation; on the other side are *taksims* with less rhythmic regularity, and associated with a 'classical' approach to *taksim*. This chapter will focus on large-scale rhythmic characteristics of *taksims*, exploring how traces of these two styles can be observed through empirical data collected using the approach described in Chapter 4. Once these fundamental parameters are established, the investigation of small-scale elements (such as those observed in chapter 5) will be reintroduced in Chapter 7, in combination with the methodology for large-scale analyses presented here.

Section 6.2 presents a rhythmic analysis of three *taksim* improvisations in the *makams* *Uşşak*, *Hicazcâr*, and *Rast* performed by the oud player Kadri Şençalar. This musician was selected based on a recommendation from one of my teachers, Kyriacos Tapakis, who cited Şençalar as an important representative of the 'taverna style' of *taksim* improvisation. The tools introduced in Chapter 4 will be employed to delineate the parameters that characterise a *taksim* within this style. By establishing typical features identified through this analytical approach, I will observe rhythmic consistencies and highlight traits that seem characteristic of Şençalar's rhythmic style.

Sections 6.3 and 6.4 will compare two contrasting styles of *taksim* improvisation: those of Cinucen Tanrıkorur and Yorgo Bacanos. Tanrıkorur's style is strongly influenced by the

*tanbur*⁷⁶ and by classical *makam*, particularly prominent in the latter half of the 20th century. Bacanos's style, by contrast, is derived from playing in lively spaces, and represents an earlier generation of oud masters which, according to Papadimitrakis, approached *taksim* with a stronger sense of regularity⁷⁷. By comparing these two approaches, these sections highlight the broader stylistic range of *taksim* practices and their implications for rhythmic structures.

The selection of these oud masters also arose from conversations and music lessons during my fieldwork. In my first lesson with Kyriacos Tapakis, he was aware of my interest in the rhythmic aspects of *taksim* and suggested Şençalar and Tanrıkorur as representatives of two contrasting styles worth studying. Bacanos was included in this comparison due to his prominent influence on contemporary oud playing (İncilli, 1994; Yahya, 2002), which led me to study his *taksim* under Tapakis's guidance. Having studied the *taksims* of Bacanos, Tanrıkorur and Şençalar with Tapakis, I will compare these musicians' styles, illustrating how the proposed methodology can reveal rhythmic differences between their *taksims*.

Given the exploratory nature of this study, it would be premature to consider the findings from this chapter as definitive. I will suggest traits that appear typical of particular styles, but further research involving a larger set of improvisations would be required to make more conclusive statements. Developing a consistent method and establishing appropriate terminology are prerequisites for such future study, something that this chapter endeavours to put in place.

⁷⁶ The *tanbur* is a plucked string, pear shaped instrument which, next to the reed flute *ney*, is considered the most esteemed instrument for the classical *makam* tradition (Feldman, 1990; 93).

⁷⁷ See chapter 7, section 7.4.1.

6.2 Kadri Şençalar

Kadri Şençalar (1912-1989) was an important oud player with an extensive career developed primarily in Istanbul. He recorded numerous *taksims*, 39 of which there are currently preserved (Boy, 2024: 156). Şençalar often performed at casinos, weddings, and various celebratory events, becoming a prominent figure on the ‘taverna’ or ‘folk’ *taksim* style (Baloğlu, 2022: 1831). Boy (2024: 218) describes Şençalar’s style as rooted in the pre-Republic ‘street tradition’ of Istanbul, where melodies were influenced by Eastern Anatolian traditions as well as by the Arabic, Greek and Armenian oud playing traditions.

According to Yurdal Tokcan, technical limitations of the period significantly influenced Şençalar’s playing style:

They didn’t have microphones, and the right hand is very strong. [Şençalar used] the *mezrab* to keep the tempo, touching the board of the instrument to make the sound stronger. We still keep this way of playing sometimes. Kadri Şençalar was representing this period. His *taksims* are more dynamic, with a big sound.⁷⁸ (Tokcan, 2023, personal communication).

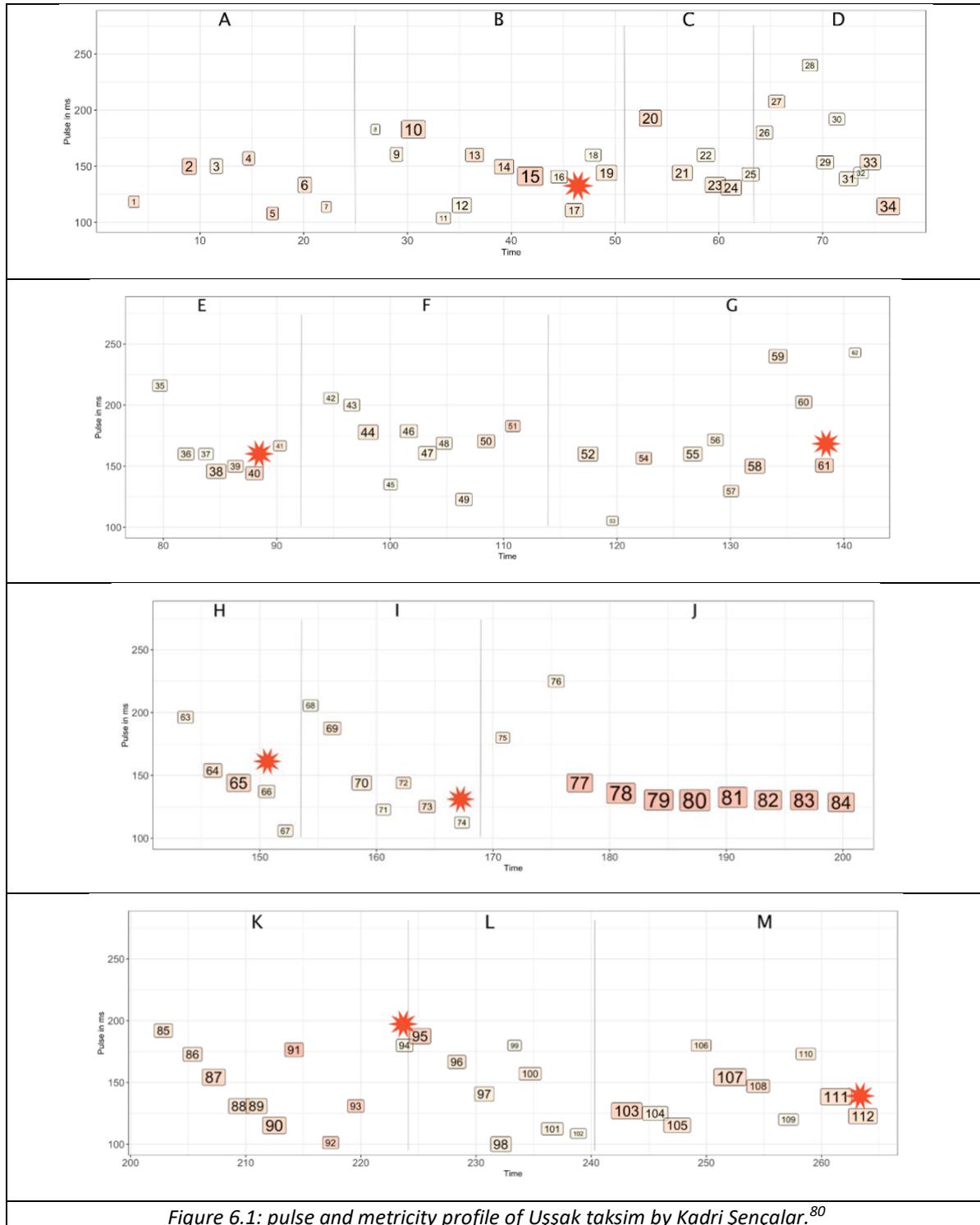
Şençalar’s improvisational style is closely linked to the ‘folk’ tradition of *makam* music⁷⁹. Here, ‘folk’ is not used in opposition to ‘urban’, but rather to specify the social environment in which the musician was embedded. Tavernas, weddings, casinos, and festive venues are associated with the ‘folk’ environment, in contrast to contemplative places such as religious temples, concert halls, museums and locations where people listen to music in silence. Since social environments associated with ‘folk’ *taksim* often include dancing and require a regular pulse in the music, it is unsurprising that *taksims* performed in such settings tend to exhibit a higher degree of rhythmic regularity. The following pages will present how the rhythmic

⁷⁸ In this interview, Yurdal Tokcan would often alternate between using ‘they’ and ‘we’ to refer to specific techniques, indicating that this was a technique used by Şençalar but still employed by the current generation of oud players.

⁷⁹ Tapakis, 2022, personal communication.

characteristics of Şençalar's *taksims* in the *makams* *Uşşak*, *Hicazcâr*, and *Rast* can be observed using the analytical tools proposed in this dissertation.

6.2.1 Kadri Şençalar: Uşşak taksim



⁸⁰ Following the discussions from Chapter 4, the plots at the beginning of each subsection focus on two parameters of rhythmic characteristics in taksim: the phrase's metricity and the phrase's pulse. Each numbered

The first section of the *taksim* begins with phrases establishing a pulse centre around 150ms (phrases 2-4), and concludes by repeating the note *neva* (D), the centre of section **A**, on a faster pulse (phrases 5-7). In section **B**, Şençalar alternates between phrases concluding on *çargâh* (C) (phrases 12-13), *dügâh* (A) (phrase 14) and *neva* (phrases 17-19), indicating that the section remains at the same step of the *seyir*. Rhythmically, there is an *accelerando* in pulse between phrases 10-17 (with phrases 11 and 12 as outliers) culminating in a cadential phrase (17) that exhibits a fast pulse and a high degree of metricity variation. Sections **C** and **D** target the note *neva* (D), with several phrases displaying pulses around 150ms (phrases 21-25, 29-33) and less metrical phrases at different tempos (phrases 26-28, 30). While section **C** shares profile similarities with section **E** (one metrical phrase around 200ms, followed by several phrases around 150ms), section **D** presents a *rallentando* of pulse (phrase 26-28) followed by a progressive increase in its metricity, with phrases transitioning from less metrical and medium tempo (phrase 26) to highly metrical and very fast pulse (phrase 34).

From sections **E-F** and throughout the rest of the *taksim* the overall pulse profile begins to shift, alternating between groups of phrases centred around a similar pulse (phrases 52-58, 77-84, 101-105 and, to a lesser extent, 44-51) and phrases with a very expressive *accelerando* (phrases 62-67, 68-74, 85-90, 95-98, 99-102, 106-109). In section **E**, a cadential phrase on *dügâh* (A) is presented (phrase 40) following series of phrases with similar pulse. To conclude the first section of the *taksim*, section **F** introduces a brief modulation to *Saba* (phrase 42-51), setting the stage for the second part, which begins with section **G**. The sections featuring modulation to *Saba* on the low register (**F**, **G**, **H** and **I**) exhibit a significantly slower average tempo and lower metricity rates. From section **J** onward, Şençalar explores the high register of the *makam*, maintaining the modulation to *Saba*. In this register, he presents a noticeably metric section (phrases 77-84), employing open string tremolos and demonstrating the influence of the Arabic *taksim* style previously discussed. Through sections **K** and **L**, Şençalar

square represents a phrase segmented according to the process described in Chapter 4. The size of each number on the plot correspond to phrase's level of metricity; larger numbers indicate more regular phrases. The Y-axis represents the phrase's pulse in milliseconds. The background colour of each data point reflects the quantity of notes in the phrase; phrases with more notes have a dark-red background. To facilitate comparison, all plots are structured with breaks every 10 seconds and standardized Y-axis values. The symbol * marks the cadential phrases.

makes use of *accelerando* patterns on pulse, progressing to very metrical phrases at a fast tempo in section **M**.

Şençalar's *Uşşak taksim* presents a predilection for beginning sections at a slower tempo and concluding them at a faster tempo. As a result, there are several substantial jumps from phrases with fast pulses to phrases with slower ones, particularly at the end of sections (**B-C, F-G, J-K, K-L, L-M, M-N**). Additionally, Şençalar often concludes sections with phrases that are often less metric compared to their predecessors. Another interesting trait is that many sections display peaks of metricity in their middle phrases, with less metric phrases towards the end (**G, H, I, J, K, M, N**).

The average metricity of the sections is 10.9, which, as subsequent comparisons will demonstrate, indicates a very metric performance. The average pulse of the phrases is 152ms, with a low standard deviation, signifying a relatively narrow range of pulse variations. Şençalar typically employs a stable pulse centre around 150ms, with occasional deviations. Furthermore, several groups of phrases exhibit *accelerando* patterns, as observed in sections **C, E, F, J, K, M** and **N**. It is possible to observe some degree of correlation between pulse and metricity: sections with a slower pulse tend to present lower metricity.

The cadential phrases also present interesting characteristics. Unsurprisingly, all cadential phrases occur toward the end of the sections. With one notable exception⁸¹, cadential phrases' pulses tend to be faster than those of other phrases. While metricity lies within a similar range for both types of phrases, the range of metricity for cadential phrases is noticeably narrower compared to non-cadential phrases.

⁸¹ The exception for the fast cadential phrases is phrase 94. An aural impression of the phrase leads to the conclusion that the pulse detection algorithm did not capture accurately the pulse.

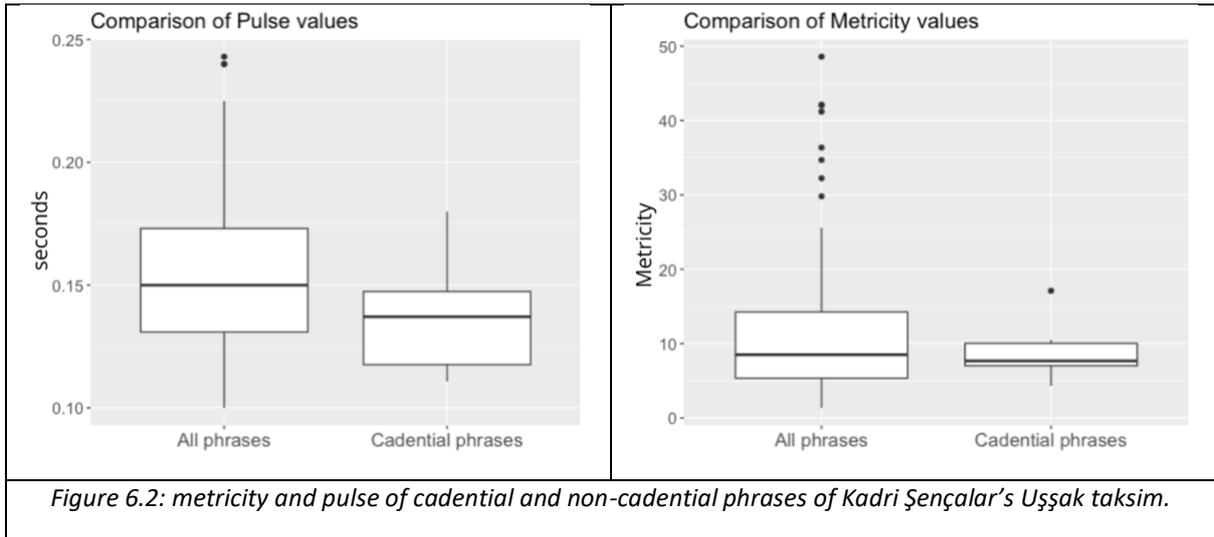
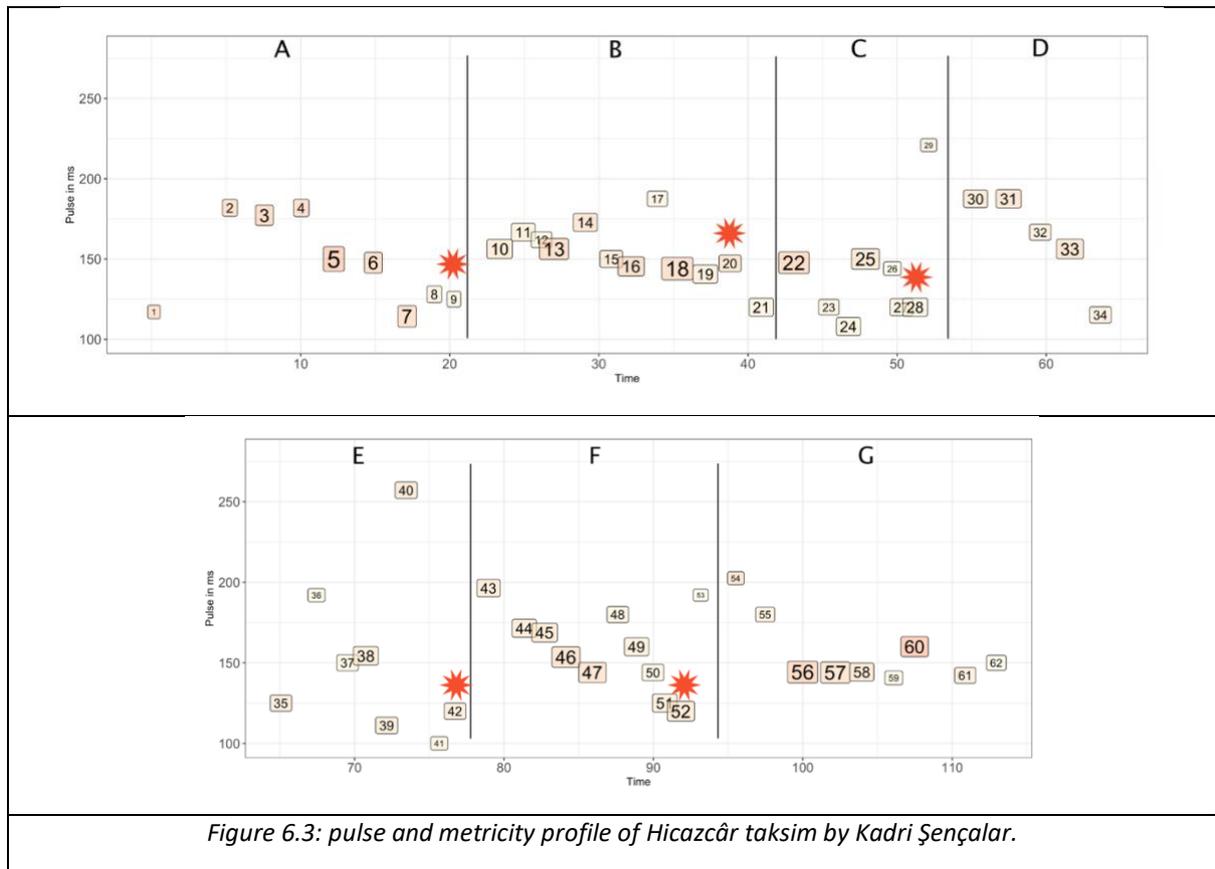


Figure 6.2: metricity and pulse of cadential and non-cadential phrases of Kadri Şençalar's Uşşak taksim.

6.2.2 Kadri Şençalar: Hicazkar taksim



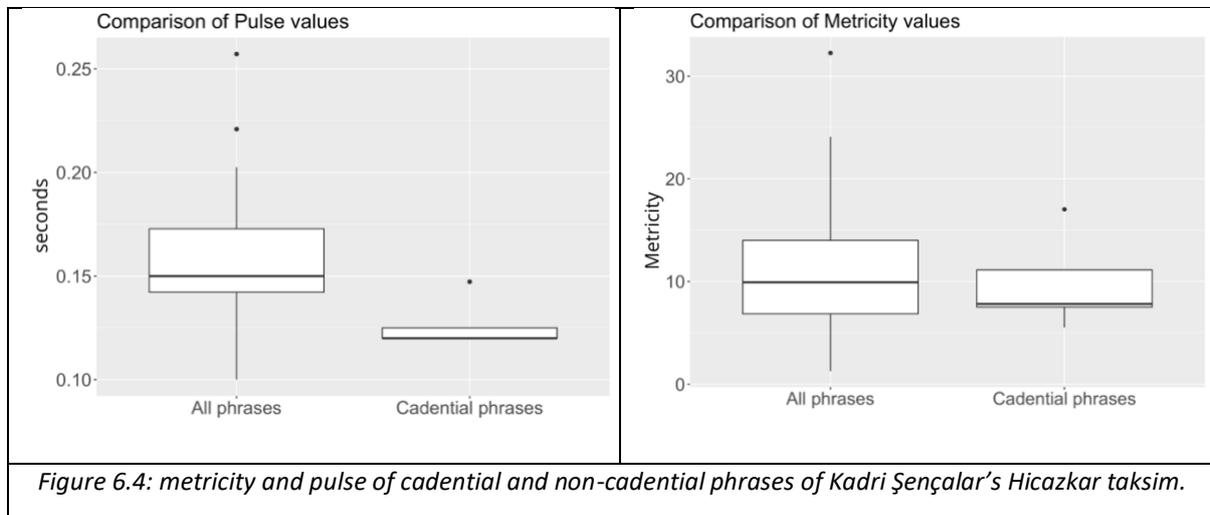
The *makam Hicazcâr* is known for its intense character, often associated with its use of the high register. This *taksim* begins with a *Hicaz* flavour on *gerdaniye* (g) and progressively descends to *rast* (G). In section **A**, Şençalar starts with phrases at a medium pulse (phrases 2-4) and gradually increases the speed of the pulse from phrases 2-9 with the peak of metricity in the middle of the section (phrases 5). Section **B** presents a relatively steady pulse, but features constant shifts in metricity, with less metric phrases at both the beginning and ending of the section. In phrases 18-21, Şençalar moves to the high melodic section of the *makam*, combining one metric phrase (18) with faster phrases (19-21). An interesting detail is found in phrase 17, where Şençalar prepares a jump to the high melodic section by presenting a less regular phrase followed by a fast and regular one (phrase 18).

While section **C** maintains and intensifies the fast characteristics observed earlier, section **D** features slower pulses and less metrical phrases between 30-33, including a brief modulation

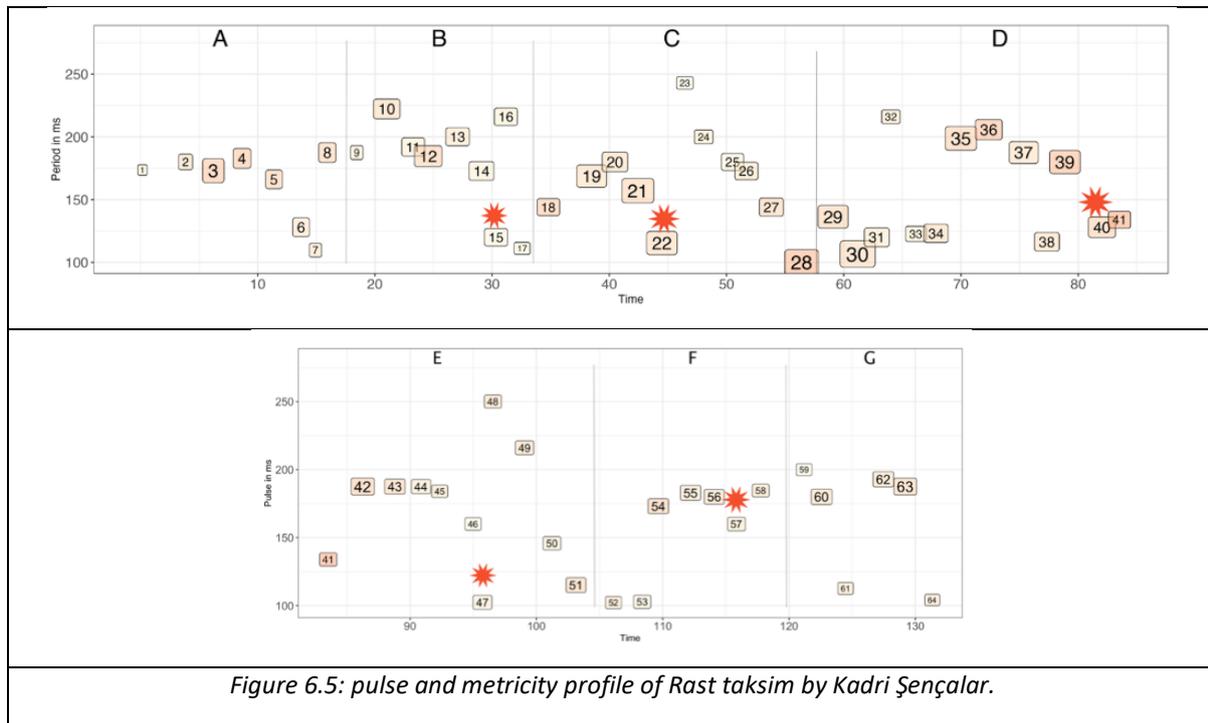
to the *Uşşak* flavour before resting on the note *segâh* (B). Section **E** exhibits an irregular pulse profile at a fast tempo, whereas section **F** features two *accelerando* patterns (phrases 43–47, 48–52), both ending in cadential phrases on *rast* (G), signalling the *taksim*'s conclusion. In the final section, **G**, Şençalar presents several phrases with a steady pulse of around 150ms (phrases 56–62), consistently alternating the metricity of the phrases.

Regarding the overall metricity, the *taksim* begins with very metrical sections (**A** and **B**), gradually moves towards less metrical sections in **E**, and finally returns to metricity in the concluding sections. Similarly to what was observed in Şençalar's *Uşşak taksim*, the most metrical phrases often occur in the middle of the section, with less metrical phrases at the beginning and end.

Comparing the pulse and metricity rates of cadential and non-cadential phrases, it is noticeable that cadential phrases exhibit much faster and more consistent pulse. Their metricity is similar but slightly narrower in range.



6.2.3 Kadri Şençalar: Rast taksim



Although this improvisation is in *makam Rast*, it incorporates elements that diverge from the classical presentation of the *makam*, most notably a frequent change of octaves. Typically, a classical presentation of *makam Rast* features a progressive melodic development, with musicians occasionally introducing phrases in different octaves. Here, Şençalar begins his improvisation in the high register of *gerdaniye* (g), quickly moving to the tonic of the *makam Rast* (G) by phrase 13 and concluding the section on *çargâh* (phrase 17) before presenting a concluding phrase on *rast* (G) in phrase 22 and phrase 28.

Rhythmically, sections **A** and **B** feature phrases with a pulse significantly slower than in Şençalar's *Hicazcâr* and *Uşşak taksims*, with a relatively linear arrangement of phrases between 170-200ms (phrases 1-14). The phrases in the high register (phrases 1-8) have pulses substantially faster than phrases in the low register (9-18). The phrases also present contrasting metric levels ranging from very metric (phrases 3, 11, 12) to less metric (phrases 1,9). Section **C** introduces the cadential phrase in *rast* (G), indicating the conclusion of the first part. Once again, we observe the cadential phrase on a much faster tempo. Section **C** also

presents an interesting accelerando of pulse's profiles, beginning with a less metric phrase (23) and concluding with a very metric one (phrase 28).

In section **D**, the musician transitions to the high *tiz neva* (d) in phrase 29, a movement that is accompanied by a much faster pulse between phrases 29-34. Upon returning to *gerdaniye* (g) in phrase 35, pulse slows down (phrases 35-39) before a concluding cadence on the same note (phrase 40). As the *taksim* progresses to the lower register in sections **E**, **F** and **G**, sequences of phrases with pulses between 175ms and 200ms are observed (phrases 42-45, 45-58, 59-63). Unlike earlier improvisations, there is less alternation between more and less metric phrases; instead, phrases lean toward lower metricity with a relatively steady pulse.

In this improvisation, Şençalar includes segments with relatively fixed pulses (phrases 1-5, 11-14, 30-34, 35-39, 42-45, 54-60) though metricity may or may not vary. Other segments present accelerando patterns (phrases 23-28, 48-52 and, to a lesser extent, 13-17, with 16 as an outlier), although the accelerando profiles are less pronounced than in other improvisations observed.

When comparing cadential and non-cadential phrases, similar traits emerge: cadential phrases tend to have much faster pulses and comparable metricity values.

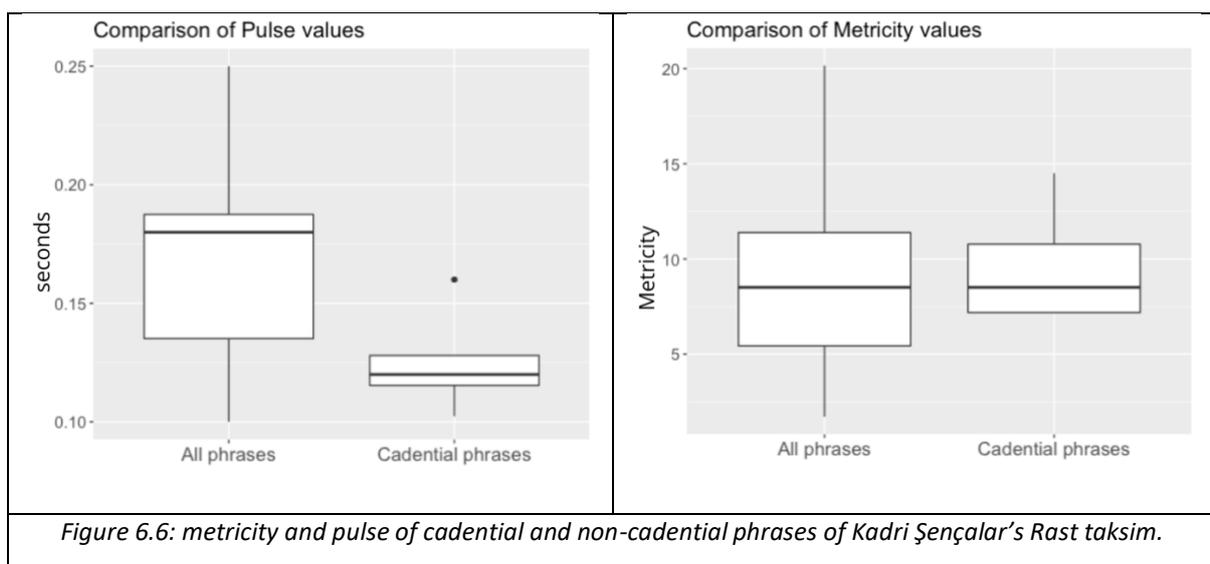


Figure 6.6: metricity and pulse of cadential and non-cadential phrases of Kadri Şençalar's Rast taksim.

6.2.4 Discussion

In this section, I have examined the *taksim* style of a single artist in detail, establishing a foundational parameter that can be used as reference in later sections. This focused approach provides a structured framework for identifying recurring rhythmic tendencies, which can then be compared with stylistic approaches of other musicians. By examining *taksims* in different *makams*, it becomes possible to suggest traces that may be connected to specific phrase behaviours, which could be further explored through the analysis of a larger corpus of improvisations.

The average metricity levels of Şençalar's *taksims* ranged from 8.8 (*Rast taksim*) to 11.2 (*Uşşak taksim*). The *Uşşak taksim* contains both the least metric section (Section I, metricity 6.4) and the most metric section (Section J, metricity 31.6). However, it is worth noting that Section J is a significant outlier compared to the second most metric section, which is Section A of the *Hicazcâr taksim*, with a metricity of 14.4. The average pulses of the *taksims* varied between 150ms (*Uşşak taksim*), 152ms (*Hicazcâr taksim*) and 164ms (*Rast taksim*), with *Hicazcâr's* section B having the fastest average pulse (128ms) and *Rast's* Section E the slowest (180ms). Defining these values provides a tentative range for metricity rates in *taksims* of the 'taverna' or 'folk' style.

Observing different improvisations from Şençalar also provides preliminary insights into the types of rhythmical behaviour present in his *taksims*. He often begins sections at a slower tempo and gradually increases the pulse, culminating in faster phrases⁸². Such pattern takes various forms: most commonly, it features a significant degree of acceleration (e.g., *Uşşak*, I, K, L; *Rast*, C, E; *Hicazcâr*, D, F), though smaller degrees of acceleration are occasionally observed (*Hicazcâr*, B; *Uşşak*, B). In these accelerando patterns, metricity can vary significantly, ranging from less metric (*Uşşak*, I, L; *Hicazcâr*, B; *Rast*, E), to more metric (*Hicazcâr*, D; *Rast*, E), alternating between the two (*Uşşak*, B; *Hicazcâr*, B) or progressively increasing the metricity level (*Rast*, C; *Hicazcâr*, F).

⁸² For a segment to be considered as one of the patterns described below, I have considered that it must include at least 4 phrases following the patterns described, with the maximum of 1 phrase as an outlier.

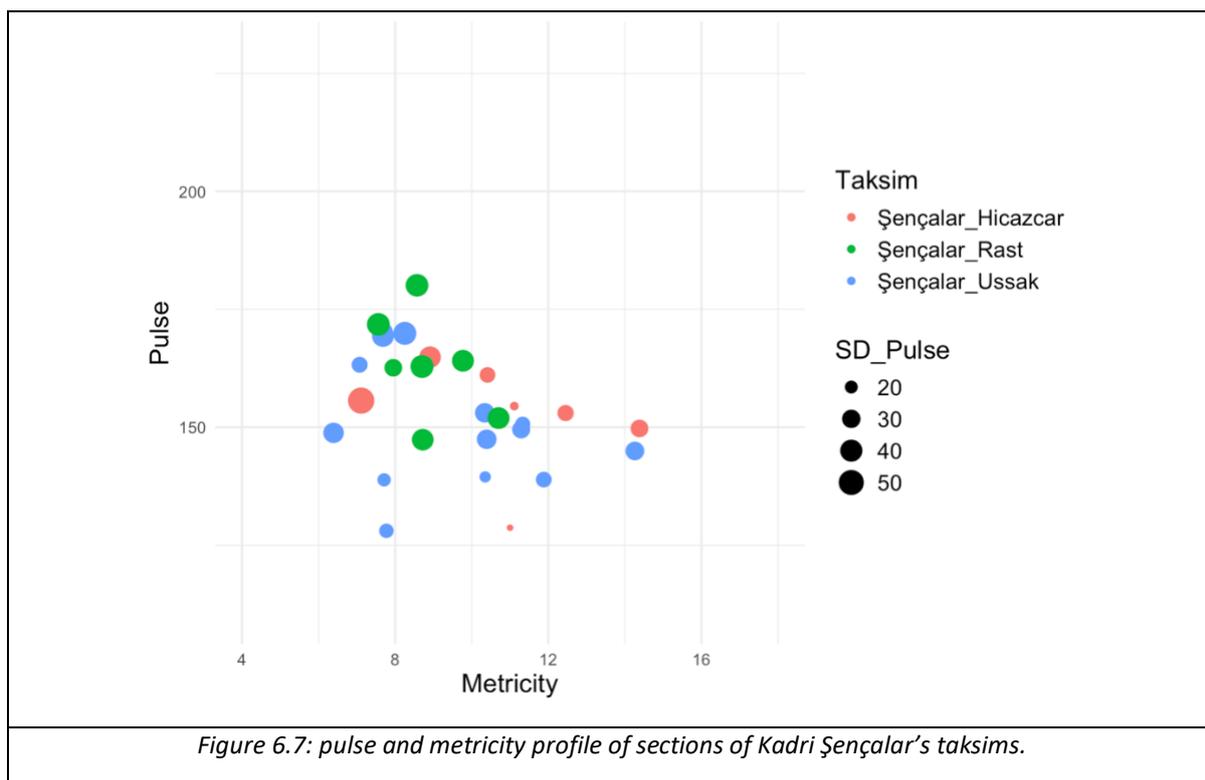
Şençalar's improvisation also contains several sections with relatively consistent pulse (*Uşşak*, **E, J**; *Rast*, **F, E**; *Hicazcâr*, **G**). In these sections, it is rare for metricity to remain constant. The only exception, *Uşşak*'s section **J**, exemplifies behaviour influenced by a different style of *taksim*, specifically the Arabic tradition.

Another notable characteristic of Şençalar's improvisations is his tendency to end sections with faster pulses than the preceding phrases. While the concluding phrase's metricity can vary, Şençalar rarely maintains the same metricity as the preceding phrases: if the preceding phrases are metric, the conclusion will tend to be less metric, and vice versa. This behaviour is evident in his *Hicazcâr taksim* (sections **A, B, D**) and in most phrases of his *Uşşak* and *Rast taksims*. In this sense, the constant change in metricity could be seen as a defining trait of these improvisations.

The sections present pulse profiles that can be categorised into three types: (relatively) levelled, dispersed or accelerando. It is rare to find sections where the pulse progressively slows (*rallentando*), suggesting that Şençalar does not favour this pattern. Even in sections with linear or dispersed profiles, a slight tendency toward accelerando is often present.

The overall metricity of phrases also reveals interesting features. As with pulse profiles, frequent changes in metricity between phrases are evident. Rarely are consecutive phrases presented with similar metric values, especially if their pulse is within a similar range. Additional traits include a preference for more metric phrases in the middle of the sections and less metric phrases at the end of sections.

Figure 5.7 presents an overview of the sections from the three *taksims* observed so far, where each point represents one section. The dimension of the pulse is determined by the standard deviation of its phrase's pulses; x-axis indicates its metricity level, and y-axis indicates its pulse. Here, it is clear that *Hicazcâr taksim* contains a wider range of metricity, but its pulse is more concentrated around 170-150ms. The *Rast taksim*, on the other hand, presents the opposite behaviour, with less varied values for metricity and a relatively spread range of pulse values. The *Uşşak taksim* contains sections with a wide range both of pulse and metricity.



Although tentative, it is worth speculating on potential relationships between *makams* and rhythmic behaviour. *Hicazcâr* is characterised by its intensity, often attributed to its use of high registers and the multiple *Hicaz* flavours required in different regions of the *makam*. Voulgaris describes his understanding of the nature of this *makam* mentioning that ‘when I listen to a *Hicazcâr*, I listen to someone that is in an explosion. But in the end of it, he tells me how he feels and what was the reason of the explosion.’ (Voulgaris, 2024. Personal communication). This intense character may correlate with the *makam*’s high metricity, a claim supported by the observation that sections with lower metricity often involve modulation to the *Uşşak* flavour.

Makam Rast, by contrast, is associated with a more serene and bright character, reflected in its lower metricity levels, but still maintaining a wide range of pulse values. *Makam Uşşak* combines a different range of expressions. In one hand, it includes a sort of melancholic nature, but it also often includes very intense sections. According to Voulgaris, ‘the *Uşşak* represents the longing, what I miss. It has a fire for something that you miss, something that

you want' (Voulgaris, 2024. Personal communication). This dual nature may explain the wide range of both metric levels and pulse observed in the *Uşşak* taksim.

In this section, I have established a foundational set of parameters for analysing metricity, pulse, and rhythmic behaviour in Şençalar's *taksims* in the *makams* *Uşşak*, *Hicazcâr*, and *Rast*. By examining Şençalar's work, I identified recurring traits, such as his preference for *accelerando* within sections, his tendency to conclude with faster and less metric phrases, and his general avoidance of *rallentando* patterns. These characteristics offer a glimpse into how rhythmic flow operates within the 'taverna' or 'folk' style of *taksim*. The analysis also suggests potential links between the rhythmic behaviours and the expressive qualities of the *makams*, as seen in *Hicazcâr*'s intense character, and *Uşşak*'s dynamic shifts. These initial insights establish a framework for recognising rhythmic traits that may be shared or contrasted in *taksims* of other artists.

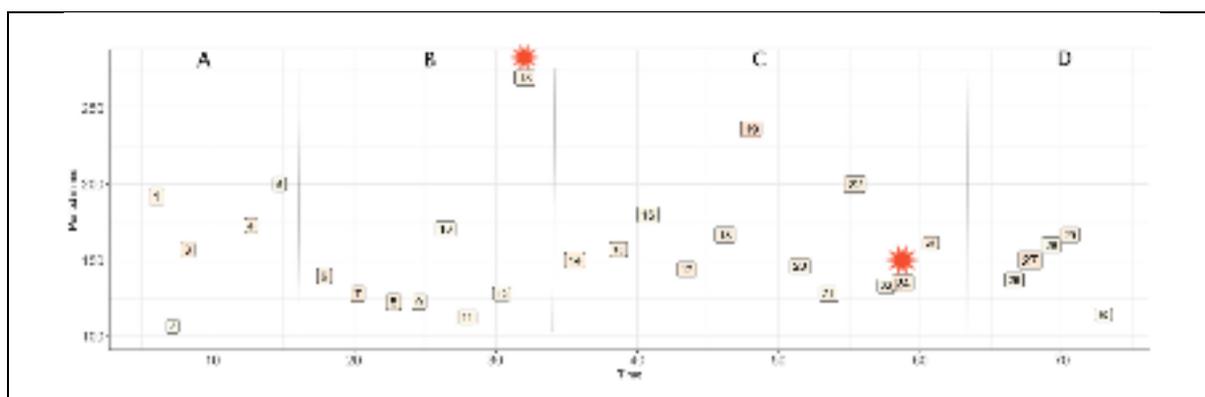
Building on these findings, the next section will explore improvisations by two musicians with distinct styles: Cinucen Tanrıkorur and Yorgo Bacanos. With Şençalar's *taksims* providing a baseline for 'folk' rhythmic behaviours, I will apply the same analytical tools to assess how Tanrıkorur and Bacanos might diverge from or align with Şençalar's patterns in their respective approaches. This comparative analysis aims to uncover further nuances in rhythmic structuring and performance style, potentially offering new perspectives on the relationship between rhythm and expression within different styles of *taksim* improvisation.

6.3 Cinučen Tanrıkorur

Cinučen Tanrıkorur (1938–2000) was a Turkish oud player, composer, musicologist, and educator, renowned for his significant contributions to the universe of *makam* music. Born in Istanbul, Tanrıkorur's career was dedicated to preserving and revitalizing traditional Turkish music. His extensive body of work includes numerous compositions, both instrumental and vocal, as well as a significant number of recorded *taksim*s, many of which remain important references for contemporary musicians.

Tanrıkorur's improvisational style contrasts sharply with that of Şençalar. Rooted in the classical *makam* tradition, his *taksim*s often feature shorter phrases and slower pulses. He favours crafting phrases on the same string, placing greater emphasis on the ornaments created with the left hand rather than on the speed generated by right-hand *mezrab* attacks. Tanrıkorur himself described his style as a synthesis of the tanbur and oud, with additional influences from the *bağlama* (Özcan, 2010).

6.3.1 Cinučen Tanrıkorur : Uşşak taksim



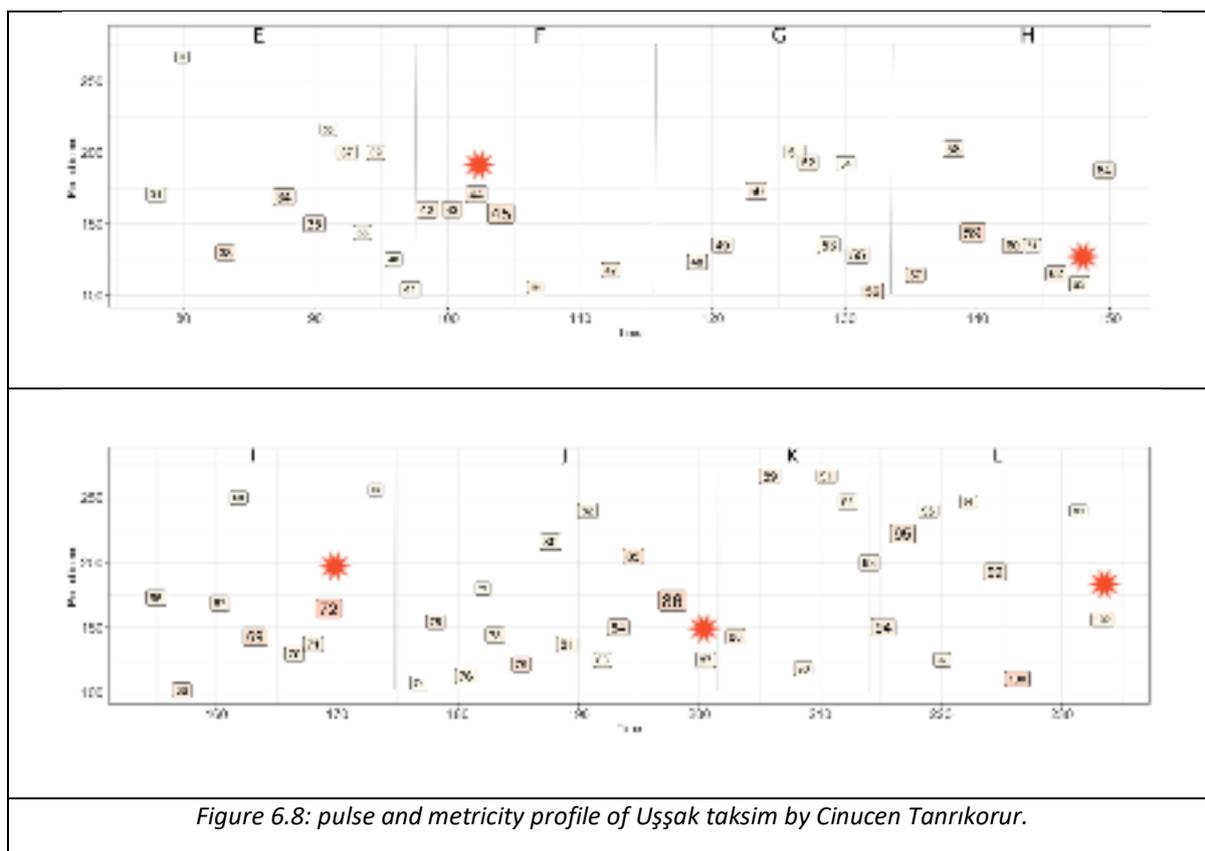


Figure 6.8: pulse and metricity profile of *Uşşak taksim* by Cinucen Tanrıkorur.

Tanrıkorur's *Uşşak taksim* begins with an opening phrase on *dügâh* (A), followed by short, less metric phrases. Section **B** shows phrases with low metricity and a pulse around 125ms (phrase 6-12, with 10 as an outlier), interrupted by a slower-paced phrase (13). This is also the moment when Tanrıkorur reaches the lowest region of the *makam*, resting on the note *yegâh* (D'). In Section C, phrases become slightly more metrical, with significant oscillations in pulse, including a slower phrase (phrase 19) and a cadential phrase on *dügâh* (phrase 24). Phrase 24 also exhibits a peak in regularity, which is disrupted by repeated notes in phrase 25. Section **D** concludes the first part of the *taksim* with a *rallentando* from phrases 26-29, featuring a peak in regularity at phrase 27, followed by less regular phrases.

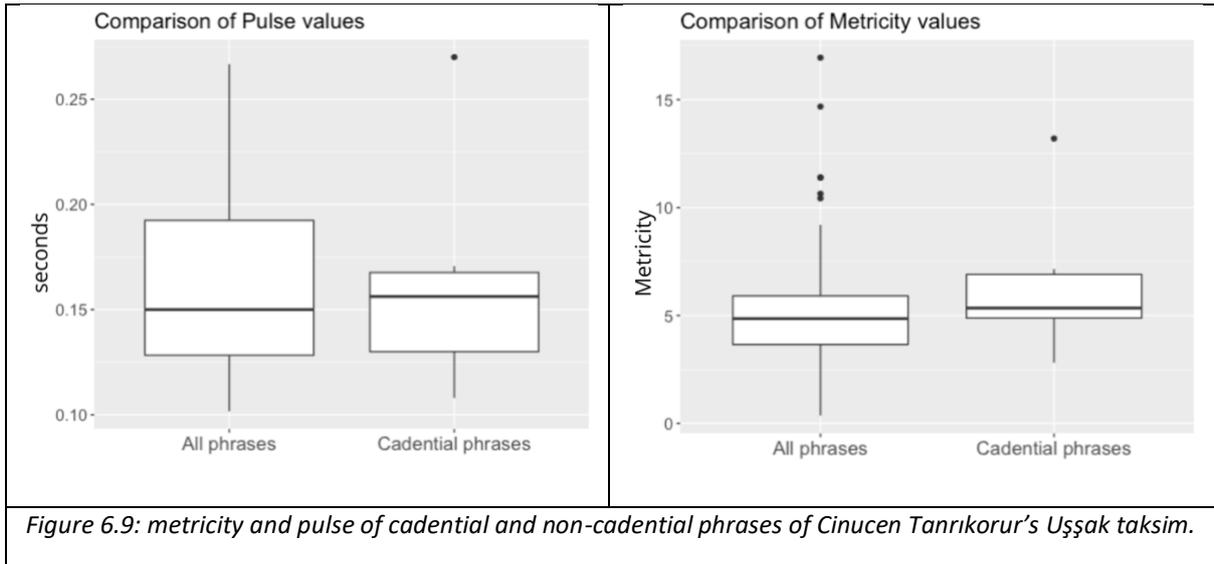
Section **E** begins with an emphasis on the note *çargâh* (C), featuring less metrical phrases and a dispersed pulse profile. This section represents the lowest regularity value of the entire *taksim*. However, this irregularity is disrupted by a peak in metricity in Section **F** (phrase 45), followed by fast phrases around *neva* (D) (phrases 46–47). In Section **G**, Tanrıkorur transitions to more connected phrases with slightly greater regularity. A *ritardando* in pulse (phrases 48–51) is followed by an *accelerando* (phrases 51–56), creating rhythmic intensity as he reaches

the *makam*'s higher register, culminating in a cadential phrase on *çargâh* (phrase 63). Section I features a dispersed pulse profile with increased metricity, presenting a metrical cadential phrase on *rast* (G) (phrase 57). Section J exhibits a *rallentando* within two distinct rhythmic layers: one with a faster pulse (100ms to 175ms, phrases 74, 76, 79, 81, 84) and another with a slower pulse (150ms to 245ms, phrases 75, 77, 80, 82). This dual-layered profile creates a distinct rhythmic ambiguity; although there is an overall sensation of *rallentando*, this movement is masked by the alternation between the layers of rhythm, leading to a cadence on *Uşşak* (B).

In Sections K and L, phrases tend to present slower pulses, with an expressive *accelerando* (phrases 91-94) and dispersed pulses (phrases 95-101) leading to the final cadence (phrase 102) on *dügâh* (A). If, between section E – I, the average metricity increased significantly, this parameter returns to its initial figure by the end of the *taksim*.

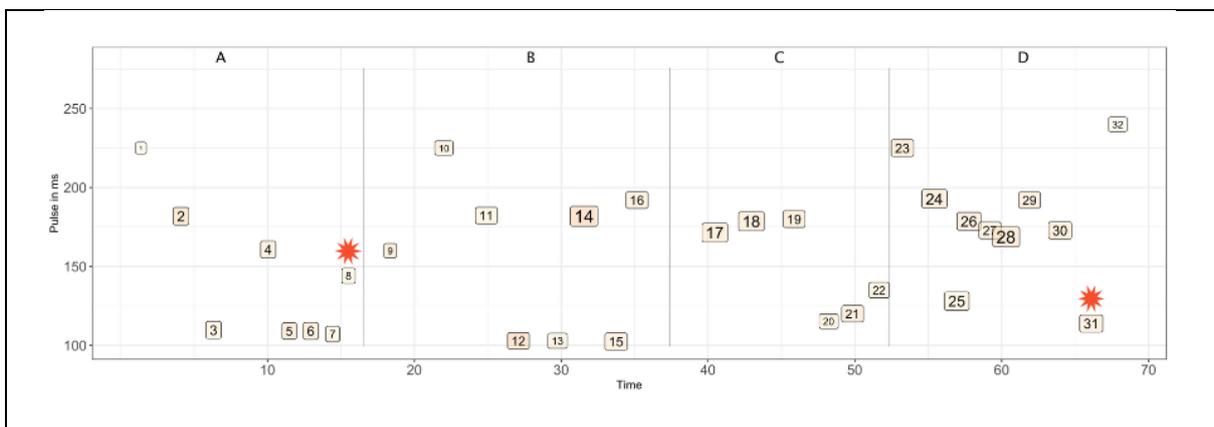
The plots highlight interesting traces of Tanrikorur's *taksim*. The average metricity of the sections is low (average 5.2) and the average pulse is relatively slow (163ms). Moments of higher metricity are often followed by abrupt shifts to less metric phrases (phrases 24-25, 45-46, 72-73, 86-87) or a progressive but quick return to less metric phrases (phrases 27-28, 30, 95-96, 97). The *taksim* also exhibits wave-like patterns of *accelerando* and *ritardando*. These movements vary in clarity, with some being well-defined (e.g., phrases 14–21, 48–56, 56–63) and others less so (e.g., phrases 2–11, 26–41, 74–101). Sections D-E include pulses that are either dispersed or relatively regular.

Cadential phrases display distinct characteristics compared to other phrases within their sections. These differences are context-dependent: for example, phrases 13, 63, and 87 have much faster or slower pulses than the rest of their respective sections. Phrase 86 (end of Section J) exhibits exceptionally high metricity, while phrases 25, 30, and 73 (end of sections C, D, I) show significantly lower metricity. This contrast is meaningful, as cadential phrases signal structural changes in the *seyir* and are often marked by noticeable shifts in rhythmic behaviour.



The analysis presented here suggests that while Tanrıkörür favours using fewer metric phrases, he establishes long-term rhythmic continuity by employing large-scale movements of *accelerando*, *ritardando*, and wave-like patterns. Metricity is used sparingly and is never sustained in a sequence of phrases with consistent pulses. The resulting temporal sensation is therefore very fluid, with little regularity to grasp. However, features described here create a particular type of cohesion: the necessity to be constantly establish contrast in the rhythmic features.

6.3.2 Cinucen Tanrıkörür: Hüseyini taksim



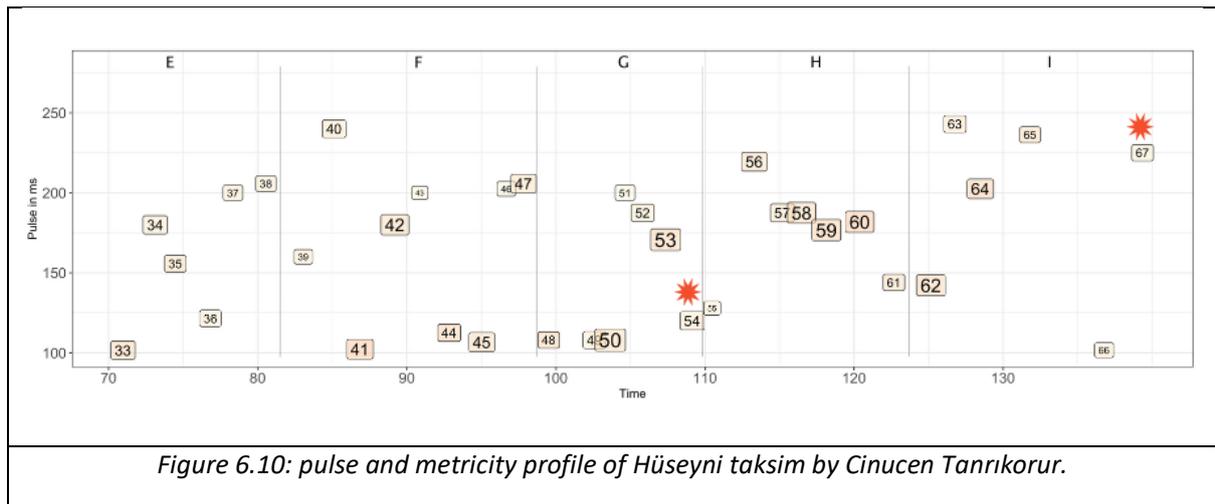


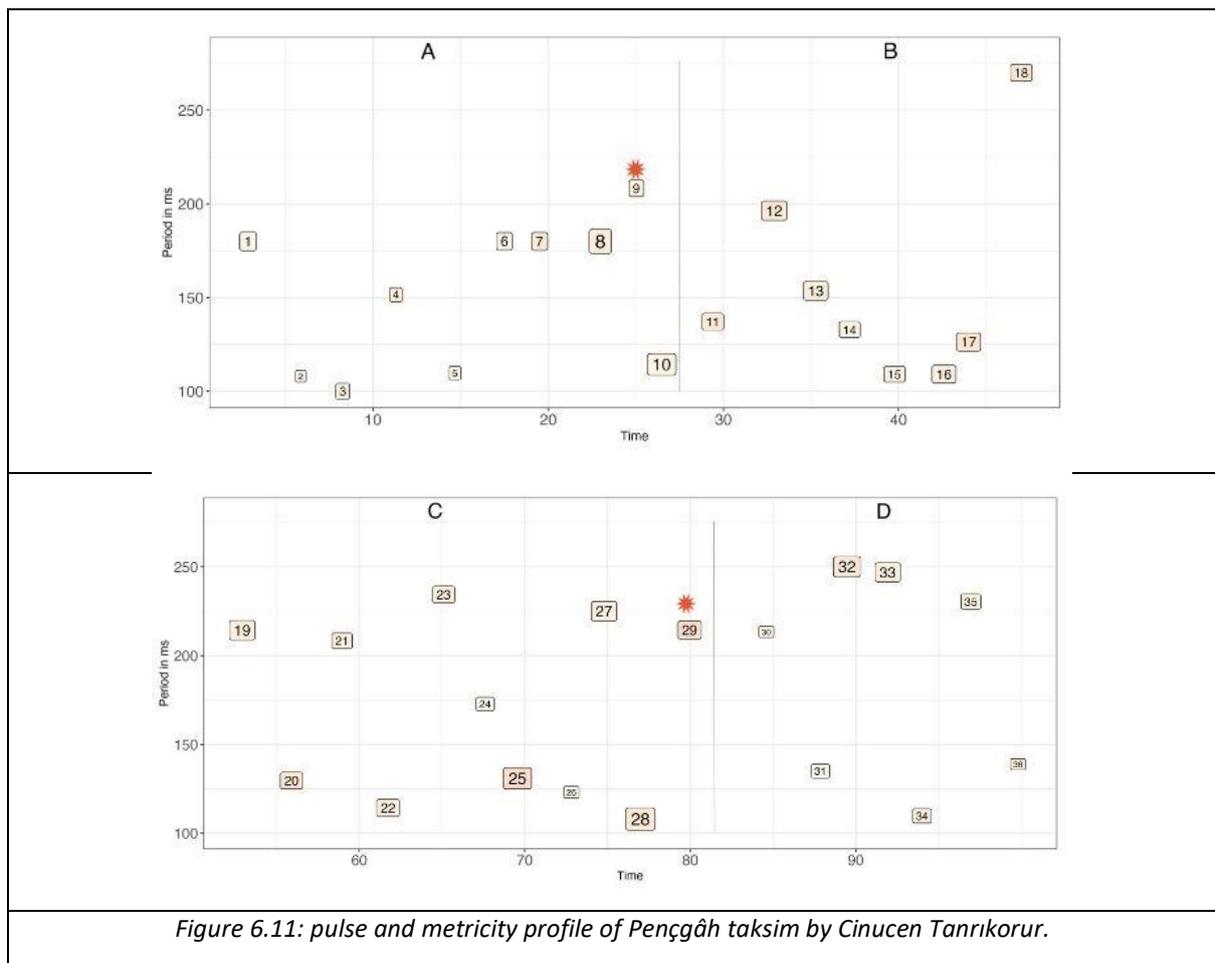
Figure 6.10: pulse and metricity profile of Hüseyini taksim by Cinučen Tanrıkorur.

The *taksim* begins by emphasizing the note *muhayer* (a) in phrases 1-3, but quickly moves towards *huseyni*, the *makam*'s tonic, with a cadence on phrase 8. While the first phrases move from a slow to a fast pulse (phrases 1-3), the subsequent gestures reverse this pattern, transitioning from fast phrases (phrases 3, 5-7) to a slower cadential phrase (phrase 8). In the first section of this *taksim*, Tanrıkorur extensively explores the reiteration of melodic fragments, which are repeated either identically or with rhythmic variations. Phrases 6, 7, 9, 12, 13, 17 and 18 offer clear examples of such repetitions. The initial sections of the *taksim* (A – C) exhibit low metricity and a very fast average tempo, which may be attributed to the melodies being in a high register. Another important feature of these sections is the constant shift between pulses; there are no more than 3 phrases in a similar pulse range. This pattern is interrupted in section D by the introduction of a long and accelerando movement from phrases 23-31, leading to a concluding cadence on *huseyni*, marking the end of the first section of the *taksim*. In Section D, the pulse shifts to a slower average tempo (178ms), and a higher metricity.

In sections E – I, Tanrıkorur alternates between the rhythmic profile of changing tempos seen in A – C and a few long and continuous sections, similarly to what was observed in section D. The pulse becomes significantly slower (except in section G), and metricity increases (with exception of section E). The average pulse follows a broad pattern of moving from fast to slow and from less to more metrical, though this pattern is not highly consistent. Between E and G, many tempo changes are observed, with frequent alternations between slow and fast phrases. These fluctuations create a sense of discontinuity that is resolved when Tanrıkorur

concludes the cadential phrase in phrase 54. The remaining sections **H** and **I** establish a slow pulse. After a long, metrical *accelerando* phrase concluding on *neva* (D) (phrases 56–61), Tanrikorur ends the *taksim* with short phrases separated by silences (phrases 63–67).

6.3.3 Cinucen Tanrikorur: Pençgâh taksim



The *taksim* begins with phrases 1-3 centred on *neva* (D) including the note *hicaz* (C#), which is characteristic of the *Pençgâh* flavour. The note *çargâh* (C) is presented very briefly in phrase 4 but is soon replaced by the *hicaz* (C#) in all phrases up to phrase 22. There is a progressive increase in metricity from phrases 1-8, culminating on the cadential phrase 9 on *neva*. Section **B** continues to emphasise *neva* (D), but primarily in the higher register, between *neva* (D) and *muhayer* (a). An increase in metricity is evident, though the pulses remain dispersed. In

section **C**, Tanrıkorur reaches *gerdaniye* (g) in phrase 19, but soon begins to descend to the lower register, which is more explored in this *taksim*. Metricity continues to increase in this section, while the pulse becomes progressively slower on average, though still dispersed. When Tanrıkorur reintroduces *çargâh* (C) in phrase 22, longer and more metrical phrases emerge (e.g., phrases 25, 28, 29, 32, 33), but these are frequently interrupted by silences or non-metric phrases that disrupt the sense of regularity. Here, the *taksim*'s conclusion is conducted with a higher degree of metricity and slower phrases, bringing a serene atmosphere to its ending.

The *Pençgâh* makam is characterised by the use of *hicaz* (C#) to create the *Pençgâh* flavour on the note *rast* (G), with occasional use of *çargâh* (C) to establish the *Rast* flavour on *rast* (G) (Aydemir, 2010: 38-40). While the *Rast* flavour is typically associated with a grounded and serene mood, *Pençgâh* often evokes an airy and meditative atmosphere. In this *taksim*, it is interesting to compare the metricity and pulse of phrases from both flavours. As illustrated in the plots in figure 6.12, phrases using the *Rast* flavour have more constrained metricity levels, which tend to be slightly less metrical, while presenting a faster pulse compared to those using the *Pençgâh* flavour.

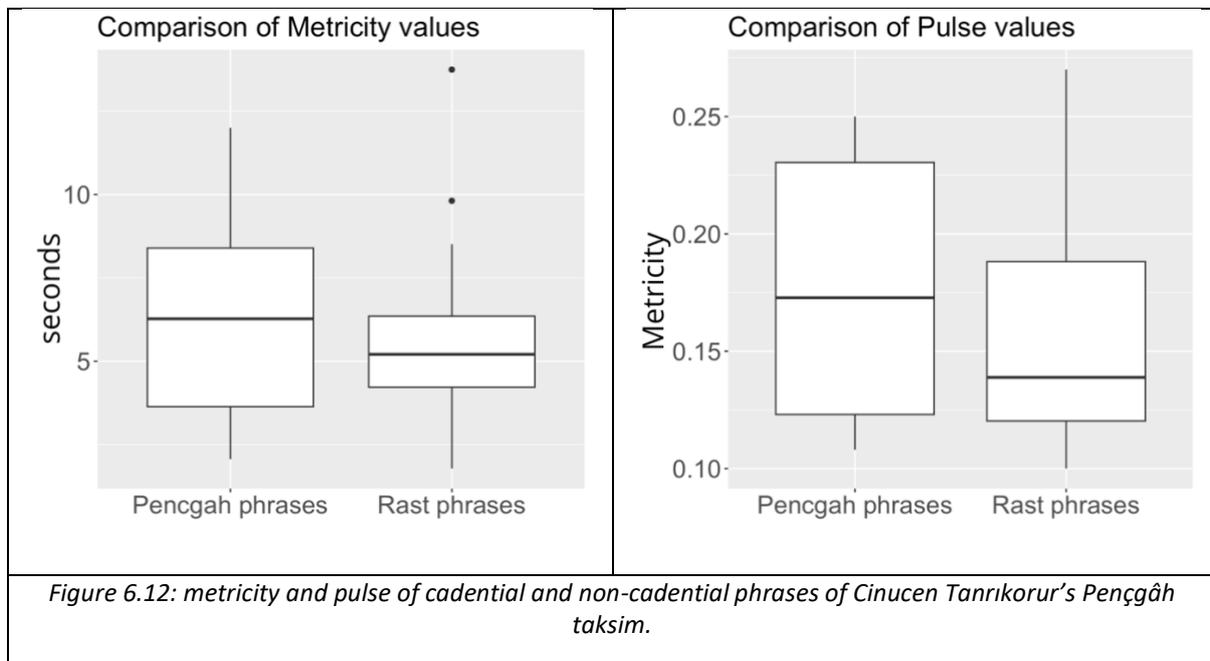
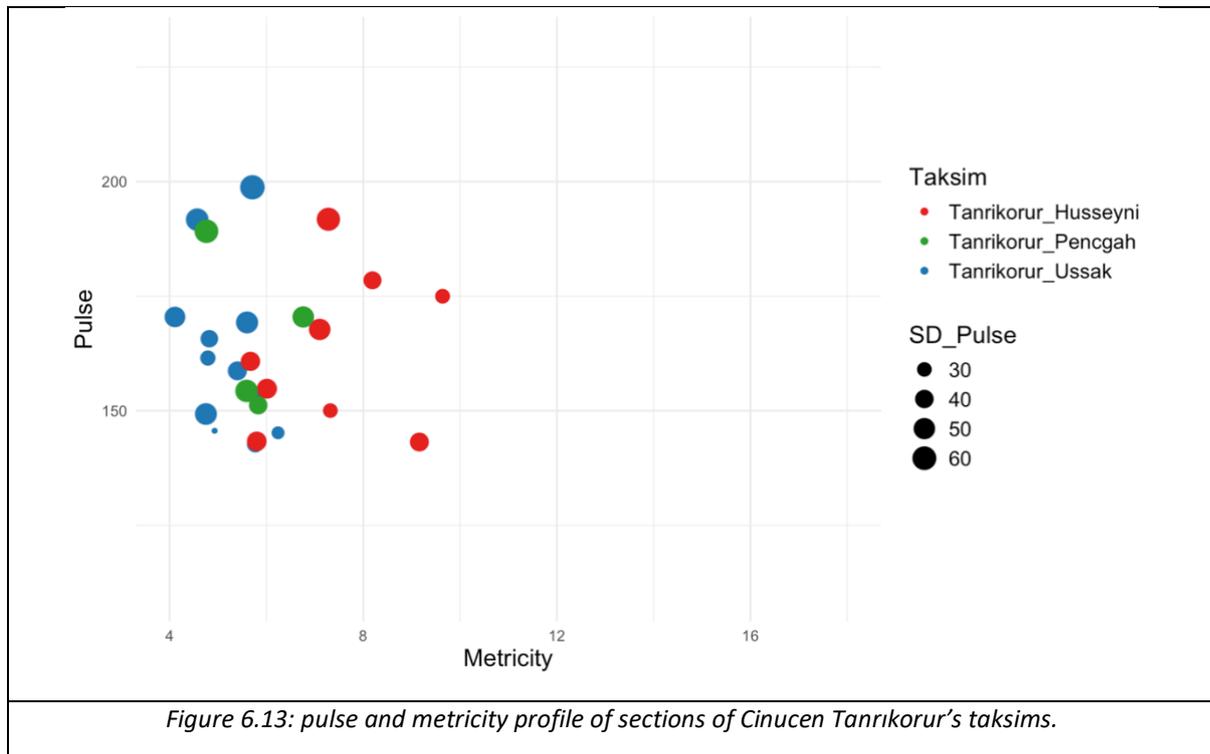


Figure 6.12: metricity and pulse of cadential and non-cadential phrases of Cinucen Tanrıkorur's *Pençgâh taksim*.

6.3.4 Discussion: Cinucen Tanrikorur 's Rhythmic Style



In this section, I have analysed Cinucen Tanrikorur 's *taksims* in the makams *Uşşak*, *Hüseyni*, and *Pençgâh*, focusing on his rhythmic characteristics. Unlike Kadri Şençalar, Tanrikorur's improvisations reflect his grounding in the classical *makam* tradition, with a preference for slower pulses, lower metricity, and intricate ornamentation inspired by the *tanbur* and *baglama*. His improvisations demonstrate distinctive rhythmic behaviours that sharply contrast with Şençalar's more dynamic and metric style.

Across Tanrikorur's *taksims*, the average metricity values are relatively low (5.73 in *Pençgâh Taksim*, 5.30 in *Uşşak Taksim*, 7.35 in *Hüseyni Taksim*), with phrases characterised by frequent shifts in tempo and metricity. Unlike Şençalar, who tends to favour *accelerando* patterns, Tanrikorur employs wave-like movements, alternating between *accelerando* and *rallentando* within and across sections. This rhythmic fluidity creates a sense of temporal flow through intentional contrasts in rhythmic features. These wave-like patterns are most pronounced in the *Uşşak* and *Hüseyni* *taksims*, particularly in sections with transitions between registers or cadential phrases.

Another hallmark of Tanrıkörür's style is his use of *rallentando* in concluding phrases, which lends an 'airy' quality to his improvisations. This is evident across all three *taksims*, where cadential phrases exhibit slower pulses and higher metricity than the surrounding phrases. Often, Tanrıkörür disrupts the continuity of metricity with silences or irregular phrases, reinforcing a serene and reflective atmosphere.

The relationship between pulse and metricity in Tanrıkörür's *taksims* varies significantly depending on the *makam*. In the *Uşşak taksim*, faster pulses are often associated with lower metricity, while slower phrases exhibit greater regularity. In contrast, the *Pençgâh taksim* showcases an intriguing dichotomy: phrases in the *Rast* flavour are more metrical and grounded, whereas phrases in the *Pençgâh* flavour are less metrical and evoke a lighter, more ethereal quality. These findings align with traditional characterisations of the *makams*, suggesting that Tanrıkörür's rhythmic approach is deeply intertwined with the expressive qualities of each *makam*.

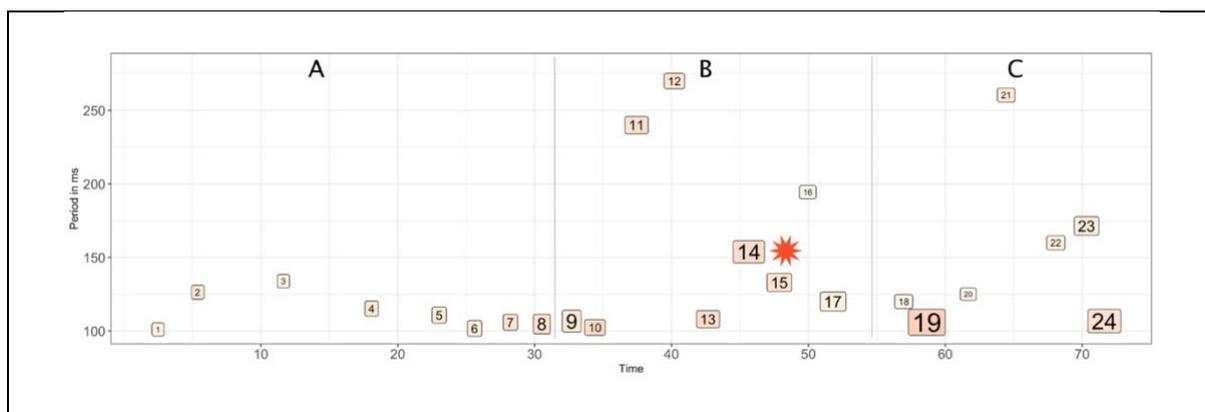
In conclusion, Tanrıkörür's improvisations reveal a rhythmic language that prioritises fluidity, contrast, and ornamentation over metrical regularity. His use of wave-like rhythmic structures, *rallentando* cadences, and *makam*-specific behaviours highlights what could be considered as a mastery in the classical *makam*. These findings provide a contrasting framework to Şençalar's style and establish a basis for further comparative studies on rhythmic characteristics in *makam* improvisation.

6.4 Yorgo Bacanos

Yorgo Bacanos (1900–1977) was an oud player renowned for his exceptional technical proficiency. Born into a musically affluent family in Istanbul, he developed his career in the city and became an enormous influence for oud players of his time and subsequent generations. Yahya (2002: 2) describes Bacanos’s playing style as ‘loud, lively, rhythmic and with rapid plectrum strokes’. The musician is particularly praised for his remarkable right-hand technique, which produces bright and dynamic sounds.

Bacanos occupies a unique position in the *makam* tradition. While his playing style aligns him with the ‘taverna’ or ‘street’ tradition, he is also highly regarded by musicians specialising in the more ‘classical’ iteration of the modal system. This dual appeal is likely due to his extensive knowledge of *makam*, which allowed him to bridge stylistic boundaries and appeal to a broad spectrum of audiences and performers.

6.4.1 Yorgo Bacanos – Rast taksim



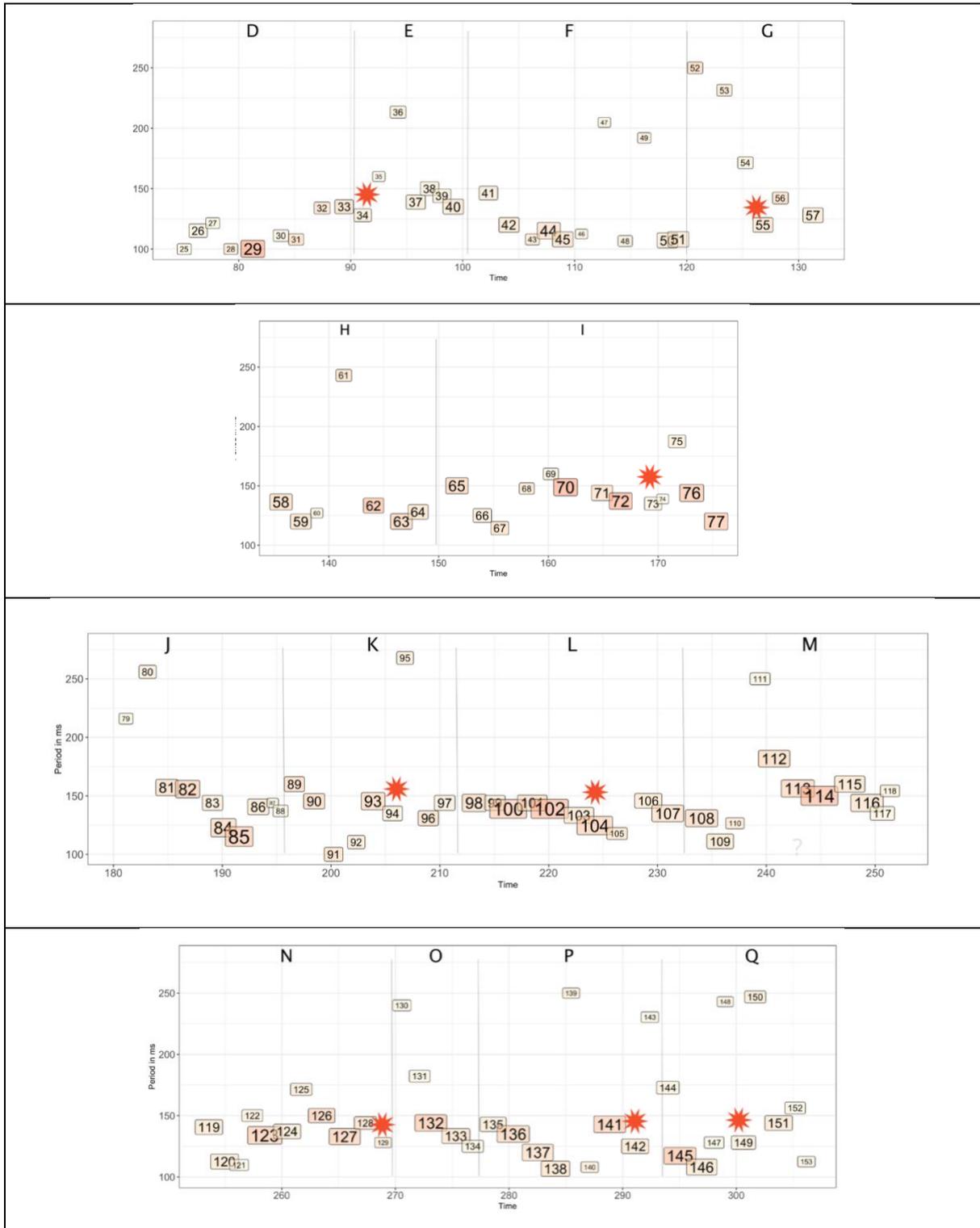


Figure 6.14: pulse and metricity profile of Rast taksim by Yorgo Bacanos.

The *taksim* begins with the repetition of the note *rast* (G), establishing the tonic of the *makam* (phrases 1-2). Bacanos then progresses with increasingly longer and more metric phrases from phrases 3-14, presenting the first cadential phrase on *rast* (G) in phrase 15. From phrases 18-31, the musician introduces phrases with very fast pulse (100–140ms) and with significant

contrast in metricity. In these sections, he gradually ascends to the high register of the *makam*, resting on *neva* (D) and progressively increasing the metricity of the phrases. He briefly touches *gerdaniye* (g) in phrases 41–43 before quickly returning to the lower register of the *makam* to conclude the first part of the *taksim* with a cadential phrase on *rast* (phrase 55). Notably, it is only toward the conclusion of this section that slower phrases emerge (phrases 47, 49, 52–54), and metricity slightly decreases.

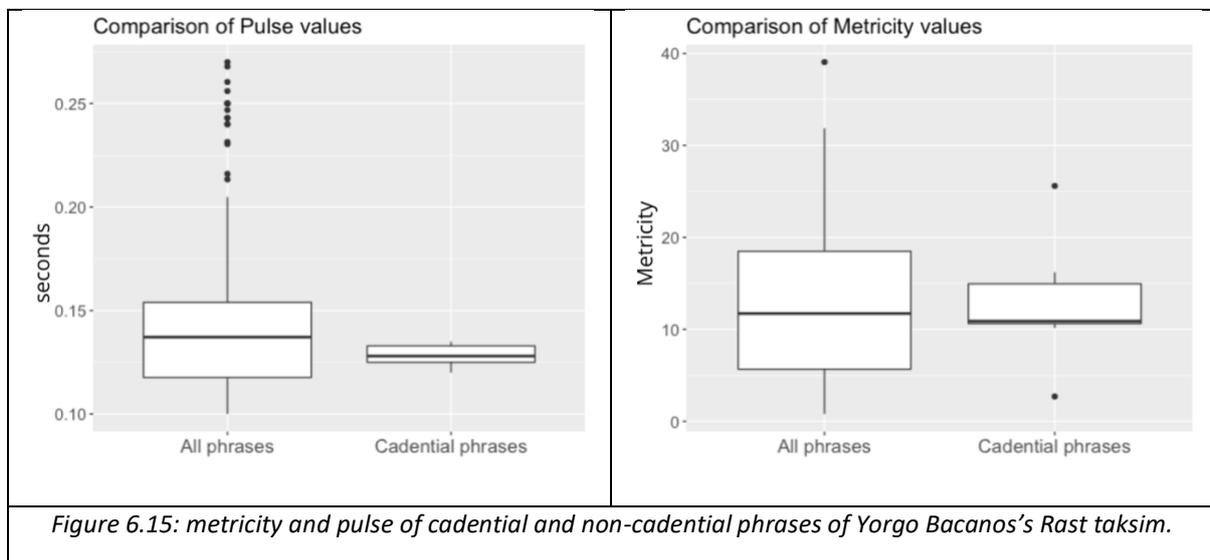
In sections **H – I**, Bacanos transitions to the high register, with phrases centred around *gerdaniye* (g). Here, the metricity increases significantly, and phrases' pulses stabilise around 140-150ms, with occasional *accelerando* gestures. This pattern continues in sections **J – L**, where Bacanos remains in the high register with phrases centred on *tiz segâh* (b) (phrases 78-86), subsequently modulating to *Segâh* (phrases 90-97) and to *Hicazcâr* (phrases 98-107). These segments are characterised by highly metric phrases, with either consistent pulse (phrases 97-102) or *accelerando*-like patterns (phrases 82-85, 102-104, 106-109). From phrases 108–110, Bacanos returns to *gerdaniye* (g) as an intermediate step before modulating to an *Uşşak flavour* on *neva* (D) in phrases 112–123. In section **M**, the modulation to *Uşşak* is accompanied by a slower pulse (phrases 112–115), though it remains highly metric. Section **N** resumes very fast pulses with highly metric phrases (phrases 123, 127), surrounded by less metric ones, as Bacanos transitions back to the lower register, concluding with a cadence on *neva* (D) in phrase 129.

Bacanos continues sections **O** and **P** with several *accelerando* patterns (phrases 130-134, 135-138, 143-146), all of them composed by one very metric phrase and several less metric ones, with a cadence on *dügâh* (A) in phrase 142. Concluding the *taksim* in section **Q**, the musicians reintroduce fewer metric phrases, some at a slower tempo. Here, the pulses become more varied, and there is a sense of relaxation which follow the concluding cadence on *rast* (G) in phrase 149.

The overall average pulse of phrases in this *taksim* (141ms) is significantly faster than those observed in other *taksim* studied here. While Bacanos is celebrated for his virtuosity, it is important to consider that older recordings were often distorted during analogue mastering, affecting pitch and speed. Consequently, the *taksim* may not have been performed at this

tempo. Nevertheless, regardless of its original performance speed, the recording has profoundly influenced generations of musicians, making it logical to study this piece as it is publicly available.

Bacanos's use of cadential phrases is particularly noteworthy. Compared to Tanrıkorur and Şençalar, his cadences are more distinct from non-cadential phrases, making it easier for an experienced listener to identify them. For instance, Bacanos's cadences exhibit remarkably consistent pulse, as shown in the figure below. The metricity of cadential phrases aligns with the range of the rest of the phrases but tends towards higher metricity, similarly to patterns observed in other improvisations.



Tanrikorur and Bacanos: discussion

Observing *taksims* from these two musicians allows for a clear visualisation of how contrasting styles can be analysed using the methodology described here. Figure 6.16 compares the pulse and metricity of sections from the two musicians, demonstrating that the pulse of most sections in their *taksims* falls within similar ranges. However, there are notable outliers: Tanrikorur's *taksims* include sections with much slower pulse while Bacano's *taksim* features sections with significantly faster tempos. Metricity, on the other hand, behaves in contrasting ways. Tanrikorur's sections are mostly contained within a narrow, non-metrical range, whereas Bacanos's sections are more metrical and exhibit a wider range of metricity.

Interestingly, Tanrikorur's most metrical *taksim* is in *makam Hüseyini*, a *makam* important within the 'classical' tradition but also strongly associated with dances and the 'folk' tradition. Tanrikorur's pulse profile follows a remarkably consistent pattern of alternating faster and slower pulse sections, while its metricity is quite stable, with only a slight increase in the middle section. Bacanos's sections, by contrast, present a broader range of pulses until section **H**, after which the pulses settle around 150ms. Notably, Bacanos's metricity range is very wide, with a peak of metricity around the middle sections.

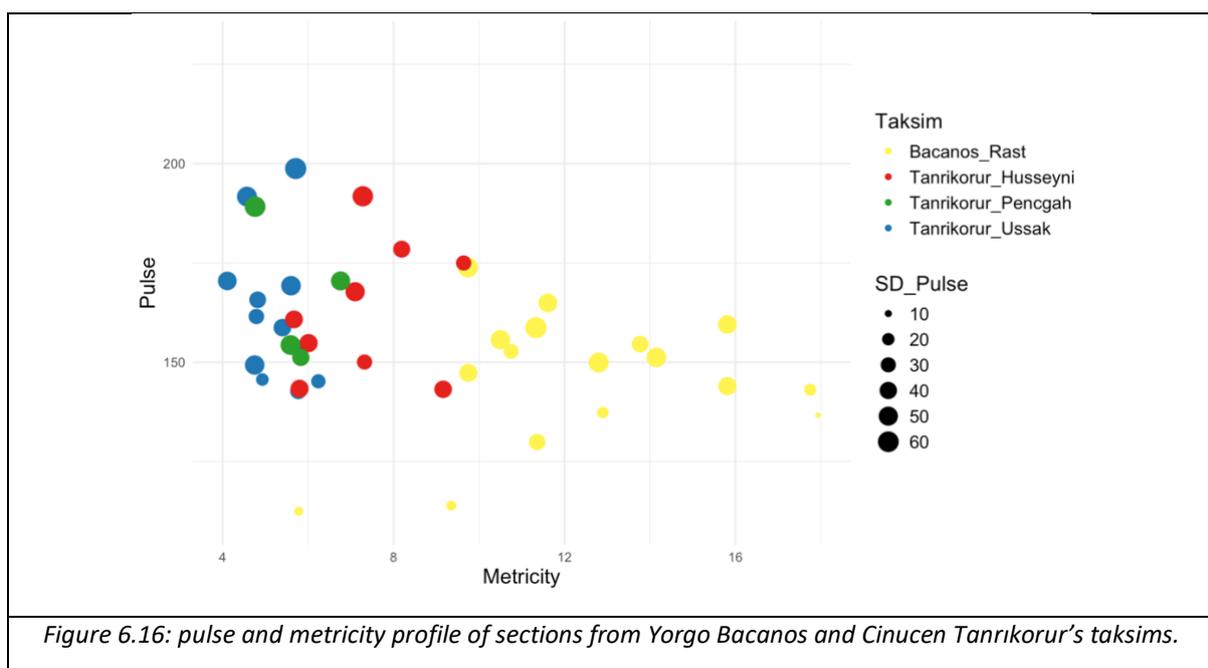


Figure 6.16: pulse and metricity profile of sections from Yorgo Bacanos and Cinucen Tanrikorur's *taksims*.

6.5 Conclusion: Comparing Şençalar, Bacanos and Tanrıkorur's *taksims*: the 'taverna style' and the 'art style'

During fieldwork, I observed that discussing rhythm in *taksim* with musicians was often challenging. In some cases, it was clear that it was a topic which they were not used to discussing, and conversations would shift to personal anecdotes or typical characteristics of the *makam* in question. Other musicians embraced the discussion and attempted to categorise how different masters approached rhythm within *taksim*. A recurring theme in these discussions was the distinction between two styles of improvisation: the 'taverna style' and the 'art style' or 'classical style'. Having explored *taksims* identified within these two styles in this chapter, and briefly covering these concepts for clarity, it is worth exploring further these distinctions.

As previously mentioned, the taverna style refers to a type of improvisation typically found in festive environments. As many of these settings often served alcohol, non-Muslim musicians frequently worked and performed in these spaces. Consequently, this style is strongly associated with minority communities within the Ottoman Empire, particularly Greeks, Armenians, and Roma. Yorgo Bacanos, a Greek musician from Istanbul, is a quintessential representative of this style. Şençalar presents an interesting case; although a Turkish Muslim, he was known for accompanying prominent singers and performing solo in Istanbul casinos in the 'taverna style' of *taksim*. According to Baloğlu (2022: 1835), Şençalar's involvement in these events may have affected his reputation, which may explain why he is less celebrated than some of his contemporaries.

Both Şençalar and Bacanos performed in the 'taverna style', offering opportunities to discuss their rhythmic similarities and differences. Besides their shared preference for more metrical phrasing, both musicians often use successive phrases with similar pulses or phrases that vary through *accelerando*. Another shared trait is the continual variation in metricity levels between phrases. While Bacanos shows a preference for faster phrases and demonstrates

significant variation in pulse and metricity across sections, Şençalar's taksims are more consistent in these parameters, though they make extensive use of accelerandos.

Tanrıkörur, on the other hand, embodies the opposite end of the spectrum: the 'art' or 'classical' style. Coming from an academic background, he most often performs in concert halls and settings where the audience listen in contemplation and silence. *Taksims* in this style are often described by musicians as 'freer', 'airy' or 'floating'. As the analyses suggest, qualities such as metricity and stable pulses are less prevalent in this context.

While discussing these points, Voulgaris emphasised the importance of the context in which these musicians performed:

If you listen to [Tanrıkörur's] taksims (...), you will see that he plays so much with the glissando, with the sounds, and this can happen because of microphones and studios. Bacanos had his style, but this comes from playing all the time in tavernas without amplification, so he has to go beyond the limits of the instrument. (...) To communicate, [Bacanos] needs many and very strong attacks, to increase the presence. This is not something that he decided, it is something imposed on him. (Voulgaris, 2024. Personal communication).

The analyses presented here indicate that the rhythmic characteristics generally attributed to Bacanos, Şençalar, and Tanrıkörur align with the observations made using the methodology proposed in this study. Notably, Bacanos and Şençalar employ more regularity and consistent pulses, while Tanrıkörur's phrases are less regular. Although this supports the methodology's effectiveness in identifying key rhythmic features, the broader framework reveals more intriguing insights. In Tanrıkörur's improvisations, metric phrases are used sparingly, often to reinforce target notes in cadences, before quickly shifting back to less regular phrases. His phrases exhibit wide pulse fluctuations, with fewer abrupt transitions and several wave-like movements, suggesting a sense of continuity between pulses.

In contrast, Şençalar and Bacanos make extensive use of metric phrases. Although they use phrases with similar pulses, these often take the form of accelerandos, with fewer rallentandos compared to Tanrıkorur’s *taksims*. Consequently, there are more abrupt shifts in pulse, moving between very fast and very slow. One reason this approach works well in their *taksims* may be the high level of metricity in their phrasing.

Kadri Şençalar	Yorgo Bacanos	Cinucen Tanrıkorur
<i>Metricity: High, with mid-section peaks</i>	<i>Metricity: Very high, with high fluctuation</i>	<i>Metricity: Low, with high fluctuation</i>
<i>Pulse: Stable, with several accelerandos</i>	<i>Pulse: Very fast, potentially distorted due to recording</i>	<i>Pulse: Wide fluctuation, with fewer sudden jumps</i>
<i>Cadential Phrases: Faster pulses, varying metricity</i>	<i>Cadential Phrases: Remarkably consistent pulse</i>	<i>Cadential Phrases: High metricity, varying pulse</i>
<i>Table 6.1: comparison between rhythmical features from Şençalar, Bacanos and Tanrıkorur.</i>		

Figure 6.17 combines the metricity and pulse data from the *taksims* analysed. It shows that Şençalar’s improvisations lean toward metricity, generally positioned between the non-metrical style of Tanrıkorur and the highly metrical style of Bacanos. The regression line’s slope indicates a general trend: as the section’s pulse increases in speed, so does the level of metricity. The standard deviation of pulse also varies significantly across all *taksims*, with Tanrıkorur’s improvisation being the only one with few sections showing a very small standard deviation.

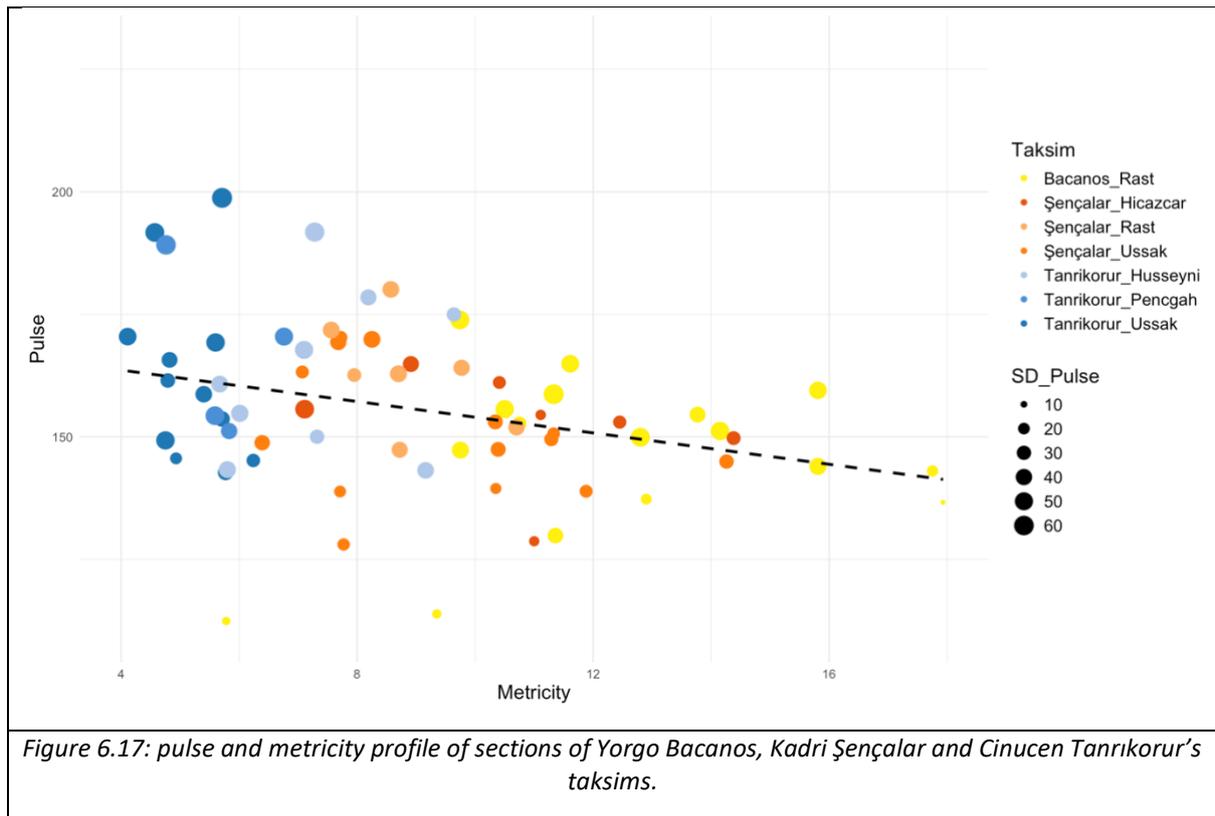


Figure 6.17: pulse and metricity profile of sections of Yorgo Bacanos, Kadri Şençalar and Cinucen Tanrikorur's taksims.

This chapter has demonstrated that the rhythmic characteristics associated with two *taksim* styles—the ‘taverna’ and the ‘art’ style—are detectable using the analytical tools developed in this research. By prioritising a quantitative approach, I have focused on broad trends and statistical patterns, enabling a comparison of metricity and pulse across a wide range of phrases and styles. This approach has proven effective in identifying rhythmic tendencies and establishing baseline values for different improvisational traditions. However, the reliance on large-scale features comes at the cost of neglecting smaller, nuanced details in phrasing.

The analysis presented in Chapter 5 highlights the importance of such details. For instance, that chapter examined individual phrases and melodic gestures, identifying subtle variations in timing and the interplay between melodic and rhythmic elements. These micro-level observations revealed musician’s use rhythmal gestures to emphasise certain notes and maintain a sense of regularity while, simultaneously, disrupting the sensation of pulse or metricity. Such details cannot be observed using quantitative approaches, which favour aggregate trends over moment-to-moment variability.

A dual perspective, combining large-scale analysis for establishing stylistic trends and small-scale analysis for exploring the richness of individual phrases will be explored in Chapter 7. By integrating these methods, I aim to refine the analytical tools further and demonstrate their applicability in understanding rhythm in *taksim*.

Chapter 7: Observing contemporary Oud Players

*We shall not cease from exploration, and the end of all our
exploring will be to arrive where we started
and know the place for the first time*

T. S. Eliot, Little Gidding.

7.1 Introduction

Having examined the rhythmic features of 20th century oud masters in Chapter 6, this chapter shifts its focus to the use of rhythm by contemporary oud players. Previously, the analysis characterised two distinct styles of *taksim* – ‘classical’ and ‘taverna’ – and identified empirical values for pulse and metricity associated with each style based on collected data. Although different *taksims* by the same musician could reveal distinct characteristics, the analyses provided information which demonstrated a clear association between the musicians and specific styles of *taksim*, a finding corroborated by discussions with practitioners.

However, unlike the early masters, who predominantly learned their instruments through the traditional *mesk* system, the Greek musicians studied in this chapter belong to a generation shaped by multiple musical influences and varied learning methods⁸³. While many of them took lessons from important masters in Istanbul at different stages of their lives, their learning processes involved a greater sense of agency in selecting their musical influences compared to musicians that learned through the *mesk* system. This agency was often expressed through their choices of recordings to study⁸⁴.

⁸³ For more information regarding the learning trajectory of Greek musicians belonging to this generation, see Kallimopoulou, 2016.

⁸⁴ Listening to existing *taksim* improvisations is also a part of the process of learning within the *mesk* system. However, within the *mesk*, the master is responsible for selecting the recordings which will be studied by the musicians. Here, the musicians are choosing themselves the references to be studied, and this process is not necessarily accompanied by a master.

Papadimitrakis exemplifies a learning process that, although not universal, is shared among musicians:

To be honest, I didn't have a specific method, I was just listening to musicians that I liked and trying to copy [them]. And of course, I was listening a lot. And even if I didn't try to copy phrase by phrase, ornament by ornament, because in my early years, it was just not possible, I was [still] trying to catch how an ornament is made. (...) I was just listening to more modern players or let's say classical *makam* with Bacanos. And I felt like even if I put the CD and I listened to it, then, when I was picking up the oud, the memory of the style was affecting my playing. And for sure, when I reached a certain level after some years, then I did go copy some *taksims* of Bacanos, or Ara Dinkjan, or of Socrates [Sinopoulos].

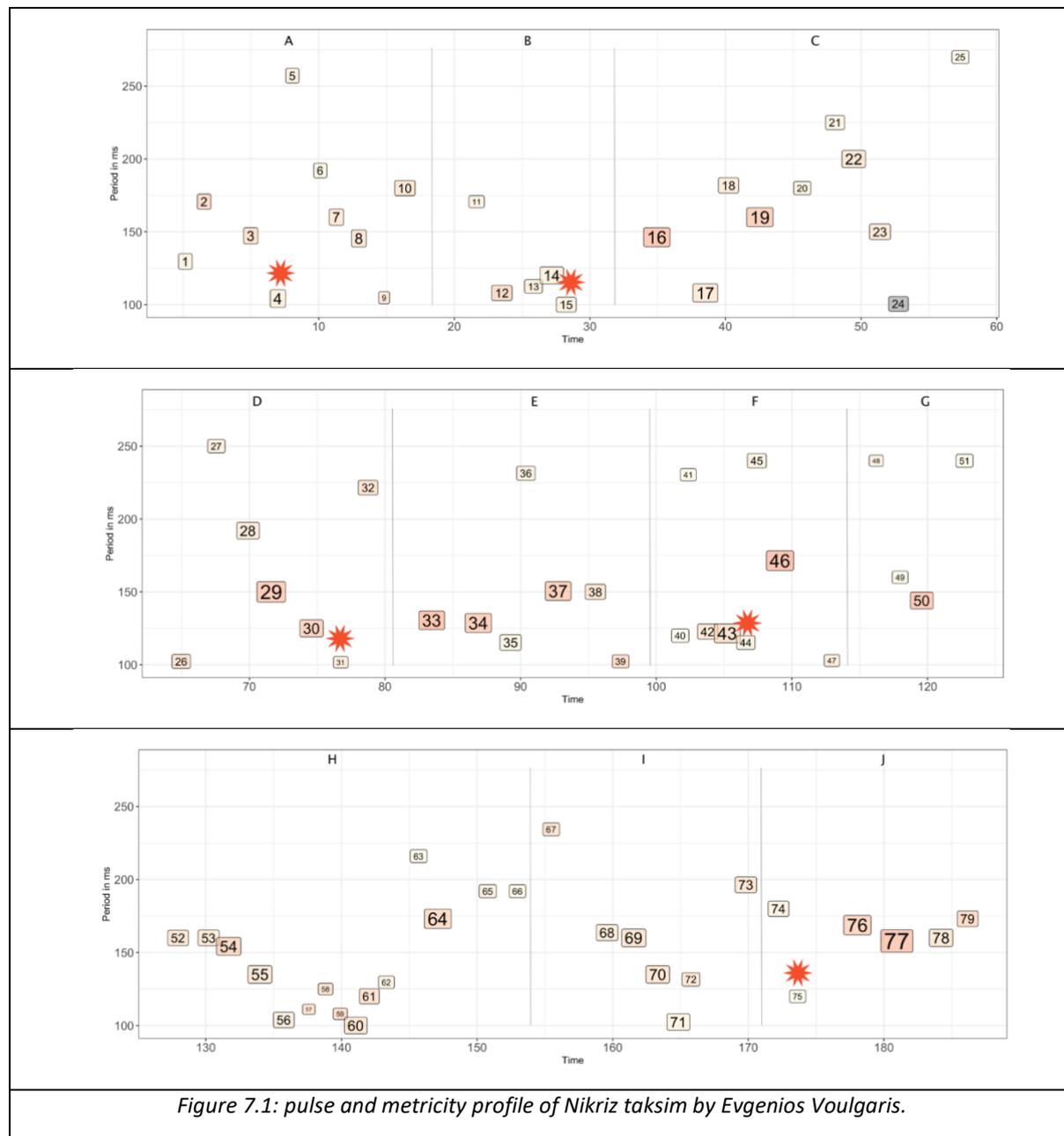
Perhaps as a consequence of such diverse learning trajectories, these musicians' knowledge is typically not confined to a single genre or style of performance. For instance, Evgenios Voulgaris is an expert in the *makam* system but also teaches, records, and composes extensively within the *rebetiko* repertoire. Similarly, Kyriacos Tapakis and Alexandros Papadimitrakis possess extensive knowledge of the oud and *makam* but also master other string instruments and genres associated with traditional Greek music. This versatility could be considered a defining trait of this group of musicians, whose expertise integrate diverse aspects of *makam* and Greek traditional music.

To illustrate the diversity of their *taksims*, I have selected performances from various contexts, including field recordings and publicly available materials. These recordings were chosen to showcase the musicians performing in different environments: formal concerts, presentations in tavernas, teaching sessions, and demonstrations in the workshop of instrument builders. As described by musicians in Chapter 3, the characteristics of a *taksim* are highly dependent on the context in which it is performed, and these contextual differences will be explored in this section.

In addition to examining metricity and pulse profiles, this chapter reintroduces the small-scale analytical elements discussed in Chapter 5. Observing rhythmic subtleties present in phrases will contribute to understanding different ways in which notes are reinforced, especially around cadential moments. By integrating these micro-level observations with the broader trends established earlier, this chapter aims to provide a comprehensive understanding of contemporary *taksim* practices and demonstrate the applicability of the analytical methodology developed in this dissertation.

7.2 Evgenios Voulgaris

7.2.1 Evgenios Voulgaris: *Nikriz Taksim*



This *taksim* was selected from a video recording of a concert at the venue ‘The Princess’. The ensemble in the ‘cafe aman’⁸⁵ style, presenting songs typical of tavernas from the late 19th

⁸⁵ ‘Cafe Aman’ references the music from Greek inhabitants of the minor Asia, which moved to what is now Greece in the early 20th Century. Musically, it could be fitted within a subcategory of a ‘Taverna Style’. For more information on ‘Café Aman’, see Pine & Konidari, 2023.

and early 20th centuries. In such settings, it is common for the environment to be noisy, with people talking, drinking and not entirely focused on the music. Here, *taksims* are usually performed either unaccompanied, as an introduction to the next composition, or in the middle of the song, with rhythmic and short melodic accompaniment for the solo. It is noteworthy that this repertoire does not typically feature oud *taksims*; the bouzouki or kanun are more commonly the main plucked string instruments. Therefore, it is unsurprising that the *taksim* in question does not conform to a typical presentation of the *makam Nikriz*. While Voulgaris' melodic development extends beyond the expected range of the *makam*, the main aesthetic features of *Nikriz* are present, leaving no doubts about the musician's intentions with the improvisation.

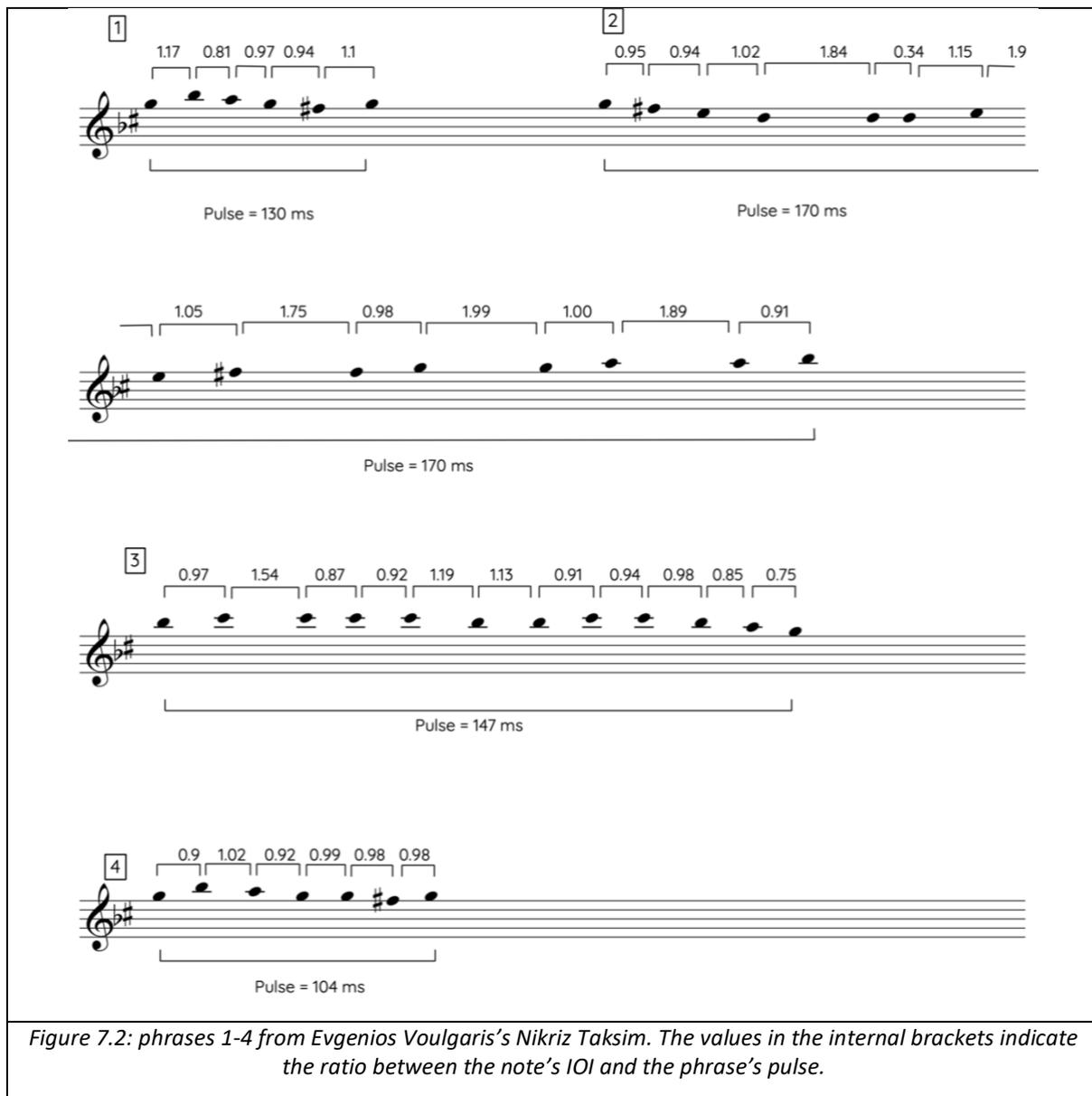
Representing a type of 'taverna' style, this *taksim* can be stylistically compared to those of Şençalar and Bacanos. While not a perfect comparison due to the distinct characteristics of the contemporary Greek taverna style influenced by the *bouzouki*⁸⁶, some resemblances emerge. The regularity averages are very similar, with several groups of phrases featuring accelerandos ranging from slow to very fast pulses (phrases 5-9, 21-24, 27-31, 67-71). Unlike Şençalar, Voulgaris' phrases demonstrate a wider range of pulse, and it is not easy to identify a single region of pulse where most phrases cluster, as observed with the 20th century master. This may be explained by the influence of the bouzouki style, known for its long accelerando and rallentando.

Most phrases with high metricity generally exhibit a pulse between 130ms-180ms, while 'extreme' pulses tend to be less metrical. This is particularly interesting in phrases 56-62, where the musician reaches the highest notes of the improvisation and the fastest (though quite non-metrical) pulses.

Melodically, the first three sections (**A**, **B**, **C**) are centred on reinforcing the note *gerdaniye* (g). In section **A**, Voulgaris presents three gestures: two groups of phrases (1-4, 5-9) and one concluding phrase (10) arriving on the target note. In the first segment, metricity increases from 9.8 in phrase 1 to 16.2 in phrase 4, while the phrases' pulses are scattered, starting from

⁸⁶ For more information on the relationship between the *bouzouki* and makam music, see Pennanen, 2004.

130ms in phrase 1 and concluding in 100ms in phrase 4. Here, a melodic motif is introduced in phrase 1 and reappears in phrase 4 on a faster pace and with the addition of a repeated note, after a long sequence ranging from *neva* (D) to *tiz hicaz* (c#) (phrases 2 and 3).



Different rhythmic features are present in this section. The acceleration of phrase pulses from (phrases 2-4) and the increase of metricity (phrases 1-4) produce an overall feeling of rhythmic intensification. Simultaneously, the reiteration of a similar motif in phrases 1 and 4 evokes the return of an element which was previously observed, bringing an assertive sensation that the *gerdaniye* (g) is established as the centre of the phrases. The second part of section **A** (phrases 5-10) returns in a similar fashion: from phrase 5-9, Voulgaris presents a

long *accelerando* spanning from *rast* (G) to *gerdaniye* (g), only to repeat the same gesture on a single, more metrical phrase in phrase 10. Once again, we observe the repetition of a similar melodic gesture, but now with very different rhythmical characteristics – that is, one enlarged exposition (phrases 5-9), and a very compressed one (phrase 10). The three gestures (phrases 1-4, phrases 5-9 and phrase 10) have the same melodic target of *gerdaniye* (g), but each one uses rhythm in a very different fashion, demonstrating how rhythm can be used to create variations over a unique melodic idea by reinforcing the target note.

Sections **B** and **C** feature a wide range of metricity and pulses. The section alternates between phrases centred in *muhayer* (a) in phrases 11-15 and *tiz hicaz* (c#) in phrases 16-25. Here, there is a clear contrast between phrases with high metricity (16, 17, 19, 22) and low metricity (9, 11, 20, 21, 25). The pulse of phrases also varies significantly; section **A** presents groups of *accelerandos* (2-4, 5-9), section **B** contains very fast pulse phrases, and section **C** includes a spread-out *rallentando*-like (17-21) and an *accelerando* (21-24).

From sections **D** to **G**, the *taksim* ascends to the highest register of the *makam* system, with phrases centred on the *tiz neva* (d) between 26-39, *tiz gerganye* (g') between 40-47 and *tiz muhayer* (a') between 48-51. In this section Voulgaris often employs phrases with a fast pulse, which can be short and less metrical (phrases 31, 40, 47, 56-59) or longer and more metrical (phrases 33, 34, 43, 60, 61). In this section, Voulgaris often employs single less metrical phrases with a slow pulse, potentially with the aim of disrupting the continuity of the relatively steady pulse of the fast phrases (phrases 32, 36, 41, 45, 48, 51).

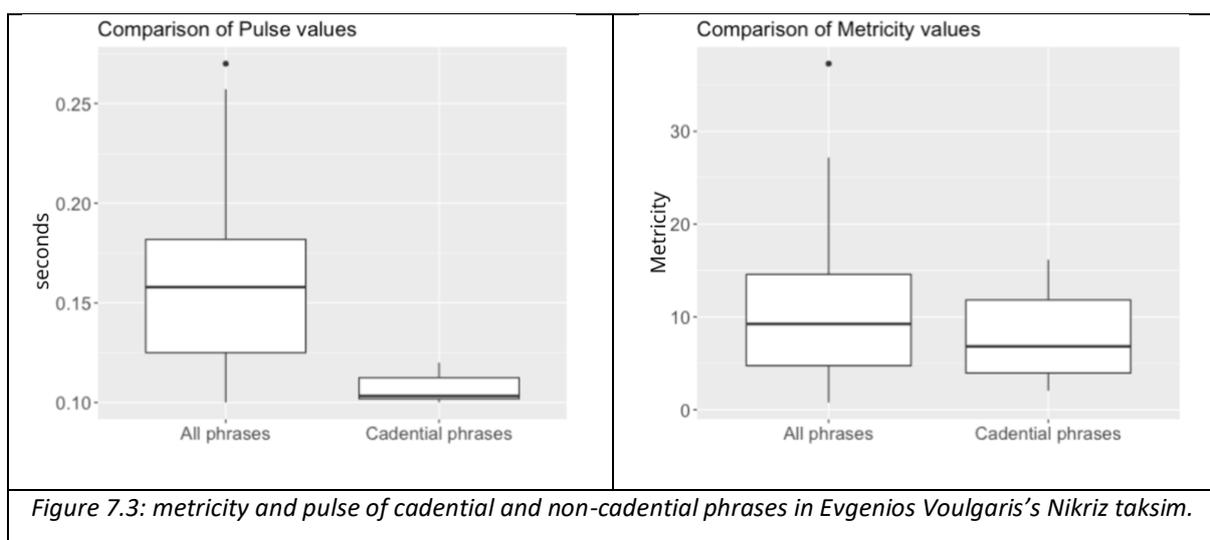
Section **H** consolidates the divergence from a standard presentation of *Nikriz*, as the musician moves into octave higher than *tiz neva* (d'⁸⁷). Even though these high notes are uncommon in a classical rendition of a *makam*, such features are often found in the bouzouki style. Voulgaris explained that this type of performance, aiming the very high and explosive nature of the improvisation, is derived from the singing practices of the 1930s, where amplification was not used in the environment.

⁸⁷ There is no name for this note in the *makam* terminology.

The way a singer would be hired would be like this: the owner [of the taverna] would tell the singer: ‘Sing a song, I will get out, close the door of the taverna and go two blocks away. If I can still hear you, you have the job’. And you had to do this, otherwise you don’t exist sound wise. We are talking about places where either you have the power to demonstrate this, or it doesn’t work. (Voulgaris, personal communication, 2024)

The use of the extreme registers, required by the technical limitations from the origins of the cafe *aman* style, influenced instruments such as the oud. Rhythmically, sections **H** and **I** (the ones in which the high register is present) present phrases which move between a mid-speed pulse (52-55), very fast pulse (56-62), mid-slow pulse (63-69) and a scattered profile (70-73). The region with the higher register coincides with the fastest pulse section (56-62), which has little metricity, an unusual combination. After almost three minutes of constant changes between different levels of pulse and metricity, section **J** concludes the *taksim* by establishing a steady tempo around 150ms, with metrical phrases leading to the next composition.

Cadential phrases have an interesting profile; their metricity is not significantly different from non-cadential phrases, but, on average, slightly less metrical. However, the pulse of cadential phrases is significantly faster than of non-cadential phrases.



Overall, several noteworthy elements can be observed in this improvisation. Previously documented characteristics, such as the use of long accelerandos transitioning from very slow to very fast, are evident here. The pulse profile exhibits fewer sudden jumps and is more akin to the profiles observed from Bacanos and Şençalar, contrasting with Tanrıkorur's improvisations. Unlike the previous musicians, Voulgaris employs irregular phrases at a fast tempo and presents a larger contrast between metrical and non-metrical phrases, as well as in the pulse of the phrase. These features are particularly apparent when comparing the standard deviations of metricity and pulse among the different musicians. Ending the *taksim* in a more metrical fashion is logical, given that it is followed by a rhythmically regular piece.

While discussing the nature of this improvisation with Voulgaris, it was possible to gain insights relative to his state of mind in the moment of the performance.

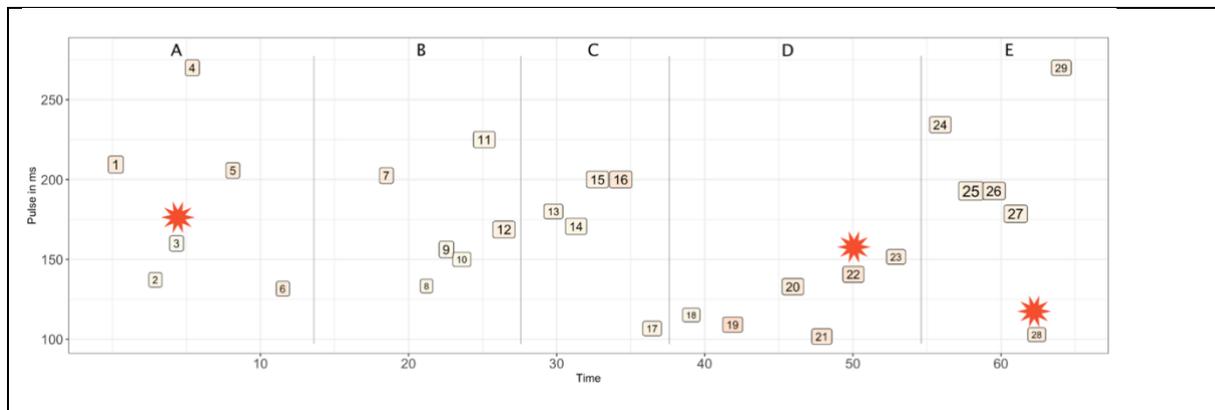
I hear this [*taksim*] and I can recognize my specific internal tuning. It is something that I feel I could not do it again. I don't think I could do that. It is the moment, playing in this specific place. We were playing here, and just in front of us there was a table without an empty space between us. If I had a drink, I would put it on the first table of the customers. So it was an intense atmosphere. And my colleague musicians' [musical] comments between my phrases refresh the whole thing. They are saying 'tell us, tell more'. It's like they confirm the emotions that I'm feeling. This gives me new tension to make more, not just to make something big. It was not the purpose to do something with high energy, it was just something that happened. It was a moment when I felt supported by my friends. This made the long duration of the *taksim* and the intense playing. If you don't have these conditions, it does not work. (Voulgaris, 2024, personal communication)

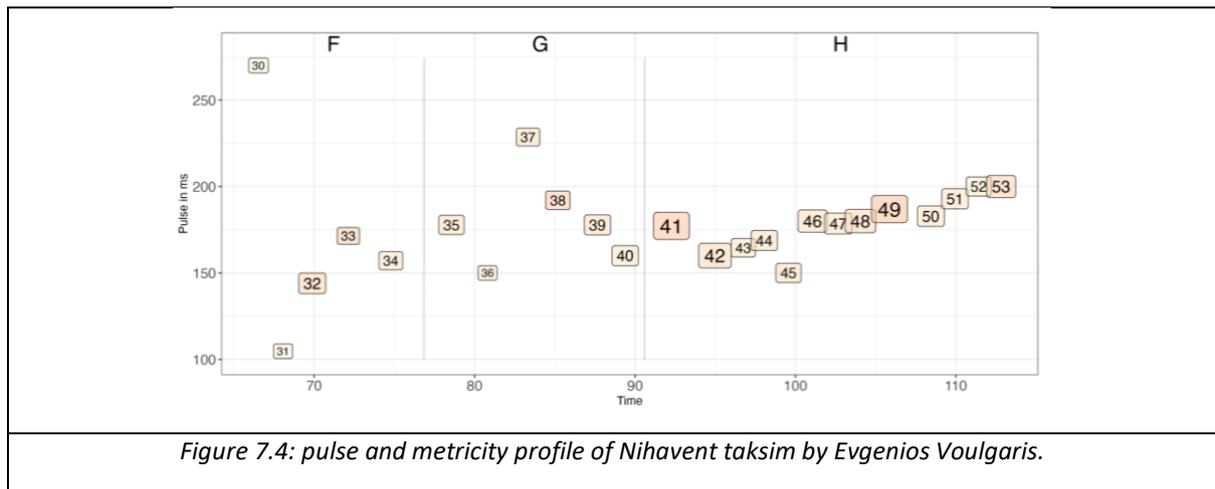
Voulgaris reinforces the notion that the 'extreme' rhythmical features presented in this *taksim* – which can be associated with what he describes as intense playing – are contingent upon the conditions of the environment. Moreover, the musician emphasized the importance of the support provided by his fellow musicians in establishing this atmosphere.

So when I go to the very high region, this is beyond the limits of what is established in the *makam*. This came, to me, from an internal state, which does not come from the taverna, but from my friends. The two other musicians that support me and tell me ‘yeah, don’t be afraid, say it, we are here and support you’. I didn’t feel lonely or that people expected something from me, but people came with me. So it was a very warm situation for someone that wants to take out something very intense. If I want to do something like this, I have to feel all these conditions again. It is a really nice moment, but not on purpose, it happened and fortunately we recorded. It is the fever of the live performance, not in a theatre, but in a place with my friend, where I feel supported and comfortable, and made the door bigger. When I play in a studio is totally different. If I play rebetiko in Europe in a theatre, it’s impossible to play like I play in a taverna. You would be like the crazy guy! Like for no reason you enter a wild situation. (Voulgaris, 2024, personal communication)

Analysing this *taksim* offers a glimpse into the rhythmic features of an improvisation performed in a live and energetic environment. It has been established that both metricity and pulse exhibit stark contrast, and a close examination of the opening phrase reveals examples of rhythmical techniques. In the next section, a *taksim* presented in a contrasting context will be analysed.

7.2.2 Evgenios Voulgaris: Nihavent *taksim*





This *taksim* was performed during an unaccompanied oud and voice concert. The concert took place at Music Village, an important centre that organises workshops and concerts every summer, where Voulgaris often teaches. The environment contrasts significantly from the previous *taksim*. In the *Nikriz taksim*, Voulgaris performed with an ensemble, with musicians providing short responses to his phrases. The atmosphere was noisy, with people talking in the background. Here, Voulgaris performs alone on the stage; the concert is outdoors, and the audience is completely silent, occasionally interrupted by the distant sound of a barking dog.

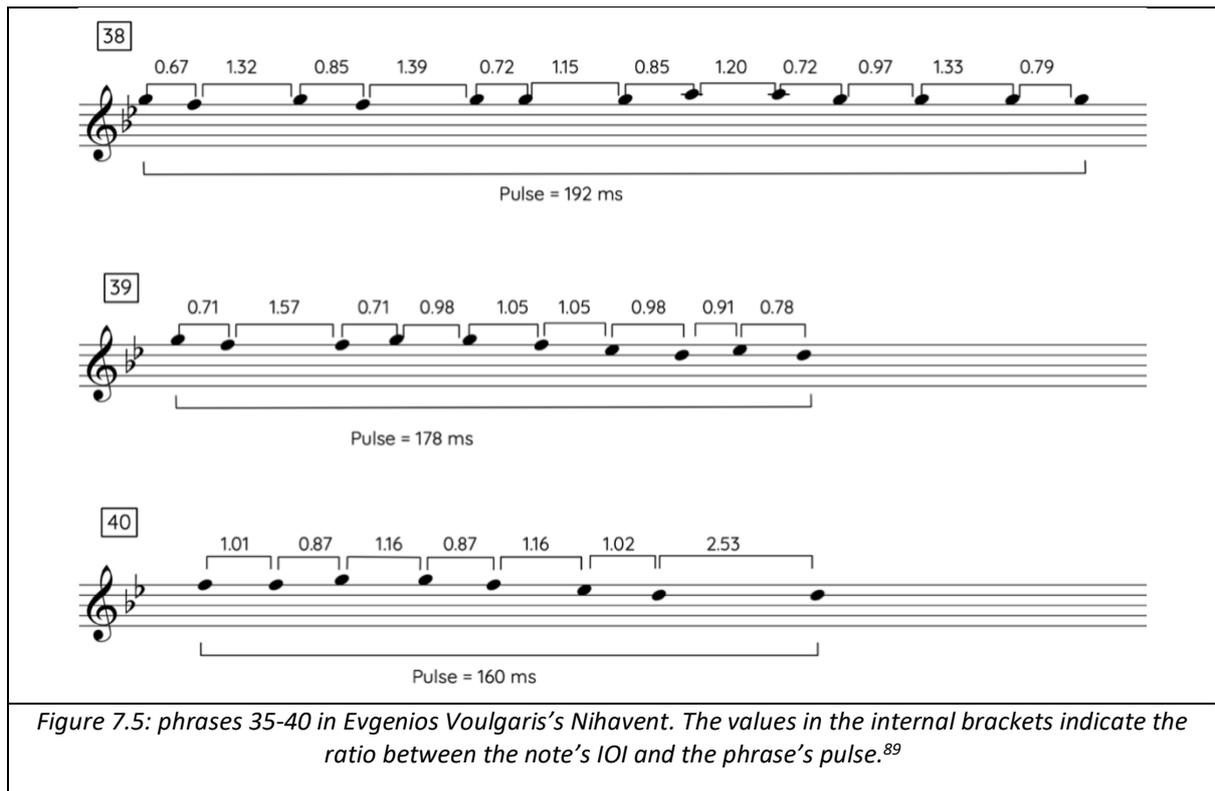
Section **A** presents phrases on *neva* (D), the fifth degree of *makam Nihavent*. Voulgaris uses irregular phrases with a wide range of pulse. During sections **A** and **B**, the sensation of pulse remains vague due to the low metricity and constant changes in pulse. This begins to change after the cadence in phrase 22, with repeating notes suggesting a subtle sense of pulse, leading towards phrases 25-27, which are more metrical and share a similar pulse. These are critical points in the *seyir*, as they mark the final phrases centred around *neva* (D). From sections **F-H**, the rhythmic profile of the improvisation changes significantly. While the *Nihavent* flavour is introduced for the first time with the note *rast* (G) in phrase 32, phrases become progressively metrical⁸⁸, longer, and the pulse becomes less dispersed, narrowing between 150-200ms and presenting a consistent *rallentando* from phrases 42-53.

⁸⁸ Sections **A-E** average 5.76 in metricity, whereas sections **E-H** average 9.05.

Examining the beginning of the rhythmic intensification in phrases 35-40, it is noticeable that in phrase 35 Voulgaris emphasises *muhayer* (a), the note above the target *gerdaniyeh* (g) by playing it with a stronger dynamic and using non-isochronous durations. The rhythmic intensification becomes clear through the repetition of the note G in different octaves in phrases 36-37, preparing for phrases 38-40, where the pulse becomes progressively faster. In this sequence, Voulgaris begins by alternating fast and slow durations on phrase 38. As the pulse accelerates in phrases 39-40, durations tend to become more isochronous, culminating in a sudden stop on the new target note *neva* (D). From this point onwards, metricity becomes more latent with faster phrases, reaching a peak in phrase 45. Subsequently, Voulgaris concludes the *taksim* with a *rallentando*, maintaining a drone on *neva* (D).

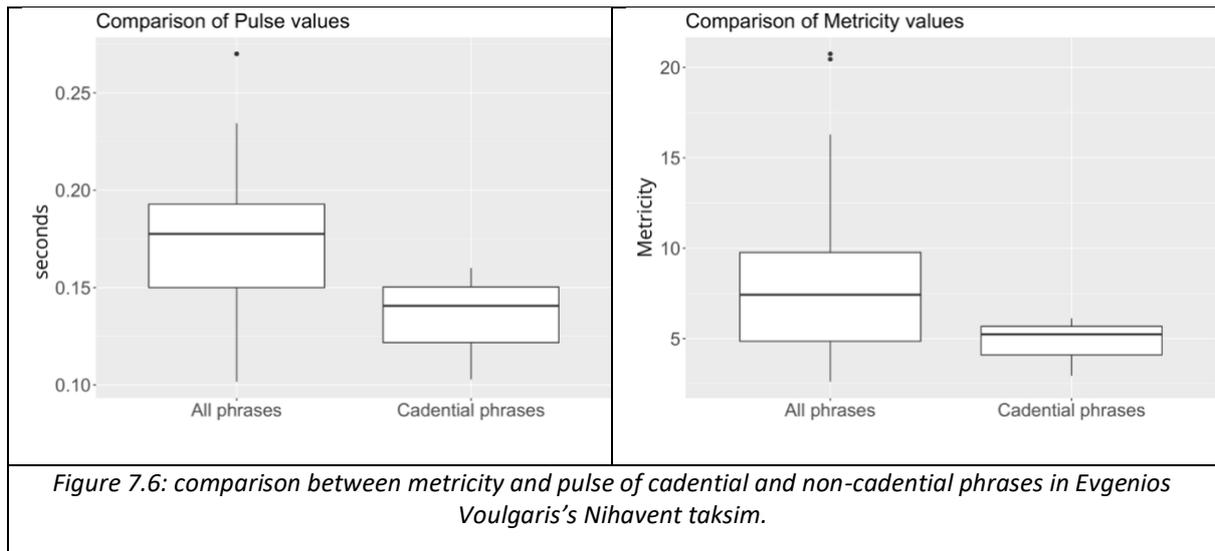
The image displays three musical phrases (35, 36, and 37) on a five-line staff with a treble clef and a key signature of one flat (B-flat). Each phrase is annotated with note durations in milliseconds (ms) and a pulse value.

- Phrase 35:** The first note is a half note (1.11 ms). It is followed by four quarter notes (1.04 ms each), a quarter note (1.76 ms), an eighth note (0.78 ms), and another quarter note (1.10 ms). The pulse is 178 ms.
- Phrase 36:** The first note is a half note (2.63 ms), followed by a quarter note (2.32 ms), a quarter note (2.08 ms), a quarter note (2.09 ms), a quarter note (1.93 ms), an eighth note (1.85 ms), and a quarter note (1.93 ms). The pulse is 150 ms.
- Phrase 37:** The first note is a half note (1.06 ms), followed by two eighth notes (0.41 ms each), a quarter note (1.02 ms), a quarter note (1.07 ms), a quarter note (0.96 ms), a quarter note (0.97 ms), and a quarter note (0.92 ms). The pulse is 229 ms.



This *taksim* is significantly shorter than the previously analysed *Nikriz taksim*, and it is notable that the musician uses longer and more spaced-out phrases. The first four sections have a low average regularity, which increases in the final sections (F, H). This is consistent with the role of the *taksim*, played just before a composition in the form of a *saz semai*. Observing the overall progression of the *taksim*, there is notable development from less metrical, short phrases with a dispersed pulse and silences between them, to more metrical, longer phrases around a similar pulse that are connected. Cadential phrases are more metrical and have a faster pulse in comparison with non-cadential phrases.

⁸⁹ This example presents a limitation of the methodology proposed here for visualizing rhythm in *taksim*. A first impression over the data would suggest that, between phrases 36 and 37, the ratio of notes presents a large jump, from values around 2 in phrase 36, to values around 1 in 37. However, the value of the pulse also changes significantly, from 150ms in phrase 36 to 226ms in phrase 37. In these cases, an accurate perception of what are the ratios between phrases becomes a bit obscured, and need to be balanced by observing the pulse values.



One notable aspect of this *taksim* is that Voulgaris employs the *Uşşak* flavour on the note *neva* (D), rather than the more common *Kürdi* or *Hicaz* flavours for this *makam*. This has a significant impact on the improvisation, as, according to Voulgaris, the *Uşşak* flavour conveys particular characteristics:

[The *makam*] *Nihavent* normally has a *Kürdi* or a *Hicaz* [flavours] on [the note] *neva*. But sometimes, the *Kürdi* can become softer, and becomes an *Uşşak*. It is like someone that has a nostalgia, because of the *Nihavent*, and in the moment that he's out, he expresses it. If it is a *Kürdi* [instead of the *Uşşak* flavor], it is something internal, without much strength. When it is a *Hicaz*, it becomes something dramatic and somehow more externalizing the pain. And when we have the *Uşşak*, it is like you communicate the longing for what is missing, but together with the longing. It has a fire for something that you miss, that you want so bad. The colours, the flavours that you use can show different things. So it is a little bit desperate in the beginning, it is very emotional, because it comes from a *Nihavent*. (Voulgaris, 2024. Personal communication).

Thus, the low metricity, shifting pulse and spaced-out phrases in the first sections could be associated with the nature of the *Uşşak* flavour being evoked. As *Nihavent* – the main

character of the piece – becomes more prominent, the phrases move towards greater regularity in pulse and metricity, preparing for the subsequent composition. Voulgaris elaborates further on how he conceptualizes the development of his *taksim*.

It is like a movie, but you don't start from the home of the hero. But you see him somewhere else, speaking with other people, saying 'I want something so much'. And then, in the next scene, you see him at home, and see how lonely he feels. This affects the speed of the discourse. He does not go for a 'full *Uşşak*'. The atmosphere is a *Nihavent*, it is really emotional. So I would not expect an aggressive *Uşşak*, with many notes and a fast development. (Voulgaris, 2024. Personal communication).

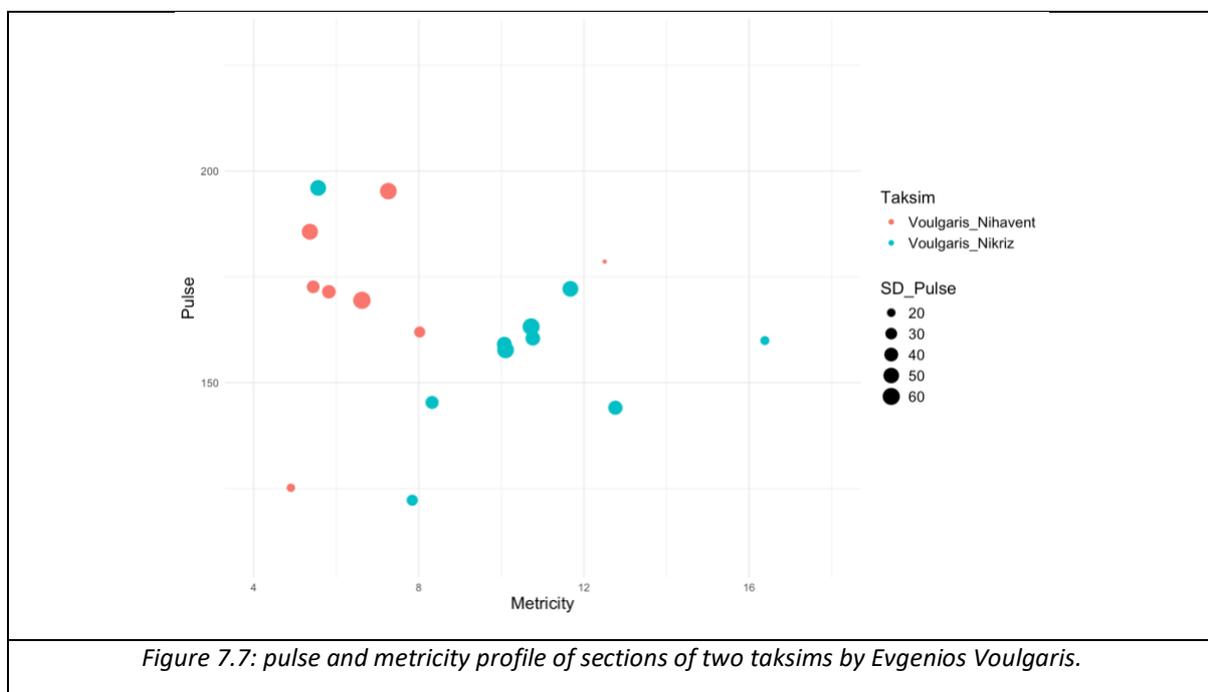
Voulgaris's remarks demonstrate the musician's strategies for engaging the audience by transitioning from an abstract rhythmic dimension in the beginning of the *taksim* (shifting pulses, low metricity phrases separated by silences) to a more grounded dimension in its end (phrases with consistent pulse, higher metricity). With the previous quotes, it is possible to connect the rhythmical aspects with the melodic flavours evoked by the musician. However, it is important to note that such strategies are context-dependent. In a taverna-like scenario, such an approach might fail due to inadequate conditions (e.g., people talking and drinking, without paying full attention to the music), and the choice of flavours and rhythmical approach is likely influenced by the performance context.

7.2.3 Discussion – comparing Evgenios Voulgaris's *Nikriz* and *Nihavent taksims*

The comparison between Voulgaris's *Nihavent* and *Nikriz taksims* reveals striking rhythmic and contextual contrasts that highlight the adaptability of his improvisational style. The *Nihavent taksim* is characterised by slower pulse and lower metricity in its earlier sections, creating an abstract and contemplative atmosphere. This aligns with its performance context – a solo recital in an outdoor, quiet environment – where the focus is on subtlety and the gradual development of *makam* flavours. By contrast, the *Nikriz taksim*, performed in a lively

taverna setting with a cafe *aman* ensemble, features faster and more metric sections, reflecting the energy and rhythmic demands of the environment.

An intriguing distinction is the inverse correlation between pulse and metricity observed in the *Nikriz taksim*. Faster sections, such as those involving *accelerandos*, exhibit lower metricity, which contrasts with typical expectations in *taksim* performance. This characteristic could be associated with the influence of the *café aman* style as, in this *taksim*, *Voulgaris* uses the extreme register of the instrument with less metricity. Conversely, the *Nihavent taksim* displays a more conventional relationship between pulse and metricity, with faster phrases tending to be more metrical.



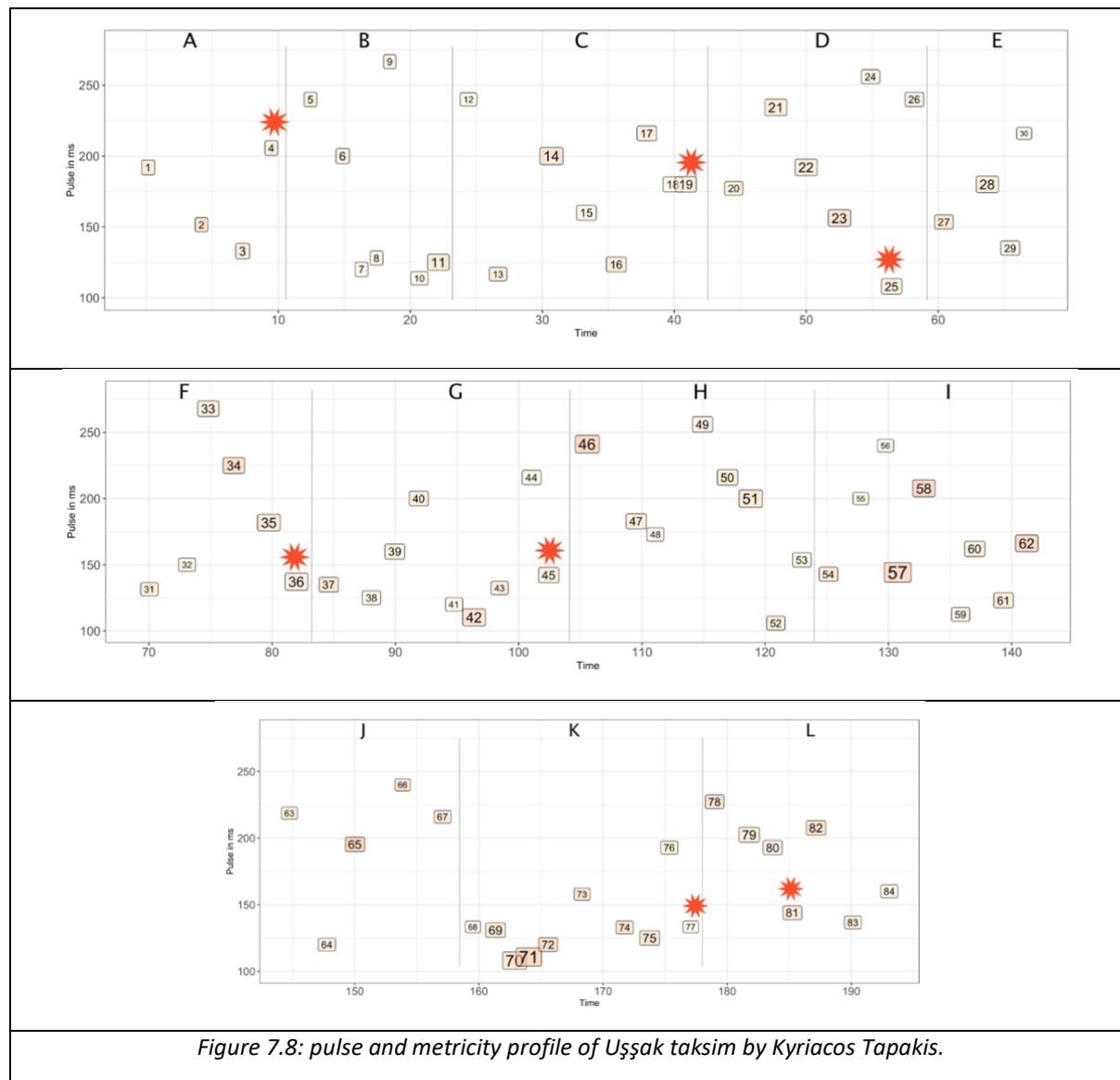
Another interesting comparison is how cadential phrases are developed. In the *Nikriz taksim*, cadential phrases exhibit pulses that are significantly faster than non-cadential phrases but with a similar level of metricity. In the *Nihavent taksim*, however, cadential phrases are more metrical and feature a narrower range of pulse values, presenting a stronger contrast in relation to the non-cadential phrases.

The melodic trajectories of the two *taksims* also influence their rhythmic characteristics. The *Nikriz taksim* frequently ventures into the higher registers, with phrases centred on *tiz neva*

(d') and *tiz gerdaniye* (g'), producing moments of rhythmic instability and contrast. These elements reflect the energetic and exploratory nature of the *café aman* setting. In the *Nihavent taksim*, the melodic path remains more anchored, gradually developing around *neva* (D) and *rast* (G), with much narrower melodic range. This creates a more introspective and meditative character, consistent with its performance context.

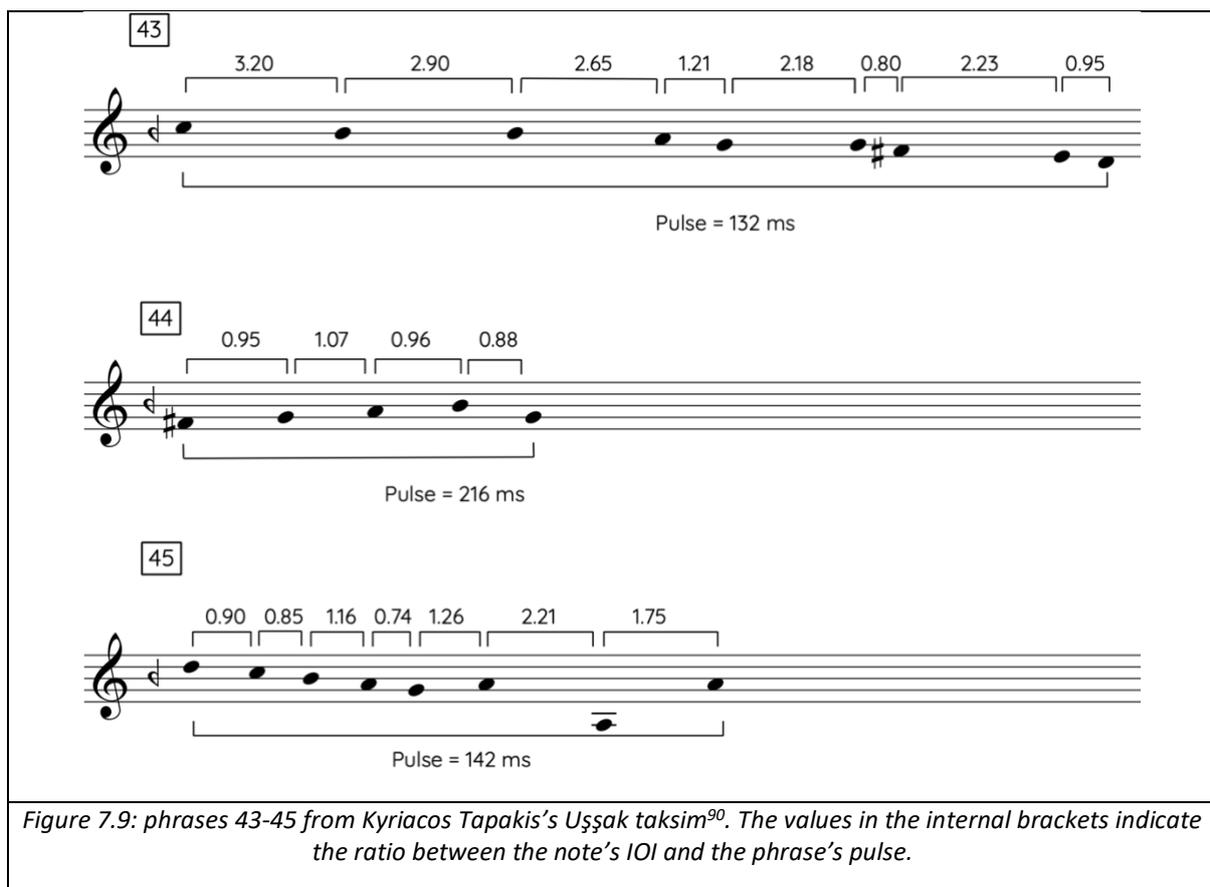
7.3 Kyriacos Tapakis

7.3.1 Kyriacos Tapakis: Uşşak *taksim*



This *taksim* was performed at the end of our final individual lessons during the fieldwork period. Tapakis played the *taksim* as a conclusion to our meetings, providing a clear example of the *seyir* of *makam Uşşak*, which we had studied for three months. This demonstration had a didactic nature, as Tapakis periodically interrupted the improvisation to explain the steps he was undertaking and, at times, described each section’s characteristics. Nevertheless, the performance stands as a solid *taksim*, demonstrating different rhythmical characteristics.

The first three sections of the *taksim* present the main notes of *makam Uşşak* with phrases on *çargâh* (C), *neva* (D) and *rast* (G), consistently returning to the tonic *dügâh* (A). In these sections, metricity is relatively low and phrases' pulses are highly dispersed, with an average pulse between 170-177ms. Phrase 25 concludes the first section of the *taksim* on *dügâh* (A), preparing for the subsequent sections, which are centred around *neva* (D) in sections **D** and **F**, but also concludes in *dügâh* (A) on phrase 45. Here, metricity varies significantly (ranging from 7.9 in section **D** to 5.5 in section **E**), and the average pulse becomes slightly slower. Phrases 43-45 exemplify how Tapakis employs rhythm in concluding phrases. In phrase 43, durations vary considerably; while there are notes around 132ms, these are never played consecutively, making the sensation of pulse difficult to perceive. In phrases 44 and 45, durations align more closely with the phrases' pulses. However, the significant difference between the pulses of the two phrases (216ms in phrase 44, 142ms in phrase 45) creates an alternation that further obscures the perception of pulse.

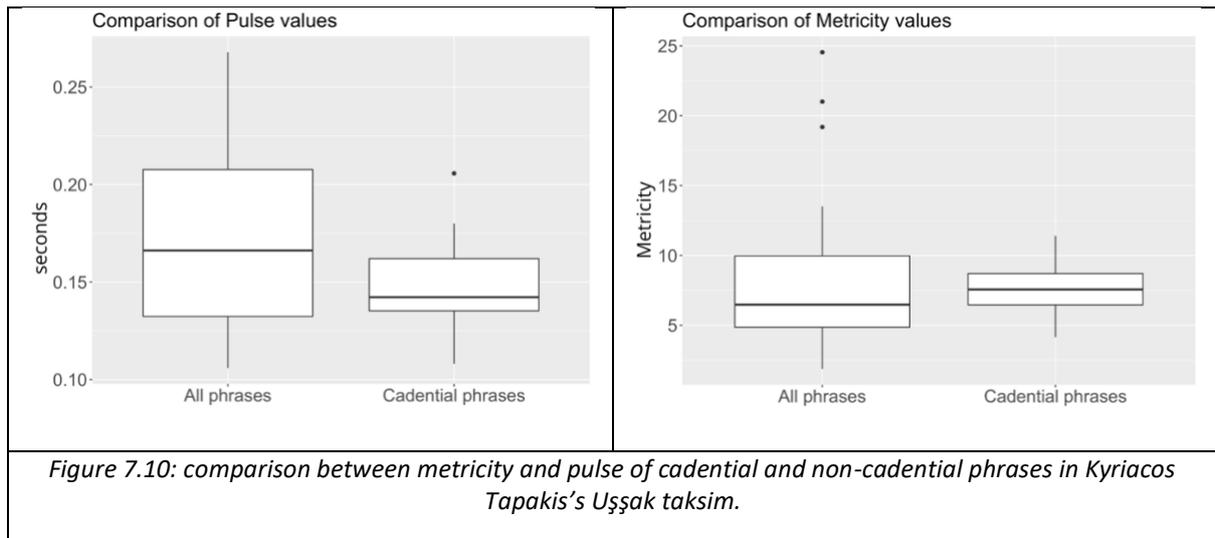


⁹⁰ This example presents the same distortion explained in example 7.5.

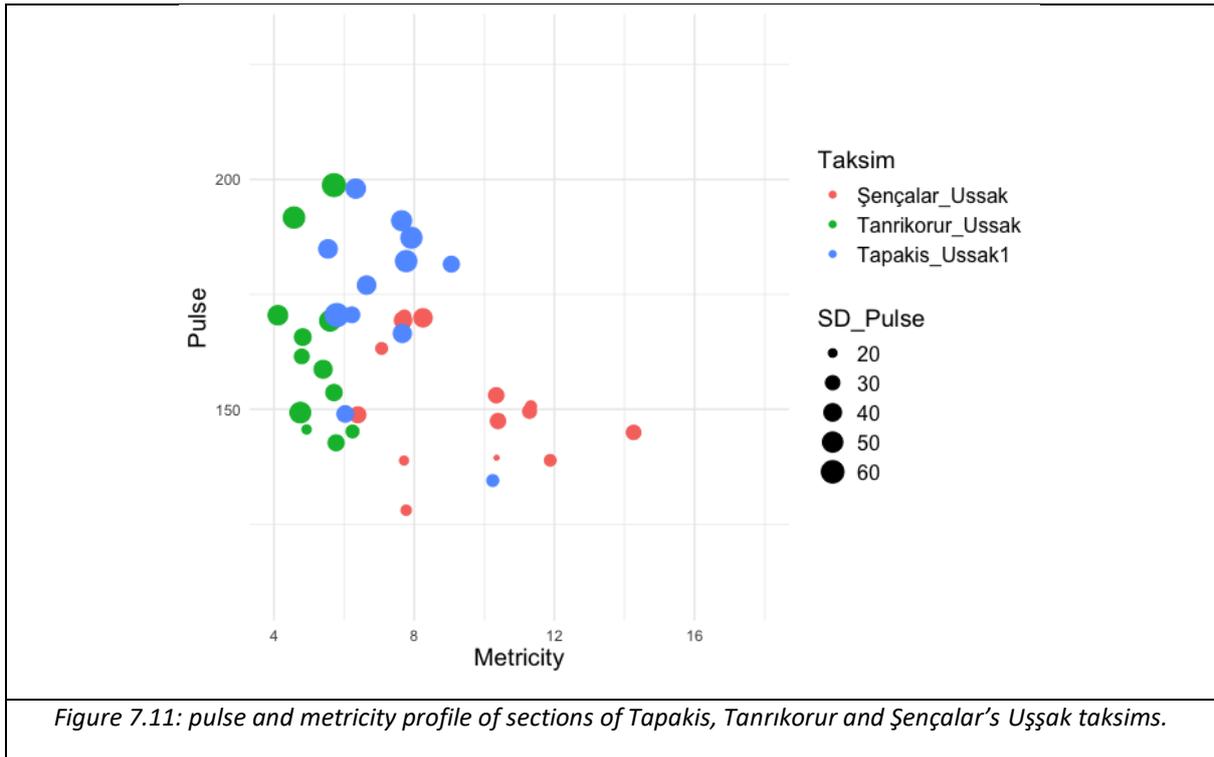
Sections **H - I** introduce a melodic jump towards *muhayer* (a), accompanied by a significant increase in metricity but a slower average pulse. This section features the highest melodic range, characterised by longer phrases, relatively high metricity, and larger differences in the phrases' pulses. From **J - L**, the melodic path begins to return to the *makam's* tonic, first passing through *huseyni* (E) in phrases 66-67, then *neva* (D) in 72-75, and finally arriving in *dügâh* with a cadence on phrase 77. Section **L** concludes the improvisation by reaffirming the centre of the *makam*, with connected phrases resolving on *dügâh* (A).

In this improvisation, most sections contain phrases with pulses at varying tempos, without many consecutive phrases in similar regions. Exceptions include accelerando movements in sections **D** (phrases 21-25), **F** (phrases 33-37), and **L** (phrases 78-81), as well as the fast passage in **K** (phrases 68-72). In the remaining sections, slight traces of pulse regularity might be suggested (e.g., between phrases 7-11 and 18-20), but overall, the pulse is generally dispersed. This is indicated by the high standard deviation of this parameter and the varying averages of periodicity in each section. Metricity is relatively low between **A - J**, (5.54 to 7.92), a characteristic that changes in sections **K - L**, where metricity spikes up to 10.24. Tapakis provided a verbal hint for this increase in metricity, noting before section **F** that the musician should 'play harder' and with 'more right-hand features' from this section onwards.

Values for metricity and pulse in cadential phrases do not significantly differ from other phrases. However, cadential phrases tend to remain within a narrow range of metricity and, as observed in other improvisations, typically feature a faster pulse compared to non-cadential phrases.

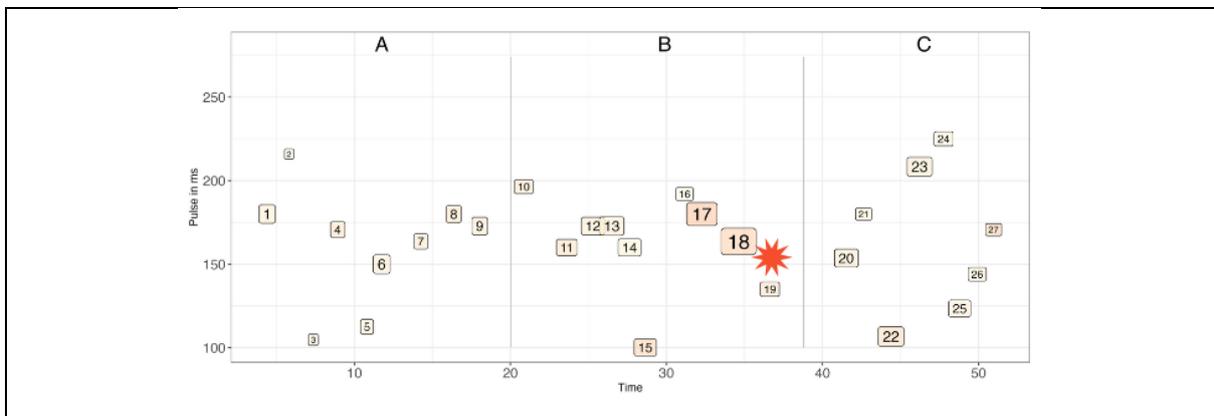


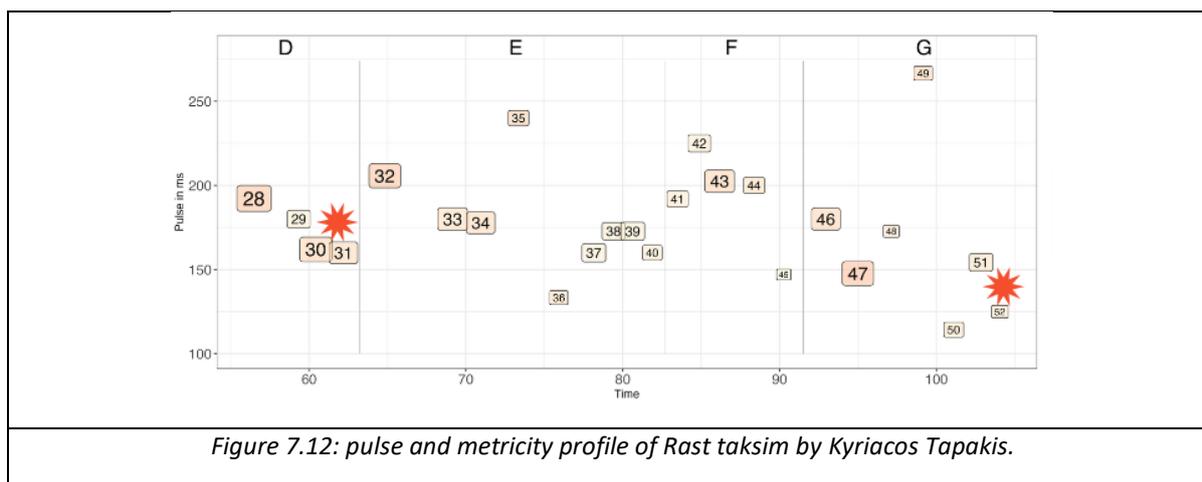
During my studies with Tapakis, we focused on *taksims* from two contrasting rhythmic styles: the more metric *taksims* of Şençalar and the less metrical ones of Tanrıkörür. It is interesting to analyse this improvisation in light of these masters. Similar to Tanrıkörür, the pulse in Tapakis's *taksim* is spread across the plot, with only a few identifiable regions having a consistent pulse. However, some long *accelerando* passages, resembling those in Şençalar's improvisations, are also present. Metricity values appear to be intermediate between those observed in Şençalar's and Tanrıkörür's improvisations. While Tapakis's *taksim* is significantly more metrical than Tanrıkörür's, it is not as metrical as Şençalar's, except in a few sections (**K** and **L**) featuring faster, more metric phrases. Other characteristics of Şençalar's improvisations, such as increased metricity in the middle of the sections (**I** and **K**), are also present. Figure 7.11 compares the rhythmical characteristics of Tapakis's, Şençalar's and Tanrıkörür's *Uşşak taksims*.



The combination of features from Tanrıkorur's and Şençalar's improvisations is not surprising. For months leading up to this *taksim*, Tapakis detailed elements from *taksims* performed by these two musicians during our sessions. The observed features exemplify how musicians can alternate between different improvisational styles – in this case, to provide a clear demonstration of *taksim* strategies to a student.

7.3.2 Kyriacos Tapakis: Rast *taksim*



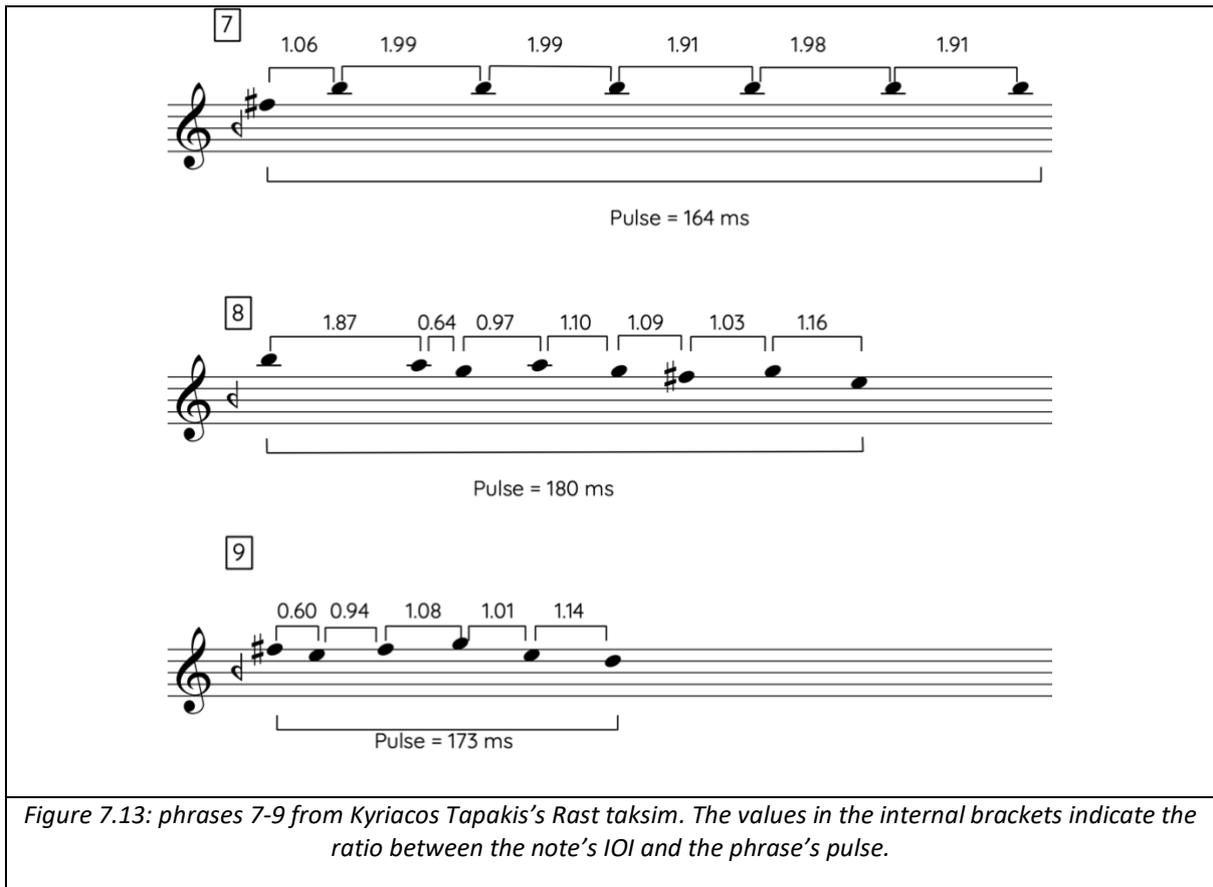


This *taksim* improvisation was retrieved from a video in which Tapakis is testing an oud constructed in the Iraqi style⁹¹ by Dimitris Rapakousios. The video was filmed in the workshop of the instrument's builder, with the goal of showcasing the sound of this new instrument. Therefore, this *taksim* was not performed during a concert but rather as a short demonstration. Background noises include faint voices and the sandpaper from workers preparing instruments.

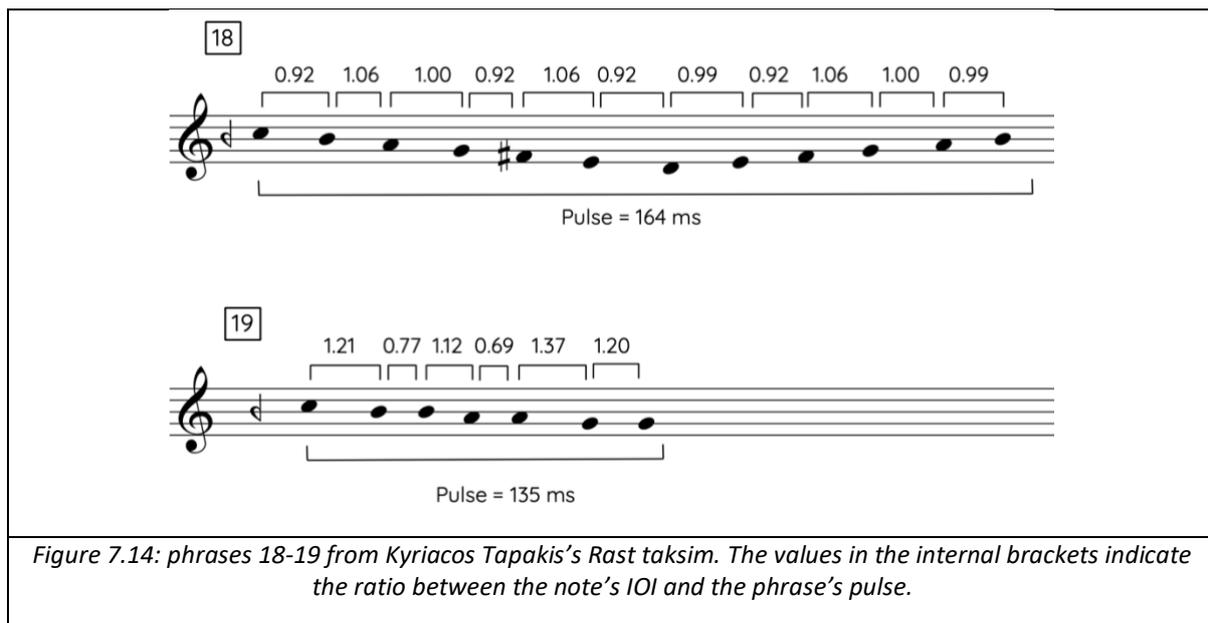
Possibly to align with the nature of the instrument, the musician performs a *taksim* with rhythmical characteristics that differ significantly from previous improvisations. The most striking feature is a typical tremolo, evoking the Arabic style of oud playing. Tapakis also predominantly uses down-strokes with his right hand, another feature associated with the Arabic style.

The *taksim* begins by exploring the high register of *makam Rast* with phrases on *gerdaniyeh* (g), subsequently moving towards the lower register in the first two sections. As in previous improvisations, the *taksim* starts with less metric phrases and progressively increases metricity as the melodic path advances towards the cadential phrase 18 on *rast* (G), the most metric phrase of the first two sections. In phrases 7-8, the *tiz segâh* (b) is emphasized. While the durations in phrase 7 are isochronous, the final reiteration of *tiz segâh* (b) in phrase 8 disrupts the previously established continuity, producing an irregular movement that leads into the continuation of isochronous durations towards *neva* (D) at the end of phrase 9.

⁹¹ For more information on the changes promoted by the Iraqi school of Oud, see Beckless-Wilson (2023: 127).



The *taksim* continues with progressively more metric phrases, with pulse ranging between 155-200ms. After a long phrase 17, phrases 18 and 19 present an interesting movement towards a cadential phrase. Phrase 18 employs very regular durations and a wide melodic range, similar to the earlier phrases in this section. However, the cadential phrase 19 on *rast* (G) disrupts this continuity by introducing a fast and non-isochronous pace to the section



The same pattern of increasing metricity is observed from 19 to the second cadential phrase in phrase 30. Here, Tapakis transitions once again from the high register, with phrase 19 on *muhayer* (a), towards a cadence on *irak* (F#) in phrase 30. This increase in metricity appears more abrupt and less gradual than earlier transitions. From section **D** onwards, metricity levels are significantly higher. After several metric phrases (28-34), Tapakis creates another progressive increase in metricity from 36 to 47.

With the exception of sections **A** and **C**, the phrases' pulses are not as dispersed as in Tapakis' previous improvisation. They tend to cluster within the 150-200ms range. There are fewer distinct groups of phrases forming accelerandos than in earlier *taksims*, but between 36-47, phrases composing a rallentando (phrases 36-42) followed by an accelerando (phrases 42-47) are observed, culminating in the final cadential phrase (phrase 52). Although the phrases' pulses exhibit a similar average to his *Uşşak taksim*, this improvisation shows less variation in pulses, as evidenced by the lower standard deviation.

Despite having only three cadential phrases, they exhibit noticeable characteristics: higher metricity compared to non-cadential phrases, and while their pulses are within the range of other phrases, the cadential phrases exhibit strikingly similar pulses.

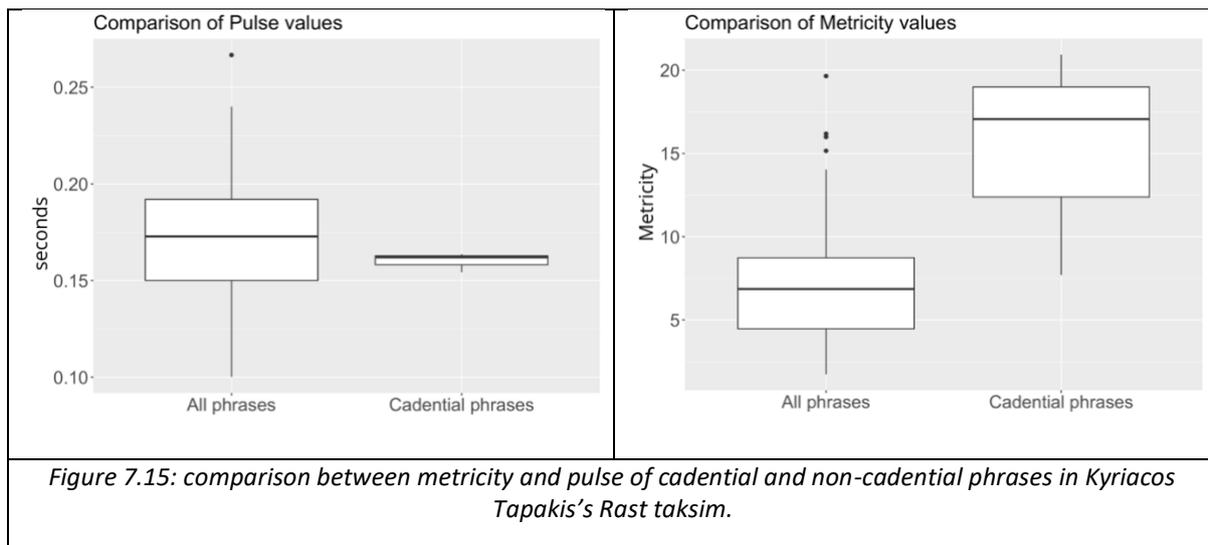


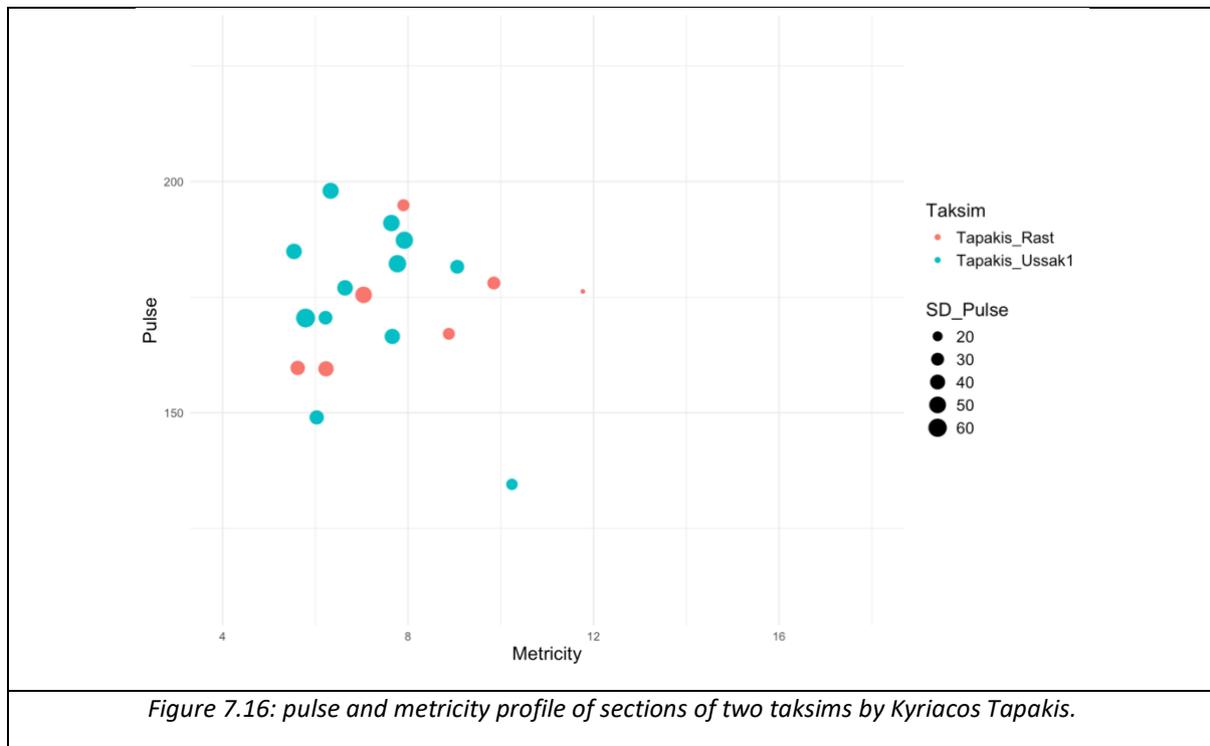
Figure 7.15: comparison between metricity and pulse of cadential and non-cadential phrases in Kyriacos Tapakis's *Rast taksim*.

Comparing both Tapakis's improvisations, we observe distinct rhythmic characteristics that highlight the musician's versatility in adapting his style to different contexts. The *Uşşak taksim* exhibits a wider range of pulses within sections, as reflected by its higher standard deviation. Conversely, the *Rast taksim* demonstrates a more constrained range of pulses, with phrases clustering within the 150–200ms range, reflecting the influence of the Arabic style of playing resulting from the instrument and context of the performance.

Furthermore, the *Rast taksim* features slightly more metric phrases overall, with a progressive increase in metricity that peaks during cadential phrases. This contrasts with the *Uşşak taksim*, where metricity remains relatively low for most of the improvisation, only increasing towards the final sections. Notably, both *taksims* employ *accelerando* and *rallentando* movements, but these are more pronounced and frequent in the *Uşşak taksim*.

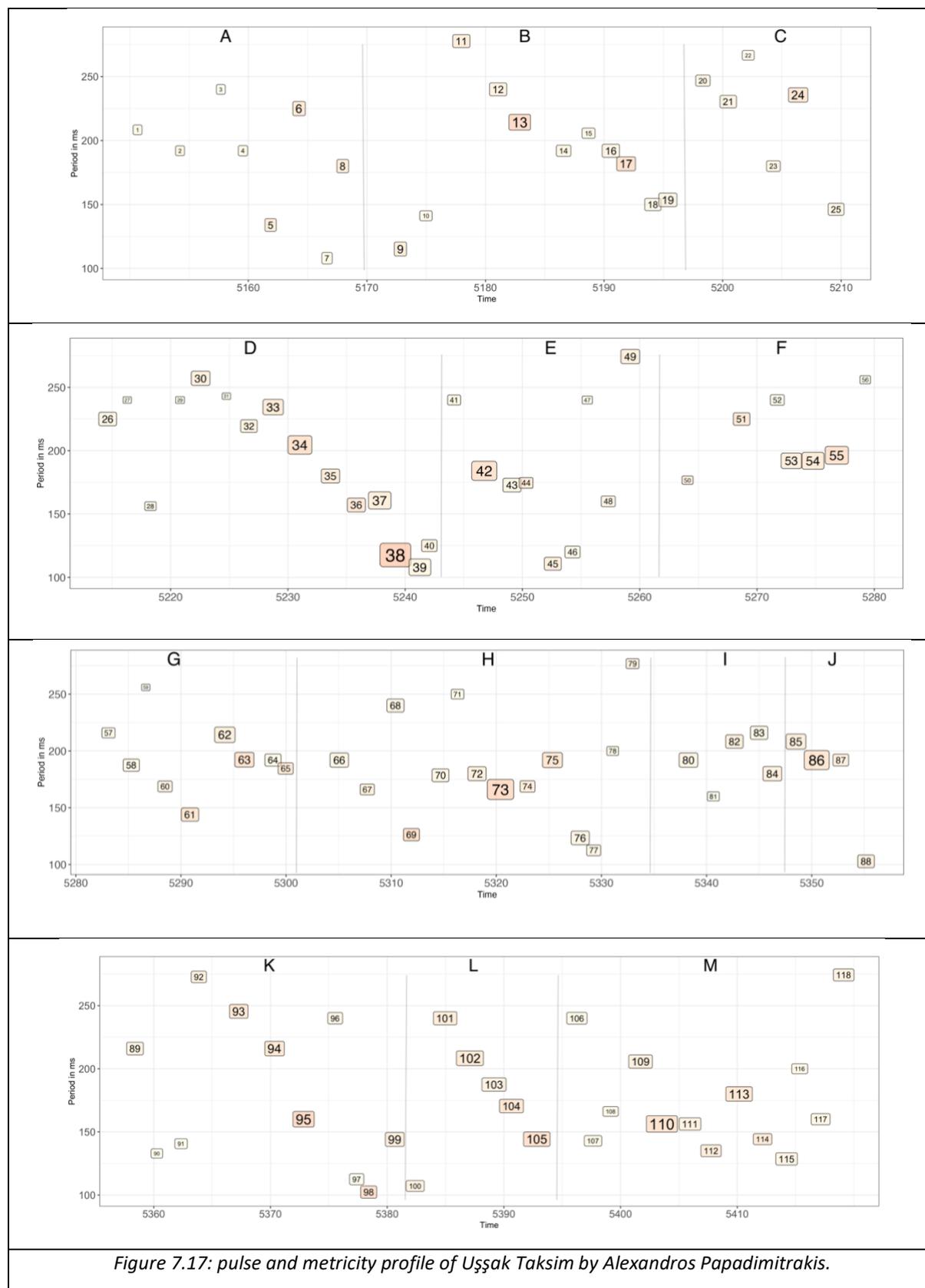
Another critical distinction lies in the treatment of cadential phrases. In the *Rast taksim*, cadential phrases stand out more prominently, not only due to their higher metricity but also because of their strikingly similar pulses, suggesting a deliberate rhythmic cohesion in these climactic moments. In the *Uşşak taksim*, cadential phrases can present different rhythmic features, but tend to present contrast in relation to previous phrases. Furthermore, their pulses often exhibit faster averages compared to non-cadential phrases.

These contrasting features exemplify Tapakis's ability to integrate elements from diverse stylistic traditions and adapt his approach based on the *taksim's* context and purpose. The figure below visually underscores these distinctions, highlighting the differences in metricity and pulse distribution between the two improvisations.



7.4 Alexandros Papadimitrakis

7.4.1 Alexandros Papadimitrakis: Uşşak *taksim*



Papadimitraki's *taksim* was performed at the end of a lesson as an example of typical exposition of an *Uşşak taksim*. During the lesson, the musician explained the exercise of working with melodic constraint (see chapter 5), and this *taksim* appears to be influenced by such exercises, in particular in the first section of the improvisation.

In section **A**, the musician employs phrases with varying pulses and without a strong sense of metricity. Here, Papadimitrakis extensively uses repeated notes to establish *dügâh* (A), the central note of the *makam Uşşak*, facilitating a slow development of the *taksim*. From the beginning of section **B**, it becomes clear that the central note is *rast* (G). This section introduces contrasting rhythmical features: there is a distinct overall *accelerando* (phrases 11-19), with phrases exhibiting a higher degree of metricity. Phrases also tend to be longer, with more metrical phrases emerging (e.g., phrases 13 and 17). The *accelerando* spans the entire section, starting with a very slow pulse and steadily increasing until phrase 19, which concludes with a cadential phrase on *rast* (G).

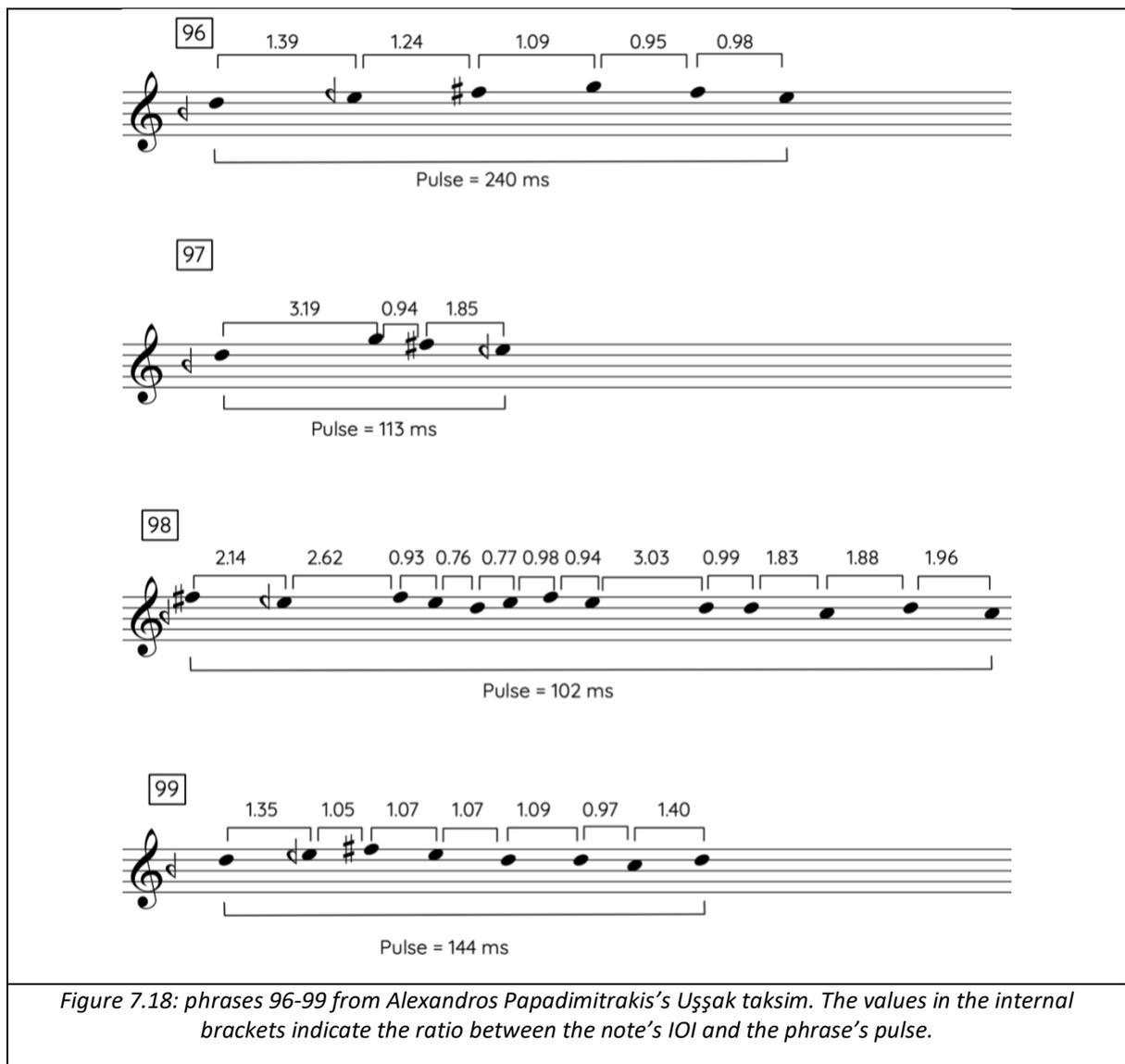
The return to *dügâh* (A) in section **C** reintroduces rhythmic features similar to section **A**. Once again, we observe a dispersed arrangement of pulses and repeated notes. However, metricity is now significantly higher, and longer phrases are also present. Section **D** introduces *çargâh* (C), marking a new step in the *seyir*. Here, Papadimitrakis alternates between phrases with few notes (26, 30) and phrases with a single note being repeated (27,28, 31). This creates an intriguing contrast; on the one hand, the short phrases are more metric, as are the repeated notes that follow them. However, the regularity of the repeated notes is eventually disrupted by 'off beat' bass notes, forming a unique combination of metricity and irregularity. After phrase 32, this pattern is interrupted, and an acceleration occurs from phrases 33-39. In this section, Papadimitrakis explores and progressively expands the range of similar melodic contours with increasing pulse and metricity, relaxing only at the end of the section with a less metric cadential phrase (40) that signals a return to *dügâh* (A), the starting note of the *seyir*.

In section **E**, the note *acem* (F) is introduced – the highest note presented thus far. Since the musician has returned to *makam's* tonic, *dügâh* (A), this section reinforces the conclusion of

the *taksim*'s first part. Following the intense rhythmic features of section **D**, section **E** begins with a brief pause in intense rhythmical features (phrase 41), followed by more metric phrases leading to a final cadence on *dügâh* (phrase 46). After this, the rhythmic characteristics of the *taksim*'s opening are briefly reintroduced (phrases 47–49), featuring a dispersed pulse and less metric phrases.

Section **F** introduces a significant step in the *seyir*; beginning on *neva* (D). Rhythmically, this section follows the pattern of starting with less metrical phrases (50) and progressively increasing metricity in the middle (phrases 53–55) before returning to a less metric phrase at the end (phrase 56). Section **G** continues emphasising *neva* (D), using repeated notes (phrases 59–61) in a manner similar to the *taksim*'s opening, but concluding with a cadence one octave lower, on *yegâh* (D') (phrase 65). In section **H**, Papadimitrakis presents the melodic journey back to *Uşşak*'s tonic, *dügâh* (A). First, he employs a very brief modulation to *Karacığar* in phrases 67–69, interrupted by the reintroduction of the note *acem* (F) in phrase 71, signalling a return to the *Buselik* flavour. Once again, the section features more metrical phrases in the middle (phrases 72–75) and less metrical cadences on *dügâh* (A) with a fast pulse (phrases 76–77), concluding with a relaxation of pulse and metricity in phrase 78.

Section **I** and **J** feature phrases emphasising *acem* (F) and *husseyini* (E), respectively. Phrases display a narrow pulse range, concentrating between 175–220ms. Section **K** introduces a prolonged accelerando from phrase 89–98, with the pulse decreasing from 275ms to 100ms. In the first part of the accelerando, the musician begins by using repeating notes (phrases 90–91), similar to earlier patterns in the *taksim*. This time, however, the repeated notes form a rhythmic pattern in phrase 92, continuing the accelerando until phrase 95. In phrase 96, another modulation to *Karacığar* is introduced. The rhythmic structure shifts from the steady accelerando (phrases 92–95) to less regular patterns. Phrase 96 exhibits a relatively slow pulse with an accelerando, followed by two fast phrases with non-isochronous durations, leading to the cadential phrase 99, which features relatively isochronous durations at a medium-fast tempo. Once again, we observe a constant shift in the rhythmic characteristics happening close to the cadential moment.



Section **M**, the final section of the improvisation, signals a return to *dügâh* (A) in its opening phrases (106-109). While the pulse remains relatively dispersed, traces of overall accelerandos are suggested. Several metrical phrases are presented (phrases 109, 110, 113) but the prominent accelerando patterns of earlier sections are absent. To conclude the *taksim*, Papadimitrakis presents a final cadential phrase on *dügâh* (A) (phrase 115) and short phrases of repeating notes (phrases 116-118), reinstating the less metrical and dispersed pulse observed at the beginning of the improvisation.

Overall, the analysis of Papadimitrakis's *taksim* presented rhythmical characteristics which can be summarized as follows:

- Use of repeated notes to create a sense of regularity, disrupted by 'off-beat' notes.
- Alternation of more and less metrical elements on both small (phrases) and large (sections) scales, possibly as a strategy to maintain a sense of free-rhythm.
- Employment of large-scale accelerandos, with metrical phrases appearing either in the middle or at the end of these gestures.

This analysis was presented to Papadimitrakis in October 2024, over two years after the execution of the *taksim*. The subsequent discussion provided insights into the context in which the improvisation was performed:

I liked [listening back to this *taksim*] and I was not expecting that. At that time, I was just getting back in shape after the lockdown period [consequence of the Covid-19 outbreak], in which I was not motivated and not practicing. And I remember that those were the months when I was back on enjoying playing the oud, trying new ideas on how to practice *taksim*. So these ideas were very fresh at that time.

First of all, on purpose I wanted to try a very slow development, to put this challenge on myself because for the previous 2 years I felt that I could not develop my solos. And this is the moment that I try to work on this. (...) For example, at the beginning I want to develop ideas that are targeting *dügâh*. And then, even if I am on the '*dügâh* paragraph', to present some other important degrees – *çargâh*, *uşşak*, *rast*. So in the development of the *dügâh* paragraph, [I also] give emphasis on the other degrees. (Papadimitrakis, 2024. Personal communication).

Papadimitrakis also commented on the rhythmic aspect of his improvisation, particularly how he positions himself in relation to the rhythmic differences between 'taverna' and 'classical' styles of *taksim*:

I like using rhythmic elements, even in the tradition that I am trying to develop here, let's say the 'classical' *taksim*, which for many players is less rhythmic.

Because I like the rhythmical stuff, my archetypes are more [connected to the] old school oud players, who were more rhythmic compared to the average modern Turkish oud player. If you go back in time, you will find more rhythmical playing, and I like this. [Yorgos] Bacanos, Udi Hrant [Kenkulian], [Şerif Muhittin] Tarkan, [Kadri] Şençalar. (Papadimitrakis, 2024. Personal communication).

The analysis reinforces Papadimitrakis’s assertion. Similarly to Şençalar and Bacanos’s *taksims*, several accelerando movements can be observed, and the metricity rates bring the *taksim* closer to Şençalar’s improvisations than to Tanrıkorur’s ‘classical’ style. However, it is worth noting that the average pulse in this *taksim* is much slower than that of 20th century masters, a feature potentially associated with Papadimitrakis’s deliberate attempt at ‘slow development’ in this improvisation. Figure 7.19 presents pulse and metricity of sections from *taksim* improvisations on *makam Uşşak* performed by Papadimitrakis, Şençalar and Tanrıkorur.

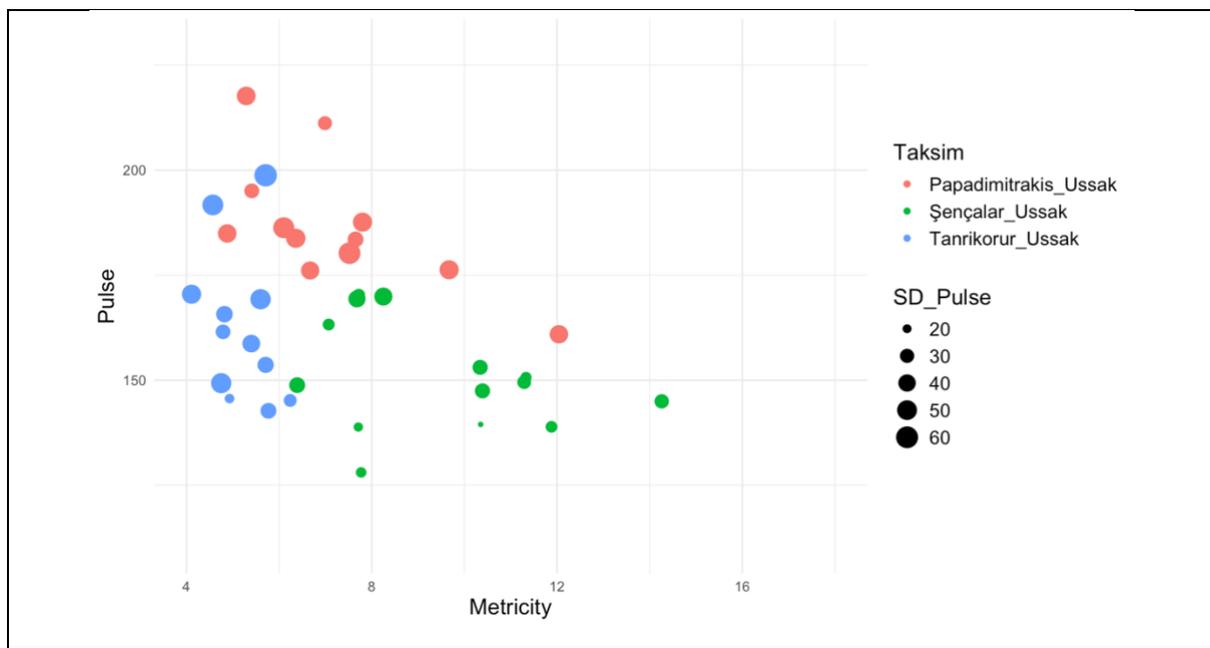


Figure 7.19: pulse and metricity profile of Şençalar’s, Tanrıkorur’s and Papadimitrakis’s Uşşak taksims.

7.5 Yurdal Tokcan

7.5.1 Yurdal Tokcan: two Nihavent *taksims*

Osman Yurdal Tokcan is recognized as one of the most influential contemporary oud players. Gifted with an outstanding technique in the instrument, Tokcan gained recognition at an early age, first performing solo and accompanying prominent masters, and later directing his ensemble at TRT⁹². In addition to his vast knowledge in *makam* music, Tokcan also shows a keen interest in merging his musicianship with other musical styles⁹³.

Being a Turkish musician, Tokcan lies outside of the original target group of Greek musicians proposed by this dissertation. However, his inclusion in this analysis serves two key purposes: first, Tokcan is a musician who comfortably performs in various *taksim* styles, making him ideal for discussing the styles examined here. Secondly, as a central authority in *makam*, his contributions to this musical tradition make his input particularly significant. As we will see, the improvisations performed by Tokcan offer clear examples of the rhythmical differences in *taksim* improvisations and facilitate relevant discussions. His remarkable versatility allows him to demonstrate distinct *taksim* styles and explore the relationship between *taksim* and the subsequent musical environment.

The conversations with Yurdal Tokcan occurred during a week-long masterclass he taught in July 2023 in Houdetsi, Crete. Tokcan's masterclasses are known for their technical rigour, as he dedicates considerable time to practising technical exercises with his students. He typically also introduces a series of his compositions spanning a wide range of styles — from classical presentations of *makam* to pieces rooted in the folk tradition — demonstrating different techniques to perform each composition's phrases appropriately.

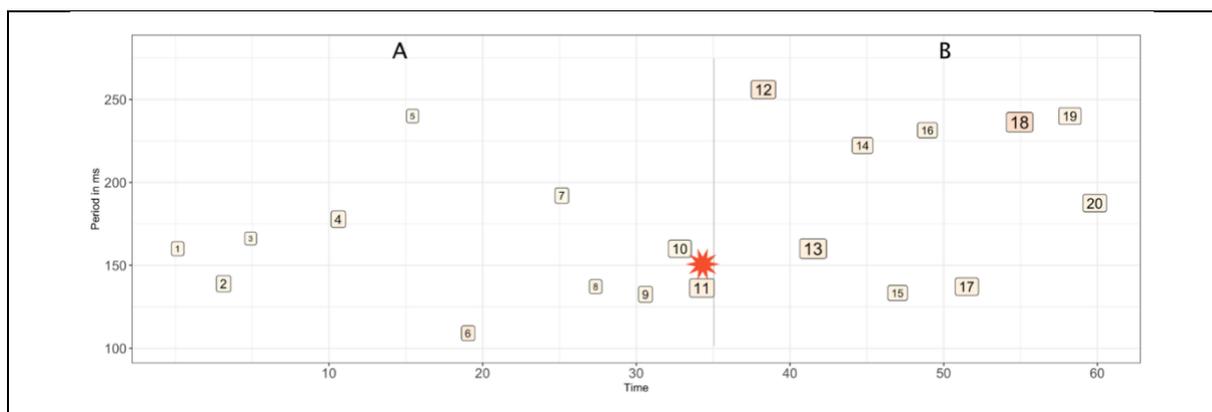
⁹² The Turkish Radio Television is a cultural institution that employed a large number of musicians and promoted Classical Turkish music. For discussions on the connection between TRT and Turkish Classical Music, see Stokes (2010).

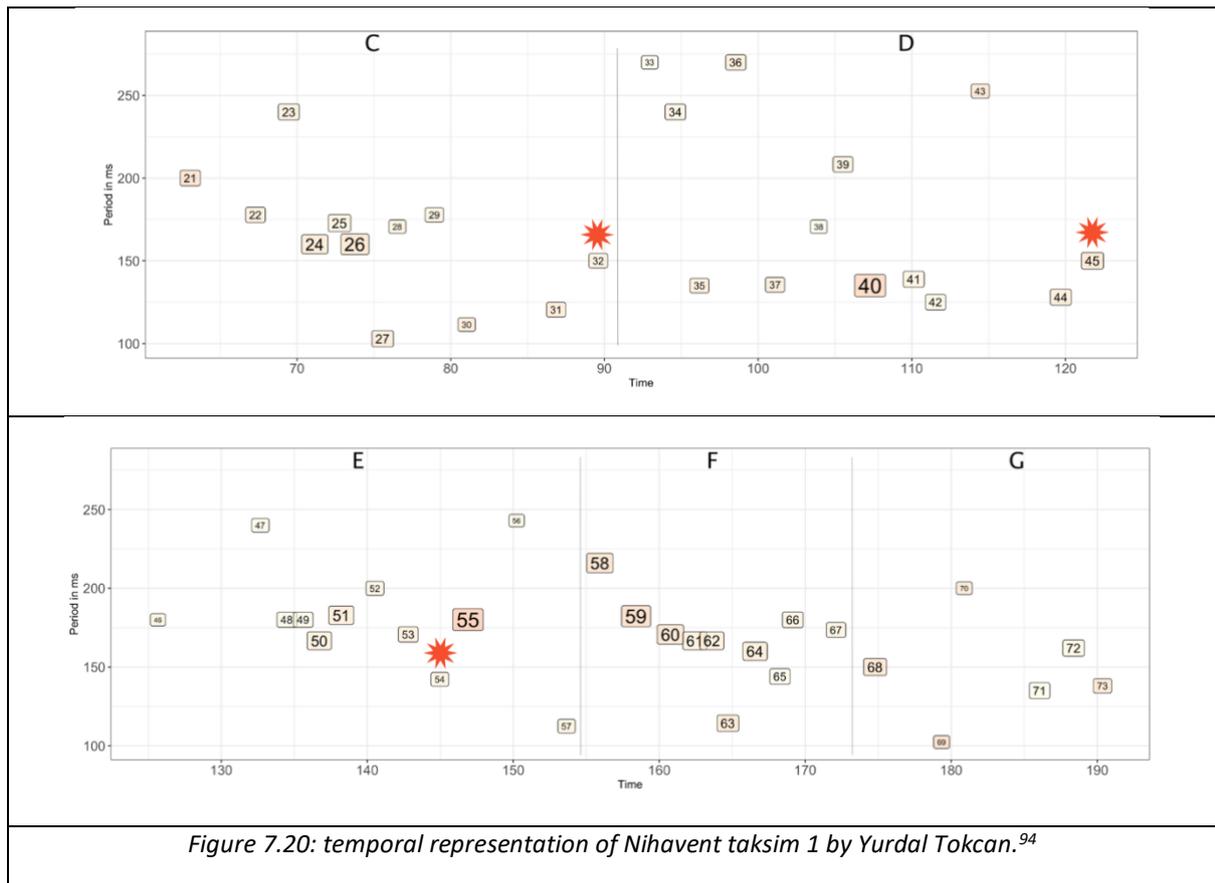
⁹³ For instance, after he performed a composition of his, I asked him about his influences on the phrasing of the piece. He mentioned that he adapted a lot of techniques from the fretless guitar, a contemporary instrument which is relatively popular in Turkey, but not a part of the classical tradition. It is not very typical for an oud player to be influenced by such instrument, and this demonstrates Tokcan's willingness to explore his instrument outside of the range of *makam* music.

One such composition, *Nihavent Saz Semai*, was introduced during the masterclass. Tokcan wrote this piece in homage to Necdet Yasar, one of the most respected Tanbur players of the 20th Century and Tokcan's most important master, with whom he performed for years at TRT. This is a composition in *makam Nihavent*, which, according to Tokcan, reflects a highly emotional character. During the masterclass, he taught the students to play the piece slowly, demonstrating various ornaments suitable for expressively presenting its phrases.

During the breaks of the masterclass sessions, we discussed *taksim* improvisation, focusing on how context and the order of compositions influence the character of the improvisation. Tokcan explained that if he were to perform a *taksim* before his *Nihavent Saz Semai*, he would choose a *taksim* style that complements the character of the composition. To illustrate this, he performed two *taksims*: the first demonstrated an appropriate style to precede his piece. In the second example, he presented what he considered an unsuitable style to be followed by his *Nihavent Saz Semai*.

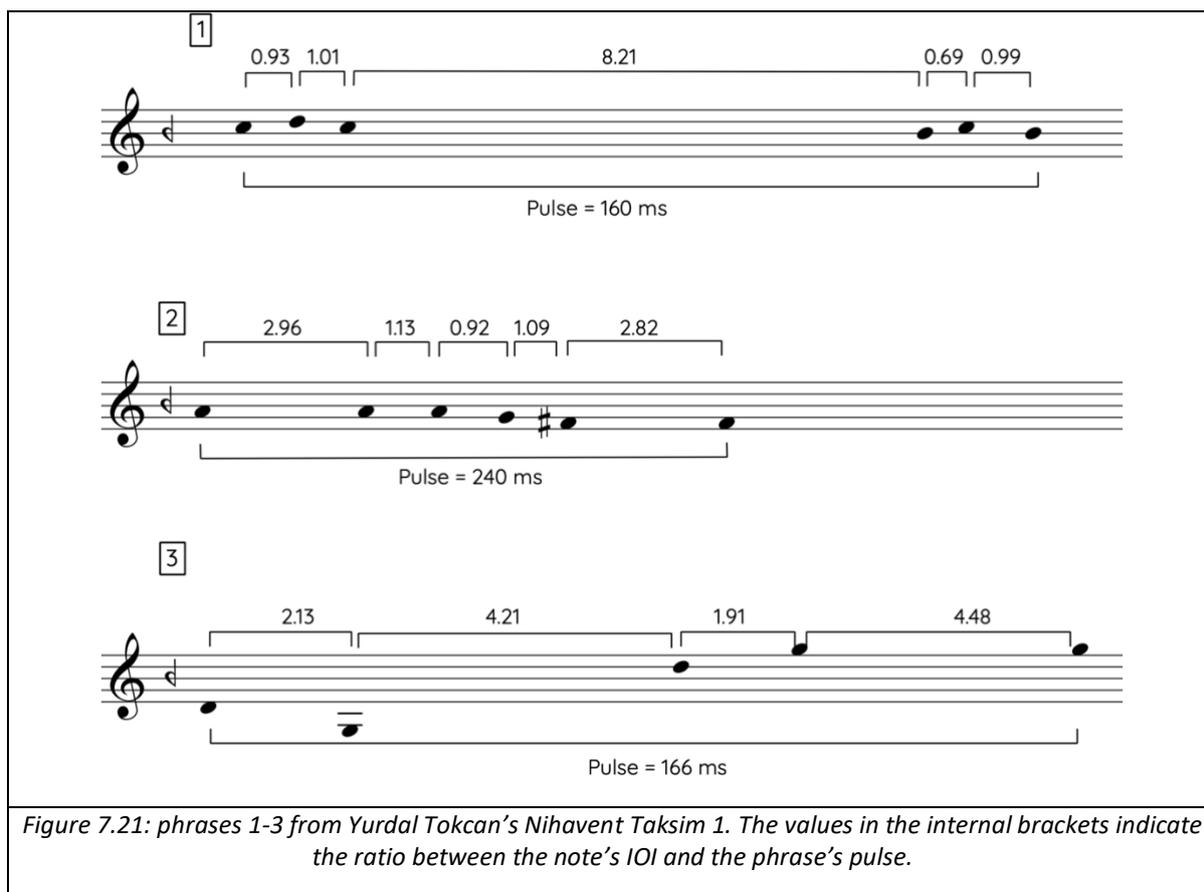
7.5.2 *Nihavent taksim 1 (within the appropriate style to precede Yurdal's Nihavent Saz Semai)*





The *taksim* begins with short, low metricity phrases separated by long silences. Compared to the other *taksims* analysed here, the silences between phrases are unusually long. This, combined with the non-metric nature of the phrases, creates an open and meditative atmosphere which is in accordance with the composition for which this *taksim* is performed. A closer examination of the first three phrases reinforces this idea. While a certain degree of regularity is observed in phrases 1 and 2, reflected in the durations close to the phrase pulses, this regularity is interrupted by longer notes that disrupt the sensation of pulse. This rhythmic ambiguity is also reflected melodically, as the central note of the section, *rast* (G), is inferred only through the open string notes of phrase 3. However, this note is not explicitly reinforced until the cadence in *rast* (G) at the end of the *taksim*, in phrase 54. Until this point, the *taksim* emphasises *neva* (D), with the first cadential phrase (11) on this note introducing a higher degree of metricity, followed by progressively more metrical phrases.

⁹⁴ Due to a technical problem with the audio recorder, the recording of this *taksim* presented radio interference. However, this did not prevent an accurate onset detection, which had to be conducted in its most part manually.



Between phrases 12-17, Tokcan alternates between slower (phrases 12, 14, 16) and faster pulses (phrases 13, 15, 17). This alternation, combined with the melodic characteristics of the phrases, creates a distinct antecedent-consequent sensation. From phrase 18 onwards, the sense of pulse becomes more apparent, either due to repeated regular notes (phrase 18) or through a long section featuring several phrases with pulses around 175ms (phrases 22-29), peaking in metricity at phrase 26. However, this regularity is soon disrupted by less metrical phrases with dispersed pulses (phrases 31-38), reintroducing a sense of irregularity. This alternation between more and less metrical moments continues to define the improvisation's rhythmic structure, with metrical sections appearing in phrases 40-42, 48-55, 58-68, while less metrical moments are found in phrases 43-44, 46-47, 56-57 and 69-73. Notably, less metrical moments vary greatly, featuring pulses at both very fast and very slow tempo, and sections comprising either a small or large number of phrases. The more metrical sections also exhibit variation, including one large *accelerando* (phrases 58–62), groups of phrases at

medium tempo (phrases 26–29) and fast tempo (phrases 40–42), as well as a few isolated metrical phrases (18, 55).

In this *taksim*, cadential phrases exhibit a similar level of metricity to non-cadential phrases. However, their pulse is remarkably consistent and relatively fast, albeit still within the range found in non-cadential phrases.

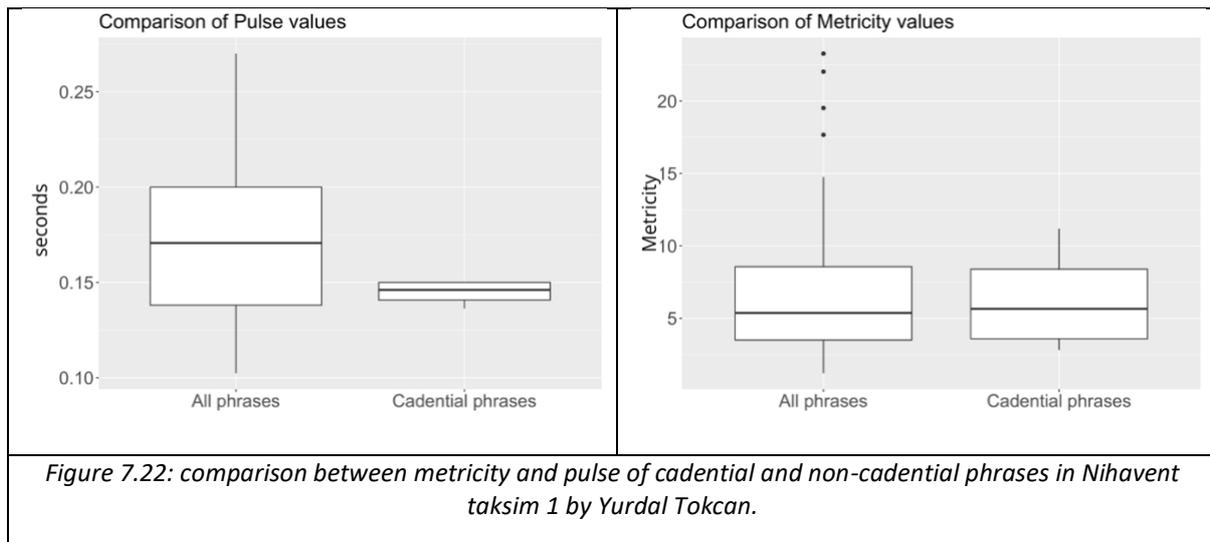


Figure 7.22: comparison between metricity and pulse of cadential and non-cadential phrases in *Nihavent taksim 1* by Yurdal Tokcan.

Perhaps the most striking feature of this improvisation is the wide array of metrical features it encompasses. Despite being less metric, certain sections demonstrate significant metricity in varying forms. This diversity could be interpreted as a hallmark of Tokcan’s improvisation style, expanding the emotional range of the *taksim*. It is no surprise that Tokcan’s *taksims* are highly esteemed in the world of *makam* music

7.5.2 Yurdal Tokcan: *Nihavent taksim 2*

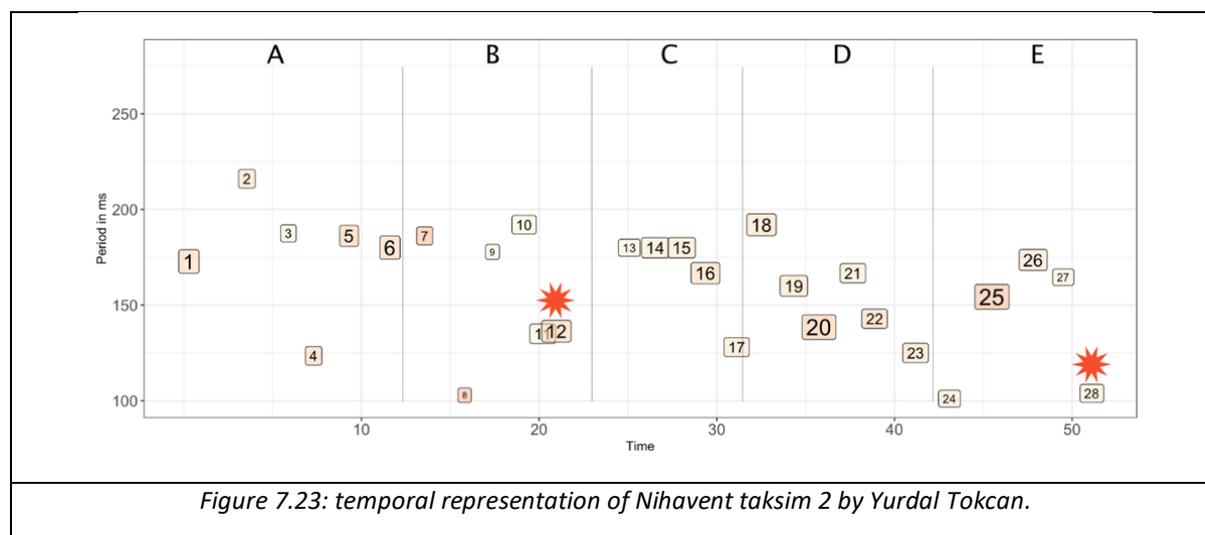
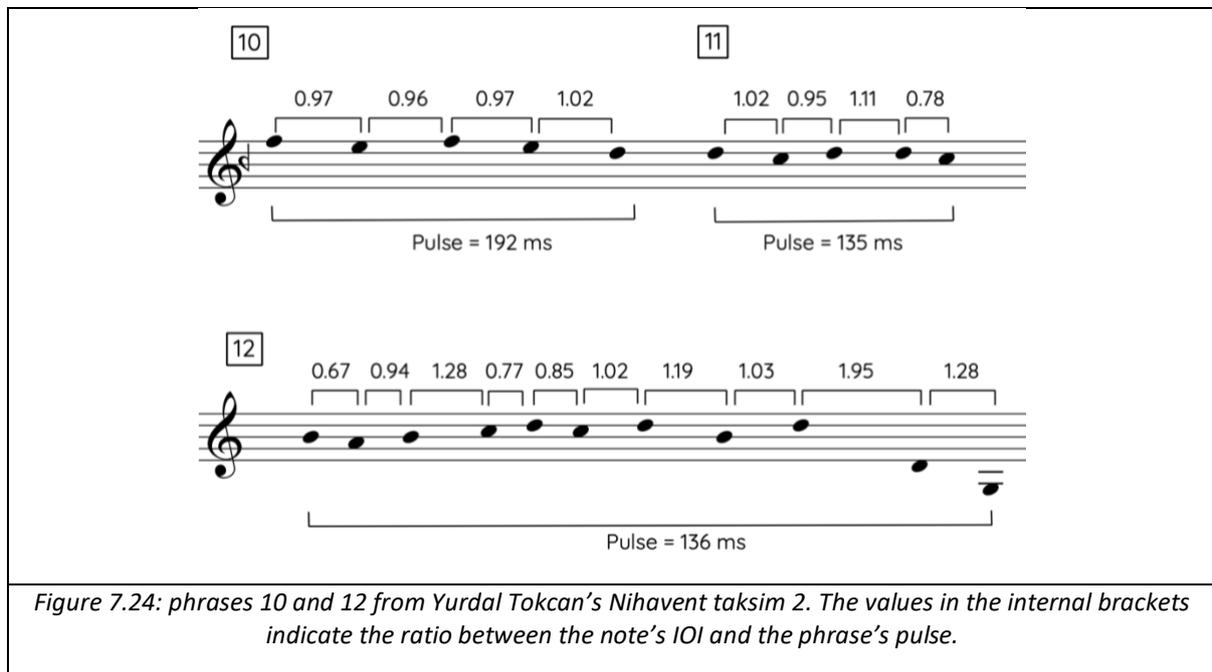


Figure 7.23: temporal representation of *Nihavent taksim 2* by Yurdal Tokcan.

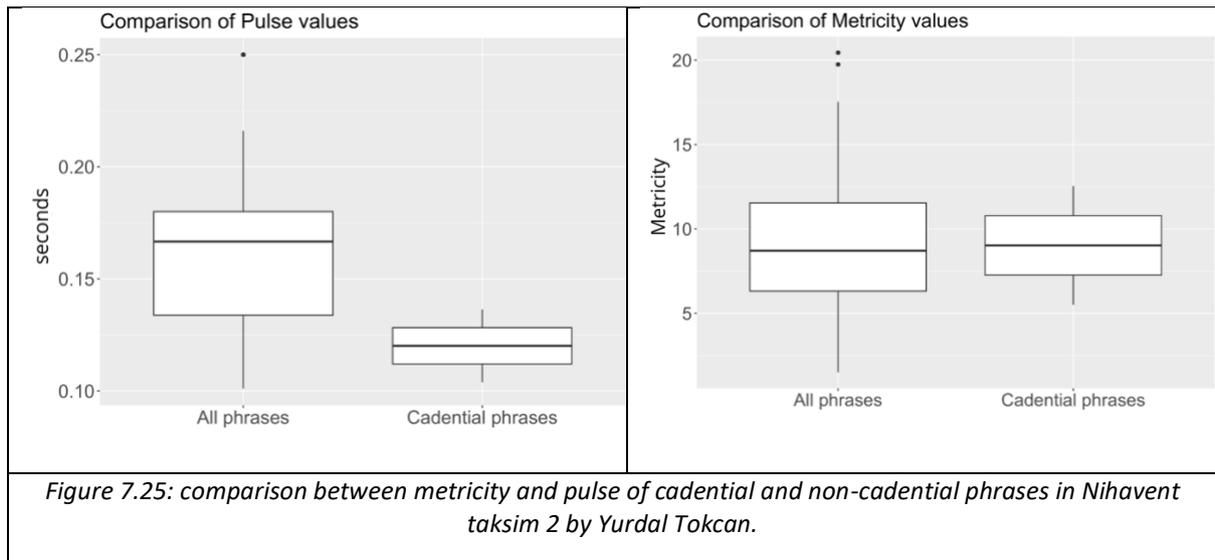
As mentioned, the second iteration of the *Nihavent taksim* was performed to present a contrasting version to the previously observed *taksim*. This version was intended as an example of an inadequate introduction to Tokcan's *Nihavent Saz Semai*. The inadequacy stems from the strong, rhythmic character of the improvisation, which contrasts with the ethereal and meditative atmosphere Tokcan envisions for his composition. Notably, Tokcan did not perform a 'generic' inadequate *taksim*; he employed motifs and phrases from his composition, indicating that this *taksim* was deliberately conceived to demonstrate an introduction to his piece. This makes the comparison between the two iterations particularly interesting, as it highlights their functional connection.

Possibly due to its inadequacy, the *taksim* is significantly shorter. Between phrases 1–16, there is a preference for phrases with pulses around 175ms (with phrases 11–12 as metrical outliers around 140ms and phrases 2, 4, and 8 as non-metrical outliers). Additionally, two *accelerando* sequences occur between phrases 8–14. The *seyir* presents a cadence on *neva* (D) on phrase 12, followed by an exploration of the higher register of the *makam* between phrases 13–17, before moving towards a cadence on *rast* (G) in phrase 26. Phrases 10–12 demonstrate that even in a *taksim* marked by strong metricity, cadential moments can emphasise notes using rhythmic irregularities. For example, after performing several phrases (2–10) with pulses between 175–195ms, Tokcan concludes the section by increasing the pulse

of phrases 11–12 and adding rhythmic irregularities, reinforcing the note *neva* (D) at the end of phrase 12.



The pulses of the phrases tend to cluster between 150–190ms, resulting in a lower average tempo and standard deviation of pulse compared to the previous *Nihavent taksim*. This feature aligns with observations of *taksims* derived from the ‘folk’ tradition. The average metricity is 8.9, which is relatively high. While the *taksim* is clearly more metric, there are no distinct sequences of progressively increasing or decreasing metricity. Instead, strongly metric phrases (11, 12, 20, 25) are often preceded by less metrical phrases, creating noticeable contrasts in metricity between phrases (although all remain relatively high in metricity). While cadential phrases exhibit similar metricity to non-cadential phrases, their pulses are significantly faster.



7.5.3 Comparing Yurdal Tokcan's *Nihavent taksims*

The comparison of the two *Nihavent taksims* reveals a number of insights into Yurdal Tokcan's approach to improvisation. While both *taksims* share the same *makam* and incorporate melodic material from Tokcan's composition *Nihavent Saz Semai*, their rhythmic profiles diverge significantly, reflecting the contrasting purposes of the improvisations.

The first *taksim* (*Nihavent 1*) is characterised by a wider range of both pulse and metricity, beginning and ending with fast, less metrical sections. This variability suggests a broader range of emotional expressiveness, aligning with Tokcan's intention to create an ethereal and meditative atmosphere appropriate for introducing his composition. The longer silences between phrases, combined with non-metrical and rhythmically ambiguous phrases, contribute to this contemplative character. Despite this irregularity, the *taksim* exhibits moments of rhythmic consolidation, particularly in cadential phrases such as those centred around *neva* (D) and *rast* (G), where metricity increases and pulses cluster within a more defined range. These features illustrate Tokcan's deliberate use of rhythmic contrast to shape the improvisation's emotional arc and build anticipation for the subsequent composition.

In contrast, the second *taksim* (*Nihavent 2*) presents a more compact and rhythmically agitated profile. With a higher average metricity (8.88 compared to 6.93 in *Nihavent 1*) and a

lower average pulse (158ms compared to 171ms), this improvisation prioritises rhythmic density and faster phrases. Unlike *Nihavent 1*, where sections transition gradually between less and more metrical phrases, *Nihavent 2* features sharp contrasts in metricity between successive phrases. Strongly metrical phrases, such as phrases 11, 12, and 25, are juxtaposed with less metrical phrases, creating a sense of rhythmic tension. This rhythmic intensity, combined with the clustering of pulses between 150–190ms, results in a more consistent yet less varied improvisation. Tokcan himself acknowledged that this approach creates an ‘agitated’ character, which contrasts sharply with the serene and expansive qualities he envisioned for his *Nihavent Saz Semai* and ‘does not work with the composition’ (Tokcan, 2023, personal communication).

Another interesting comparison is the treatment of cadential phrases. In *Nihavent 1*, cadential phrases exhibit a similar metricity to non-cadential phrases but are marked by their relatively fast and consistent pulses, which provide rhythmic stability while maintaining the improvisation’s contemplative quality. *Nihavent 2* presents similar traces; cadential phrases are equally metrical and integrated into the surrounding phrases, and their faster pulses reinforce the overall agitated nature of the *taksim*.

Melodically, both *taksims* emphasize the *makam’s* central notes, *neva* (D) and *rast* (G), but their trajectories differ. *Nihavent 1* develops gradually, with phrases often separated by pauses and transitions between registers occurring smoothly. In *Nihavent 2*, the melodic progression is more abrupt, with rapid explorations of the *makam’s* upper register and shorter transitions between phrases. This difference in melodic pacing further underscores the contrasting rhythmic and emotional profiles of the two improvisations.

Overall, the comparison between *Nihavent 1* and *Nihavent 2* demonstrates Tokcan’s versatility in adapting his style to different conceptual and functional goals. The broader range of rhythmic and melodic elements in *Nihavent 1* reflects its role as an appropriate prelude to the *Nihavent Saz Semai*, while the agitated and rhythmically intense *Nihavent 2* illustrates the deliberate contrast Tokcan sought to demonstrate as an unsuitable introduction. The figure in sequence highlights these differences, showcasing how the two *taksims* diverge in their pulse and metricity profiles.

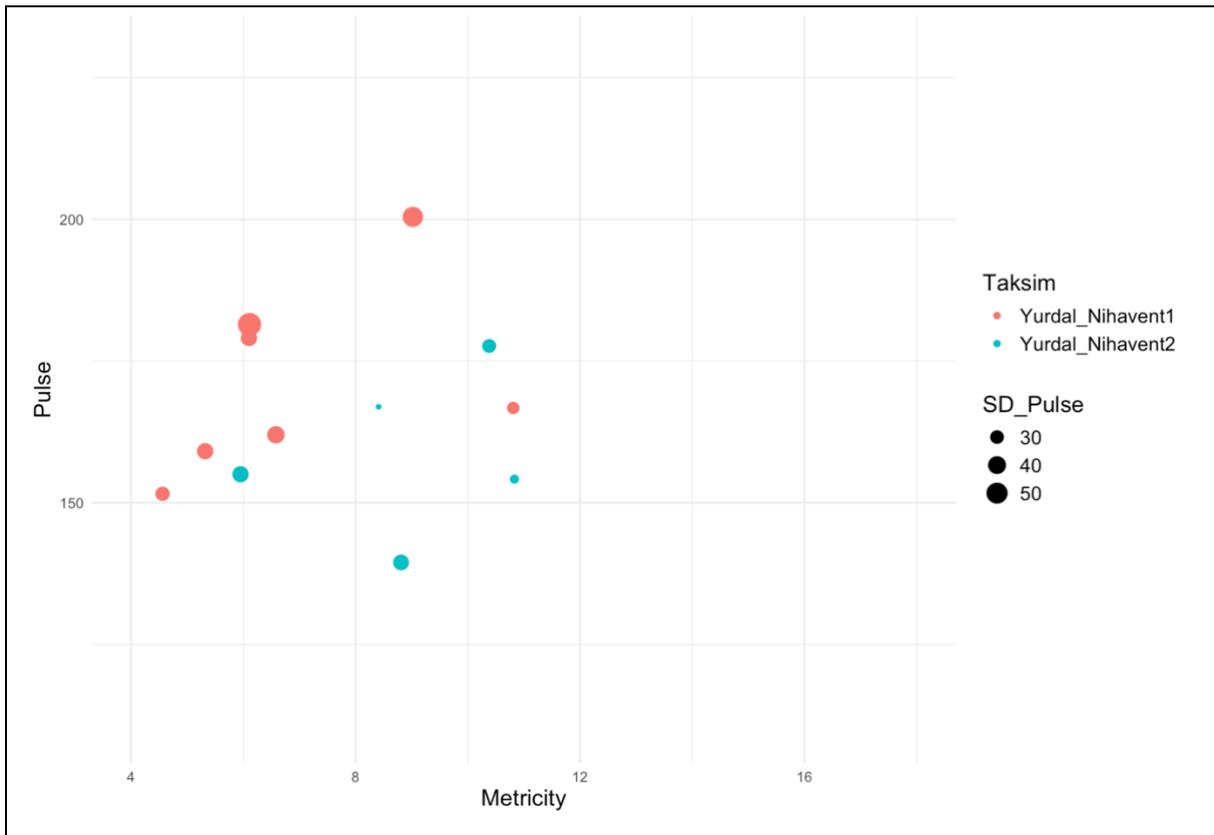
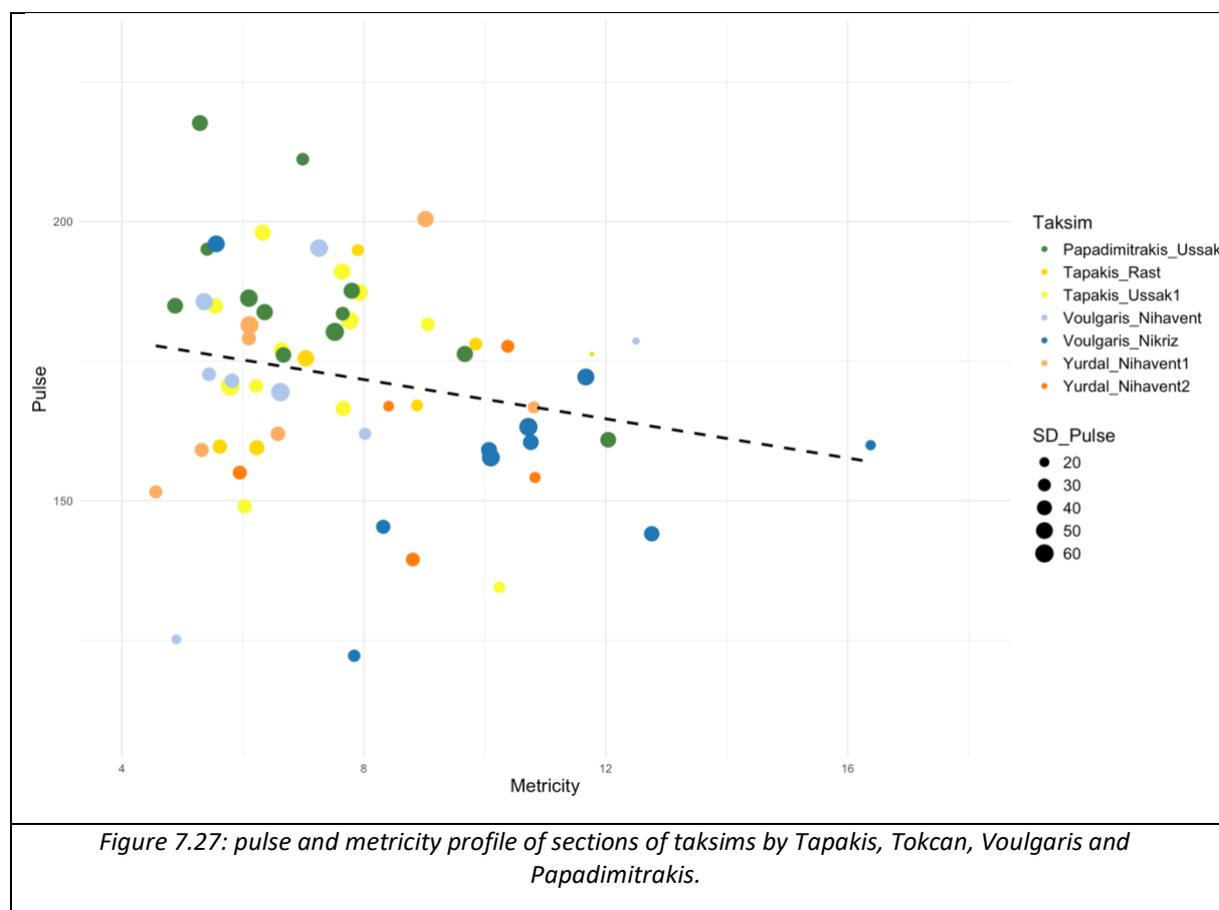


Figure 7.26: pulse and metricity profile of sections of two taksim by Yurdal Tokcan.

7.6 Conclusion

This chapter has analysed seven *taksim* improvisations by four contemporary oud players, exploring the rhythmic characteristics present in their performances. The findings reinforce the versatility of contemporary musicians, who adapt their improvisations to a range of performance environments and conceptual goals, demonstrating both continuity with and divergence from earlier traditions.



The rhythmic characteristics of the *taksims* analysed here illustrate how context influences improvisational choices. Performances in contemplative settings or preceding serene pieces often feature slower pulses, lower metricity, and a focus on subtle transitions between phrases. Examples such as Voulgaris's *Nihavent* and Tokcan's *Nihavent 1* demonstrate how rhythmic ambiguity and longer pauses contribute to a meditative atmosphere, aligning with the reflective nature of their respective contexts. Conversely, improvisations in lively or

informal settings, such as Voulgaris's *Nikriz* and Tokcan's *Nihavent 2*, highlight faster pulses, higher metricity, and more dynamic phrasing, reflecting the energy and rhythmic demands of their environments.

The analyses also demonstrate how individual musicians integrate diverse rhythmic approaches, often blending characteristics associated with different traditions. For example, Tapakis's *Uşşak taksim* presents elements from both Şençalar's metric style and Tanrıkorur's freer rhythmic approach, resulting in a combination between regularity and rhythmic flexibility. Similarly, Papadimitrakis's *Uşşak taksim* evokes the techniques of earlier masters like Bacanos and Şençalar, while also introducing a slower development through the deliberate use of repeated notes and large-scale accelerandos.

Observing cadential phrases further reinforces the adaptability of contemporary musicians. In some cases, cadential phrases act as stabilising elements, marked by higher metricity and consistent pulses that resolve rhythmic tension, as seen in Tokcan's *Nihavent 1* and Tapakis's *Rast taksim*. In other cases, such as Voulgaris's *Nikriz*, cadential phrases maintain similar metricity levels to non-cadential phrases but employ faster pulses to create contrast and rhythmic drive.

The methodological framework introduced in this chapter has proven effective in capturing and quantifying the rhythmic characteristics of *taksim* improvisations. By systematically analysing relationships between pulse, metricity, and melodic structure, and by integrating large-scale analyses with observations of small-scale details, this approach can convey different features related to how rhythmic patterns evolve across different sections of a *taksim*.

Overall, this chapter has demonstrated that contemporary oud players employ a wide range of rhythmic strategies, adapting their improvisations to reflect the demands of varied contexts and artistic goals. The concluding section of this dissertation will discuss how these findings can connect with the analyses previously observed and, most importantly, reflect on the relationship between the analyses and earlier assumptions on the topic of free-rhythm observed in its first chapters.

Chapter 8. Conclusion

[The pendulum] was the personification of stubbornness, a persistent yearning to fall, which did not cease for a single moment, always stretching the chain, hoping it would break—but lacking the strength to break it. [...] The lamp remained determined to fall. But the chain held it back with equal obstinacy, never allowing the lamp to approach the ground. Two opposing desires. The strength and stubbornness of both were equivalent. Who would win? Neither of them. [...] The oscillation of a pendulum is the relationship between its freedom to fall and the force that restrains it.

Zsolt Harsányi, The Star Gazer: Life of Galileo⁹⁵

This research combined a diverse array of theoretical, ethnographic, and computational approaches to systematically explore rhythm in *taksim* improvisation — a musical practice long considered resistant to structured analysis. As this exploratory journey draws to a close, it is time to reflect upon the goals achieved, the insights gained, and the contributions made towards answering the main research question that guided this dissertation: *How can the development of a computational methodology for rhythm analysis enhance our understanding of rhythmic characteristics of taksim improvisation?*

The first sub-question asks *how insights from expert musicians and existing analyses of free-rhythm music can inform the construction of computational tools for analysing taksim improvisation*. Due to their non-metric character, musical styles associated with free-rhythm suffer from a lack of precise terminology in discussions. Nevertheless, there are specific features that seem to be consistently associated with non-metricity. Existing academic discourse frequently associates unmeasured music with qualities such as ‘immaterial’, ‘transcendental’, and ‘spiritual’, whereas metered music typically evokes concepts like ‘physical’, ‘structured’, and ‘material’. Conversations with musicians reinforced this notion,

⁹⁵ Translated into Portuguese by Vinicius de Moraes. English translation by the author.

with artists frequently using terms such as ‘emotional’, ‘expressive’, and ‘poetic’ to describe non-metric music, contrasting these descriptions with metric music characterised as ‘mechanical’, ‘structured’, or ‘rhythmically predictable’.

Existing analytical works provided concrete examples and initial frameworks for exploring the role of rhythm within free-rhythm practices. For example, Widdess (1994) investigated pulse in free-rhythm music, demonstrating through empirical measurements a case where a musician maintains an internal pulse even in seemingly non-pulsed improvisations. Reckford (1987) attempted to verify the existence of a ‘basic pulse’ common to multiple religious Iranian chants. Conversations with musicians presented a nuanced and complex view of pulse within *taksim* improvisations. Perspectives ranged from Lambrakis’s notion that pulse is primarily perceived by listeners, Daly’s stance emphasizing the musician’s internalized and often subconscious pulse, and Voulgaris’s intermediate position describing pulse as emerging dynamically from the interactions between musician, listener, and performance environment.

Authors such as Reckford (1987), Roeder (2019), and Cholevas (2022) made significant contributions towards categorising and measuring internal melodic and rhythmic structures. Reckford’s work explored rhythmic micro-structures by proposing measurements of phrase density referents, while Roeder applied Hasty’s (1997) concept of durational projection to analyse rhythmic gestures and their interpretative implications. Cholevas (2023) introduced the concept of ‘locally metric phrases’ to understand rhythmic subdivisions within *taksims*, suggesting that phrases perceived as free-rhythm could contain internally metric structures, thereby proposing a meaningful framework for rhythm analysis.

Musicians such as Tapakis and Daly provided contrasting visions on the internal rhythmic characteristics of *taksim*. Tapakis emphasised a detailed, analytical deconstruction of existing phrases into slower, metrically clearer fragments to aid students’ assimilation of rhythmic complexity. In contrast, Daly advocated for an intuitive approach, encouraging musicians to internalise the rhythmic fluidity without rationally dividing the phrase, but by first establishing a consistent internal pulse. Additionally, Arnon, Cholevas, and all musicians consulted in this research (along with recent academic literature presented in Chapter 1) emphasised the necessity of recognising phrases as the foundational unit for *makam* music analysis. This

consensus guided the methodological approach of this dissertation, reinforcing the centrality of phrases (and sub-phrases) as essential units of rhythmic inquiry.

By integrating these theoretical insights and ethnographic discussions, three foundational criteria emerged clearly for constructing computational tools to analyse rhythm in *taksim* improvisations: (1) employing phrases (and sub-phrases) as the primary analytical units, (2) accurately determining the pulse within each phrase, and (3) quantifying the degree of metricity within phrases. These elements provided the necessary groundwork to adapt and develop computational methodologies consistent with musical practices and analytical objectives.

Chapter 4 demonstrated that it is possible to construct analytical tools using computational methods to systematically observe rhythmic characteristics in *taksim* improvisation. To achieve this, I established clear criteria for segmenting phrases and justified decisions regarding onset detection methods. Systematic testing determined that the 'Per' function from the R package 'onsetsync' (Eerola & Clayton, 2024) provided the most accurate method for calculating a phrase's pulse and quantifying its metricity.

The creation of rhythm plots further validated this approach. These plots illustrate both large-scale patterns and small-scale nuances of rhythm, presenting the foundational criteria in a visually accessible manner. By integrating computational methodologies informed by theoretical perspectives and ethnographic insights, this research developed a systematic approach capable of quantifying and visualising rhythmic phenomena in *taksim*. The resulting analytical framework not only aligns closely with musicians' conceptualisations but is also flexible enough to handle extensive datasets, clearly addressing the sub-question regarding how computational tools informed by musicians and existing literature can contribute to rhythm analysis in *taksim* improvisation.

Moving to the second sub-question, this research questioned *how musicians discuss and transmit rhythm in taksim improvisation in the context of lessons*. Chapter 5 provided an analysis of discussions held during music lessons with Perikles Papapetropoulos, Kyriacos

Tapakis, and Alexandros Papadimitrakis, expanding on the reflections observed in Chapters 2 and 3 by including concrete musical examples performed by these musicians.

Each musician presented distinctive approaches to addressing rhythm within *taksim* phrases. Papapetropoulos's teaching demonstrated diverse rhythmic possibilities applied to similar melodic gestures, alternating between irregular passages and clearly regular phrases. His pedagogical method emphasised exploring melodic gestures through varying degrees of rhythmic precision, thus enabling students to internalise both regular and irregular rhythmic characteristics. Conversely, Papadimitrakis provided examples in which durations exhibited a high degree of internal regularity within phrases, yet highlighting different levels of rhythmic irregularity through the strategic use of accents and tempo fluctuations. Through exercises that constrained melodic material to a narrow region, he illustrated how rhythmic interest could be maintained via irregular accents and progressive tempo changes. This pedagogical practice revealed how a consistent underlying pulse could be strategically manipulated, thus preserving a sensation of rhythmic freedom within a relatively regular framework.

Tapakis's approach offered another insightful perspective through a detailed examination of a phrase originally performed by Cinucen Tanrikorur. His lessons illustrated how phrases that are perceived as rhythmically free can nonetheless be systematically analysed, segmented, and transmitted through a structured, step-by-step methodology. This exemplifies a more analytical approach to transmitting rhythmic knowledge to students.

Overall, the analysis presented in Chapter 5 underscored how musicians engage with rhythm through pedagogical strategies such as imitation, detailed analytical breakdowns, and creative exercises. Regardless of whether the approach was explicitly articulated or implicitly demonstrated, each musician transmitted distinct yet coherent conceptualisations of rhythmic structure, aiming to expand students' rhythmic and melodic vocabulary. Critically, this chapter also provided proof-of-concept examples for the small-scale analytical features developed in Chapter 4, demonstrating their practical capability to capture subtle rhythmic nuances — an aspect further explored through detailed analyses in Chapter 7.

The next sub-question considers *how the analysis of improvisations from 20th century masters contributes to understanding the different rhythmic structures and stylistic tendencies in taksims*. Seven improvisations by Cinucen Tanrikorur, Kadri Sençalar, and Yorgo Bacanos were analysed to address this question. The analysis was guided by previous conversations with musicians and existing literature, both of which established a significant stylistic distinction between the ‘taverna style’ and the ‘classical style’ of *taksim* improvisation. This distinction provided a baseline for systematically examining rhythmic tendencies within these historical performances.

The findings from this analysis can be grouped into two primary categories. Firstly, the developed analytical tools successfully generated quantitative and visual indicators capable of distinguishing *taksim* performances that align more closely with either the taverna or classical styles. The segmentation of analysed improvisations into distinct sections according to the process described in Chapter 4 (see Figure 6.17) demonstrated this. Clear patterns emerged from this comparison: sections exhibiting lower metricity values (approximately between 3 and 6) correspond to characteristics identified by musicians as typical of the classical style. Conversely, sections with metricity values consistently higher than 6 indicated metric regularity typically associated with the taverna style. Additionally, the analysis identified distinctive pulse profiles: taverna-style *taksims* presented faster pulses with more pronounced accelerando tendencies, while classical-style *taksims* featured slower pulses, the frequent appearance of rallentando gestures, and an overall broader distribution of pulse values across sections.

Secondly, although the comparative analyses of individual musicians are still in an exploratory stage, preliminary observations suggest distinct rhythmic tendencies associated with each master studied. For instance, Sençalar’s *taksims* display an extensive use of pulse accelerando and higher metricity in their central sections. In contrast, Tanrikorur’s performances show notably greater rhythmic variability, with sections characterised by fluctuating metricity and extensive use of irregular phrases. Bacanos’s improvisations differ significantly, exhibiting very high metricity levels throughout phrases yet also a considerable degree of variation in pulse and metricity across sections. These preliminary stylistic distinctions highlight the

analytical method's potential to capture nuanced personal approaches to rhythm within *taksim*.

In response to the sub-question, the analyses thus provided both statistical and visual evidence enabling the identification and characterisation of specific rhythmic approaches within *taksim* improvisations. Crucially, this data-driven approach offers a more nuanced understanding of how rhythmic elements differentiate stylistic traditions and individual artists, opening new possibilities for a detailed exploration of the rhythmic dimension in *makam* practices.

The final sub-question investigates *what the analyses reveal about the ways contemporary musicians engage with, adapt, or diverge from the rhythmic practices identified in historical taksim improvisations*. To address this, seven *taksims* performed by Alexandros Papadimitrakis, Yurdal Tokcan, Evgenios Voulgaris, and Kyriacos Tapakis were analysed. While maintaining the established distinction between 'taverna' and 'classical' styles as reference points, the analyses demonstrated that contemporary musicians often adopt a hybrid approach, incorporating contrasting rhythmic elements within their performances.

On the one hand, data from certain *taksims* closely aligned with a specific style reaffirmed the aforementioned distinctions (Figure 7.27). For instance, Voulgaris's *Nihavent* and Tokcan's *Nihavent 1* exhibited lower metricity values characteristic of the classical improvisation style, marked by low metricity and broader pulse distributions. On the other hand, Tokcan's *Nihavent 2* and Voulgaris's *Nikriz taksims* presented distinctly higher metricity levels, aligning closely with rhythmic characteristics typical of the taverna style, including regular pulses and metrically consistent phrases.

The analysis of improvisations by Papadimitrakis and Tapakis illustrated a blending of rhythmic approaches within single *taksims*. Papadimitrakis's *Uşşak taksim* exhibited metricity values fluctuating between those typical of the classical and taverna styles, a finding reinforced by the musician's own commentary on his diverse stylistic influences. Similarly, Tapakis's *Uşşak taksim* displayed rhythmic characteristics influenced by his engagement with existing *taksims* during music lessons, particularly those by Sençalar and Tanrıkorur. This

suggests that contemporary rhythmic practice can be directly shaped by in-depth study and assimilation of historical masters.

Chapter 7 also included small-scale analyses, examining rhythm within individual phrases. A significant finding at this detailed analytical level was that contemporary musicians employ diverse rhythmic strategies within phrases to influence the listener's perception of pulse and metricity. For example, Papadimitrakis combined consistent pulse subdivisions with irregular accents to create alternations between sensations of regularity and irregularity. Similarly, performances by Tapakis and Tokcan deliberately disrupted rhythmic expectations through shifting note durations and unexpected accents, providing further examples of how contemporary musicians strategically generate rhythmic ambiguity.

In answering this sub-question, it becomes clear that the contemporary musicians examined in this research creatively negotiate the stylistic legacy of different rhythmic practices in *taksim* improvisation. Rather than adhering strictly to a singular tradition, these performers combine, adapt, and reinterpret elements from both classical and taverna styles, depending on the improvisational context and personal musical influences. While further research on this topic is necessary, the provided examples clearly demonstrate rhythm as a central expressive tool within contemporary improvisational practices.

Having summarised the most important findings from each sub-question, it is now possible to return to the main research question that has guided this dissertation: *How can the development of a computational methodology for rhythm analysis enhance our understanding of rhythmic characteristics in taksim improvisation?*

The computational methodology developed in this research allowed for empirical documentation and quantification of the rhythmic distinctions between 'classical' and 'taverna' styles of *taksim* improvisation. Although musicians intuitively acknowledge this distinction, this research systematically confirms it through measurable rhythmic features such as pulse consistency and the distribution of metricity values across phrases and sections. This empirical validation significantly enhances our ability to discuss and analyse rhythm in *taksim* in a structured and replicable manner.

Further exploration of the analytical tools shed new light on the rhythmic strategies employed in a free-rhythm context. These findings revealed specific techniques musicians use to balance regularity and irregularity. Rather than describing rhythmic freedom through elusive terminology, the analysis demonstrated concretely how structured irregularities, strategic use of accents, and controlled fluctuations in pulse enable musicians to sustain musical coherence without a clear metric framework.

This dissertation builds upon analyses by Roeder (2019) and Widdess (1994), who similarly addressed rhythm in free-rhythm improvisations from qualitative perspectives. However, it extends their analytical approaches by incorporating systematic computational methods developed through close collaboration with expert practitioners. This combined participatory-computational approach facilitates precise observations of large-scale and small-scale rhythmic features at an empirical and quantitative level, thereby opening a new methodological direction for empirical rhythm analysis. Consequently, future research integrating the computational-quantitative framework proposed here with the qualitative-interpretative insights developed by Roeder and Widdess promises fruitful avenues for deeper analytical exploration of rhythm in free-rhythm musical traditions.

Comparative analysis of historical and contemporary recordings further enriched this understanding, highlighting shifts in rhythmic approaches over time. While historical masters demonstrated clear adherence to either the 'classical' or 'taverna' styles, contemporary musicians displayed a more hybrid approach, blending these stylistic tendencies either across different performances or within individual *taksims*. This indicates that contemporary musicians consciously engage with historical rhythmic conventions, selectively incorporating, adapting, or diverging from traditional practices to achieve greater expressive variety. These insights suggest a dynamic evolution within *taksim* performance tradition, broadening our comprehension of contemporary rhythmic practices.

Moreover, the participatory nature of this research, with an effort to discuss foundational concepts and findings with musicians, enabled the observation of processes that were intrinsic to musicians' creative process and often hidden from conventional analytical

scrutiny. Through collaborative discussions on concepts such as pulse perception, metricity, and phrase structure, musicians articulated implicit knowledge and intuitive strategies that inform their improvisational practices. Thus, the process of constructing the methodology proved to be as rewarding as conducting the analyses, offering a perspective valuable for future research both in content and methodological approach.

Ultimately, the diverse views and approaches from musicians regarding different aspects of the rhythmic construction of *taksim* should come as no surprise. Considering the particular position of the musicians examined – simultaneously experts deeply embedded in the tradition yet positioned as cultural intermediaries rather than insiders – the learning process of *makam* becomes even more diverse, and each musician’s learning trajectory reflects individual choices, in opposition to a unified way of learning this tradition. By embracing and highlighting these differences, this research does not aim to arrive at a unified understanding of *taksim*, but to conceptualize the art of *taksim* as a profoundly personal medium through which musicians translate their innermost emotions into music.

While the research process made a considerable effort to describe rhythm in *taksim* effectively, it is important to acknowledge several limitations. The demanding nature of constructing a methodology based on a participatory approach led to a reduced number of artists and improvisations analysed. Therefore, while the conclusions suggest the validity of the method in distinguishing between the taverna and classical styles of *taksim*, further analyses using a larger corpus are necessary to validate these findings. For this reason, the analytical process has been described in as much detail as possible, to ensure its replicability and support the continuation of this project.

Regarding the small-scale observations, the method of comparing durations using the ratio between IOIs and the phrase’s pulse helps to evaluate different phrases in terms of their regularity, but it can occasionally result in counterintuitive interpretations. For instance, in Figures 7.5 and 7.9, the ratio between notes changes significantly, suggesting a large shift in note durations. However, as the pulse is also changing between phrases, this change in ratio does not necessarily reflect the actual durations. While this feature does not present a critical

problem for the methodology, it does require the researcher to remain attentive to multiple parameters when analysing the improvisation.

The computational methodology developed in this dissertation was designed to capture measurable rhythmic features. However, to achieve a more accurate understanding of the role these features play in the music, it is important to connect the findings of this methodology with the melodic characteristics of the *taksim*. In this research, this connection was primarily addressed through text, describing the musician's *seyir* and linking the melodic development to the rhythmic findings. A promising next step in the development of such analytical tools would be to incorporate melodic features into the visualisations, allowing for a more comprehensive observation of the musical elements at play in the *taksim*.

Although I specifically designed this research to analyse *taksims*, several other free-rhythm musical genres that share similarities with this practice could benefit from the proposed methodology. The styles most closely related include the Arabic *maqam* system, the Iranian *dastgāh*, and the central Asian *mugham*. In such cases, only minor adaptations would be necessary to produce comparative analyses between improvisations from different traditions. Other musical practices also exhibit important affinities. The *ālāp*, a section of the Hindustani *Raga* tradition, presents an especially interesting case. While not geographically close to the traditions previously mentioned, it bears numerous structural resemblances—particularly in its treatment of free-rhythm. This similarity becomes especially evident when consulting the literature on the topic; for example, Clayton's (2008: 102-105) definition of the rhythmic aspects of an *ālāp* could almost entirely apply to a *taksim*. These genres, therefore, are natural candidates for future investigations.

The comparison between these traditions could serve as an important step towards recognising the deep connections and shared features across modal practices in the Eastern Mediterranean and Central and South Asia. As discussed in Chapter 1, nationalist discourses shaped many theoretical models of *makam* and related systems developed during the 20th century. Often, this was done seeking to assert the uniqueness of each tradition at the expense of acknowledging their common ground. In contrast, a methodological tool such as the one developed in this research offers the possibility of drawing analytical connections

between these traditions — connections that, as some of the musicians consulted here suggest, reflect historical, aesthetic, and structural continuities that are more substantial than commonly acknowledged. In this sense, the development and application of such conceptual tools not only contributes to the academic understanding of rhythm in *taksim* but also point towards a broader project of promoting dialogues between musical cultures that have predominantly been studied in isolation, fostering a promising avenue for future studies using a data-driven, cross-cultural comparative analysis.

Appendices

9.1 Appendix I: Information Sheet and Consent form



INFORMED CONSENT FORM

Study Title: Investigating Rhythm within taksim improvisation

Researcher(s): Juliano Abramovay

Please initial box

1. I confirm that I have read and understand the information sheet dated DD/MM/YY (version.....) for the above project	
2. I have had the opportunity to consider the information and ask any questions	
3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason	
4. I agree to take part in the above project	
5. I have been informed about how the data will be used and stored	

Participant

Name

Signature

Date

.....

.....

.....

Researcher

Name

Signature

Date

.....

.....

.....

INFORMATION SHEET

Study Title: Investigating rhythm within taksim improvisation

Researcher(s): Juliano Abramovay

Researcher contact email: juliano.t.abramovay@durham.ac.uk

Date: 03/03/2022

What is this study about?

This study aims to look into rhythmical elements of taksim improvisations. Because this its 'free-rhythm' (non-metrical) characteristics, rhythm within taksim has not been research in detail, and we aim to propose a methodology to discuss the phenomenon.

What will participation in this study involve?

Participating to this study will involve one or more of the following activities:

- Listening and discussing existing recorded taksims.
- Performing taksim improvisations and subsequently discussing it.
- Discussing existing analysis of taksim that I have undertaken.

The activities might be recorded with audio and/or video, always with a written consent from the participant.

How will the data be used and stored?

Data obtained in this activities will be included in my dissertation and might be used in conferences, articles and other types of scientific publications. Names will not be used unless this is relevant for the research and explicitly authorized by the participants.

All data will be stored in a dedicated password-protected folder within a cloud. Data will be reviewed after 5 years and, if not relevant, will be deleted.

What if I change my mind?

If, by any reason, the participant do not wish to continue, they can withdraw at any time. All the data from the participation will be destroyed. If they wish to withdraw in a later stage, they can do so by sending an email to juliano.t.abramovay@durham.ac.uk informing the wish to withdraw. The time limit for asking to withdraw information is one year.

Who can I contact if I have questions or concerns?

If the participant have any question or remark regarding your participation, they can write to juliano.t.abramovay@durham.ac.uk. If the participant has any concern or complaint, they can write to martin.clayton@durham.ac.uk or laura.leante@durham.ac.uk.

9.2 Appendix II: instructions for accessing the supporting documentation

The submission of this dissertation includes a folder containing supporting documentation for accessing the audio examples referenced in the research⁹⁶. The documents are organised by chapter, with one folder per chapter containing all the audio examples presented in the dissertation.

In addition to the audio files, each full-length *taksim* analysed in this dissertation is accompanied by the following supporting documentation:

- **Sonic Visualiser file** (.sv file)

This file works in conjunction with the corresponding audio file found in the same folder. It displays the onset and phrase segmentations for the respective *taksim*. Additionally, it provides a visual representation of phrases and cadences. The most effective way to listen to the *taksims* while following the analysis is through Sonic Visualiser, as it allows for real-time tracking of phrase segmentation and cadences.

- **Onset segmentation file** (MusicianTaksim00_onset.csv)
- **Phrase segmentation file** (MusicianTaksim00_phrases.csv)
- **Section segmentation file** (MusicianTaksim00_subgroups.csv)
- **Cadential phrases selection file** (MusicianTaksim00_cadentialphrases.csv)

The supporting documentation is required to run the codes described in sequence.

⁹⁶ The material can be found under the following link: <https://doi.org/10.15128/r1707957760>.

9.3 Appendix II: RStudio Script for data preparation

The following instructions are not necessary to access the analyses presented in this dissertation, but are necessary to produce new analyses or to replicate the analyses produced in this research.

9.3.1 Creating 'Onset' and 'Phrase' .csv files based on segmentation created on Sonic Visualiser.

After conducting segmentations according to the process described in Chapter 4, the researcher should export the annotation layers from Sonic Visualiser (**File → Export Annotation Layer**). The following RStudio script can then be used to generate two .csv files: one with the onsets of the recording (MusicianMakam00_onsets.csv) and one with the phrase segmentation (MusicianMakam00_phrases.csv). Both files should be saved in the same folder.

```
,  
  
# Load necessary library  
library(dplyr)  
  
# Read the data from the CSV exported file  
onsets <- read.csv("data_onsets.csv", header = FALSE, sep = "\t", stringsAsFactors = FALSE)  
  
# Clean the data: Remove non-numeric characters and trim whitespace  
onsets[,1] <- gsub("[^0-9.]", "", onsets[,1])  
  
# Convert the first column to numeric  
onsets$V1 <- as.numeric(onsets$V1)  
  
# Handle NA values  
onsets <- na.omit(onsets)  
  
# Round the numbers to three decimal places  
onsets$V1 <- round(onsets$V1, 3)  
  
# Select only the first column and create a new data frame
```

```

result <- data.frame(onsets = onsets$V1)

# Write the data to a new CSV file
write.csv(result, "MusicianMakam00_onsets.csv", row.names = FALSE, quote = FALSE)

### Phrase segmentation File

# Read the data from the CSV file
original_data <- read.csv("data_phrases.csv", header = FALSE)
colnames(original_data) <- c("Time", "Label")

# Initialize the phrase counter
phrase_counter <- 1

# Create a dataframe to store the processed data
processed_data <- data.frame(phrase = integer(), start = numeric(), end = numeric())

# Loop through the dataset to pair each start with the next end point
for (i in seq(1, nrow(original_data), by = 2)) {
  # Check if the end point exists
  if (i + 1 <= nrow(original_data)) {
    processed_data <- rbind(processed_data,
                           data.frame(phrase = phrase_counter,
                                       start = round(original_data$Time[i], 3), # Round to three decimal
                                       end = round(original_data$Time[i+1], 3)) # Round to three decimal
    )
    phrase_counter <- phrase_counter + 1
  }
}

# Write the processed data to a new CSV file
write.csv(processed_data, "MusicianMakam00_phrases.csv", row.names = FALSE, quote =
FALSE)

```

9.3.2 Creating dataset with pulse and metricity estimation using Onsetsync package (written by Tuomas Eerola)

The following code will combine the two files and create a data frame 'df' with necessary calculations regarding the segmented phrases.

```
`,`  
  
``{r setup, include=FALSE}  
knitr::opts_chunk$set(echo = TRUE)  
``  
  
## Read data  
  
``{r prep,echo=TRUE,warning=FALSE,message=FALSE}  
  
library(dplyr)  
library(ggplot2) # For reporting  
library(knitr) # For reporting  
  
if (!require(devtools)) install.packages("devtools")  
library(onsetsync) # New package (beta)  
library(tidyr)  
``  
  
``{r analysis,echo=TRUE,warning=FALSE,message=FALSE}  
##### READ DATA -----  
fn <- list()  
fn[[1]] <- 'MusicianMakam00'  
  
## Loop across pieces  
D <- list()  
D.Piece <- NULL  
D.Phrase <- NULL  
D.Score <- NULL  
D.Onset_N <- NULL  
D.Per <- NULL  
D.PerMax <- NULL  
i <- 1  
## loop across pieces  
for (j in 1:(length(fn))) {  
  fn_onsets <- read.csv(paste0('data/',fn[[j]],'_onsets.csv'),header = TRUE)
```

```

fn_phrases <- read.csv(paste0('data/',fn[[j]],'_phrases.csv'),header = TRUE)
head(fn_onsets)
head(fn_phrases)

N_onsets <- NULL
## Loop across phrases
for (k in 1:(nrow(fn_phrases))) {
  tmp <- dplyr::filter(fn_onsets, onsets >= fn_phrases$start[k] & onsets <=
fn_phrases$end[k])

  if(nrow(tmp)>0){
    tmp$onsets <- tmp$onsets - min(tmp$onsets) + 0.00 # subtract time
    o <- gaussify_onsets(tmp$onsets,sr = 500,wlen = 0.05, plot = TRUE)
    #g<-ggplot(o,aes(time,onsetcurve))+ geom_line()+ theme_linedraw()
    #print(g)

#   source('/Path/to/file.R')
    p <- periodicity(tmp,instr = 'onsets',method = 'per',sampling_rate = 1000,freq_range =
c(0.1,0.28))
#   p$Figure
    Per <- periodicity_moments(p$Curve)
    D.Per[[i]]<-Per$Per
    D.PerMax[[i]]<-Per$Max

#   D[[i]] <- o
    D.Piece[i] <- fn[[j]]
    D.Phrase[i] <- k
    D.Onset_N[i] <- length(tmp$onsets)
#   D.Score[i] <- fn_phrases$pscore[k]
    i <- i+1
  }
}
}
}
}

## Collate everything back to a data frame

```{r collate,echo=TRUE, warning=FALSE, message=FALSE}
df <-
data.frame(Phrase=unlist(D.Phrase),Per=unlist(D.Per),PerMax=unlist(D.PerMax),Onset_N=u
nlist(D.Onset_N), fn_phrases$start)

```

### 9.3.3 Creating Large-scale plot for rhythmic visualisation in *taksim* (based on an original script by Tuomas Eerola)

```
‘
Assuming 'fn_phrases$start' represents the X-axis values in seconds
Calculate the range of 'fn_phrases$start' to determine the breaks and labels
x_range <- range(df$fn_phrases.start)
x_breaks <- seq(ceiling(x_range[1] / 10) * 10, floor(x_range[2] / 10) * 10, by = 10)
x_labels <- x_breaks

fixed_size <- 6
scaling_factor <- 5

Calculate the aspect ratio based on the number of phrases
num_phrases <- 50
aspect_ratio <- num_phrases / 460 # Adjust the denominator if the range changes

Manually set the maximum value of 'PerMax'
max_PerMax <- 59.581109

g1 <- ggplot(df[df$Phrase >= 1 & df$Phrase <= 27,], aes(x = fn_phrases.start, y = Per * 1000,
size = PerMax, label = Phrase, fill = Onset_N)) +
 geom_label(alpha = 0.5) +
 ylab('Pulse in ms') +
 xlab('Time') +
 ggtitle("") +
 scale_size_continuous(range = c(fixed_size - scaling_factor, fixed_size + scaling_factor),
breaks = c(200), guide = "none", limits = c(0, max_PerMax)) +
 scale_fill_gradient(low = "lightyellow", high = "red", limits = c(3, 35)) + # Adjust colors and
limits as desired
 theme_bw() +
 coord_fixed(ratio = aspect_ratio, ylim = c(100, 280)) +
 scale_x_continuous(breaks = x_breaks, labels = x_labels) +
 theme(plot.title = element_text(hjust = 0.5),
 axis.text.x = element_text(size = rel(1.5)),
 axis.text.y = element_text(size = rel(1.5))) # Increase font size by 50%

ggsave("output_plot.png", plot = g1, width = 400, height = 135, units = "mm")
‘
```

#### 9.3.4 Estimating the average and standard deviation of sections

After segmenting the *taksim* in sections following the process described in Chapter 4, the researcher should create a file '**MusicianMakam\_Subgroups.txt**' adding the first and last phrases of each section using the following format:

```
' subset_ranges <- list(A = c(1, 7), B = c(8, 19), C = c(20, 25), etc...)'
```

Such file will be used in the following code:

```
'
calculate_subset_stats <- function(df, subset_ranges) {
 subsets <- lapply(subset_ranges, function(range) {
 df_subset <- df[range[1]:range[2],]
 return(df_subset)
 })

 results <- lapply(subsets, function(subset) {
 avg_per <- mean(subset$Per)
 sd_per <- sd(subset$Per)
 avg_per_max <- mean(subset$PerMax)
 sd_per_max <- sd(subset$PerMax)

 return(data.frame(Average_Per = avg_per * 1000, SD_Per = sd_per * 1000,
 Average_PerMax = avg_per_max, SD_PerMax = sd_per_max))
 })

 return(results)
}

Define the subset ranges – add here the file '..._subgrups.txt'.

Calculate average and standard deviation for subsets
subset_results <- calculate_subset_stats(df, subset_ranges)

Print the results
for (i in seq_along(subset_results)) {
 cat("Subset", names(subset_results)[i], ":\n")
 print(subset_results[[i]])
 cat("\n")
}
```

```
Export subset results to CSV
output_file <- "subset_results.csv"
write.csv(do.call(rbind, subset_results), file = output_file, row.names = FALSE)
```

‘

### 9.3.5 Comparing cadential and non-cadential phrases

After locating the cadential phrases according to the process described in Chapter 4, the researcher should create a file ‘**MusicianMakam\_Cadentialphrases.txt**’ including the number of the phrases selected:

```
‘ phrases_of_interest <- c(17, 40, 61, etc...)’
```

Such file will be used in the following code:

‘

```
Load necessary libraries
library(dplyr)
library(ggplot2)
setwd("~/Path/to/file")

Load the data
data <- df

Specify the cadential phrases
Add file ‘..._Cadentialphrases.csv’ here
data_of_interest <- data %>% filter(Phrase %in% phrases_of_interest)

Subset the data for the rest of the phrases
data_rest <- data %>% filter(!Phrase %in% phrases_of_interest)

Summary statistics for Per
summary(data_of_interest$Per)
summary(data_rest$Per)

Summary statistics for PerMax
summary(data_of_interest$PerMax)
summary(data_rest$PerMax)

Perform t-tests to compare means
```

```

t_test_Per <- t.test(data_of_interest$Per, data_rest$Per)
t_test_PerMax <- t.test(data_of_interest$PerMax, data_rest$PerMax)

Print t-test results
print(t_test_Per)
print(t_test_PerMax)

Plot comparisons using boxplots with larger fonts for labels and title
plot1 <- ggplot(data, aes(x = factor(ifelse(Phrase %in% phrases_of_interest, "All phrases",
"Cadential phrases")), y = Per)) +
 geom_boxplot() +
 labs(title = "Comparison of Pulse values", x = "", y = "ms") +
 theme(axis.title.x = element_text(size = 18),
 axis.title.y = element_text(size = 18),
 plot.title = element_text(size = 20),
 axis.text.x = element_text(size = 18),
 axis.text.y = element_text(size = 18))

plot2 <- ggplot(data, aes(x = factor(ifelse(Phrase %in% phrases_of_interest, "All phrases",
"Cadential phrases")), y = PerMax)) +
 geom_boxplot() +
 labs(title = "Comparison of Metricity values", x = "", y = "PerMax") +
 theme(axis.title.x = element_text(size = 18),
 axis.title.y = element_text(size = 18),
 plot.title = element_text(size = 20),
 axis.text.x = element_text(size = 18),
 axis.text.y = element_text(size = 18))

print(plot1)
print(plot2)

ggsave(filename = "~/Path/to/file.png", plot = plot1, width = 8, height = 6)
ggsave(filename = "~/ Path/to/file.png", plot = plot2, width = 8, height = 6)

```

### 9.3.6 Comparing sections of different *taksims*

The following code uses the file 'overallplot\_sections6&7.csv', which combines the average pulse, average metricity and average standard deviation of sections of all *taksim* studied in this dissertation. Such file should be added on the line 'data'.

```
,
Load necessary libraries
library(ggplot2)
library(dplyr)

Read the dataset
data <- read.csv("~/Path/To/overallplot_sections6&7.csv")

Function to filter data by a list of 'Name'
filter_data <- function(data, names_filter) {
 filtered_data <- data %>% filter(Name %in% names_filter)
 return(filtered_data)
}

Define the names to filter
names_to_plot <- c("Musician_Makam1", "Musician_Makam2") # Change this to the
desired list of 'Name'

Filter the data
filtered_data <- filter_data(data, names_to_plot)

Define custom colors
custom_colors <- c(
)

Create the plot
p <- ggplot(filtered_data, aes(x = Average_Metricity, y = Average_Pulse)) +
 geom_point(aes(size = SD_Pulse, color = Name)) +
 scale_color_manual(values = custom_colors) +
 geom_smooth(method = "lm", color = "black", linetype = "dashed", se = FALSE) + # Add
regression line
 labs(x = "Metricity", y = "Pulse", color = "Taksim") +
 xlim(4, 18) + # Set fixed limits for x-axis
 ylim(110, 230) + # Set fixed limits for y-axis
 theme_minimal() +
 theme(
 legend.text = element_text(size = 12), # Increase font size of legend text
 legend.title = element_text(size = 14), # Increase font size of legend title
```

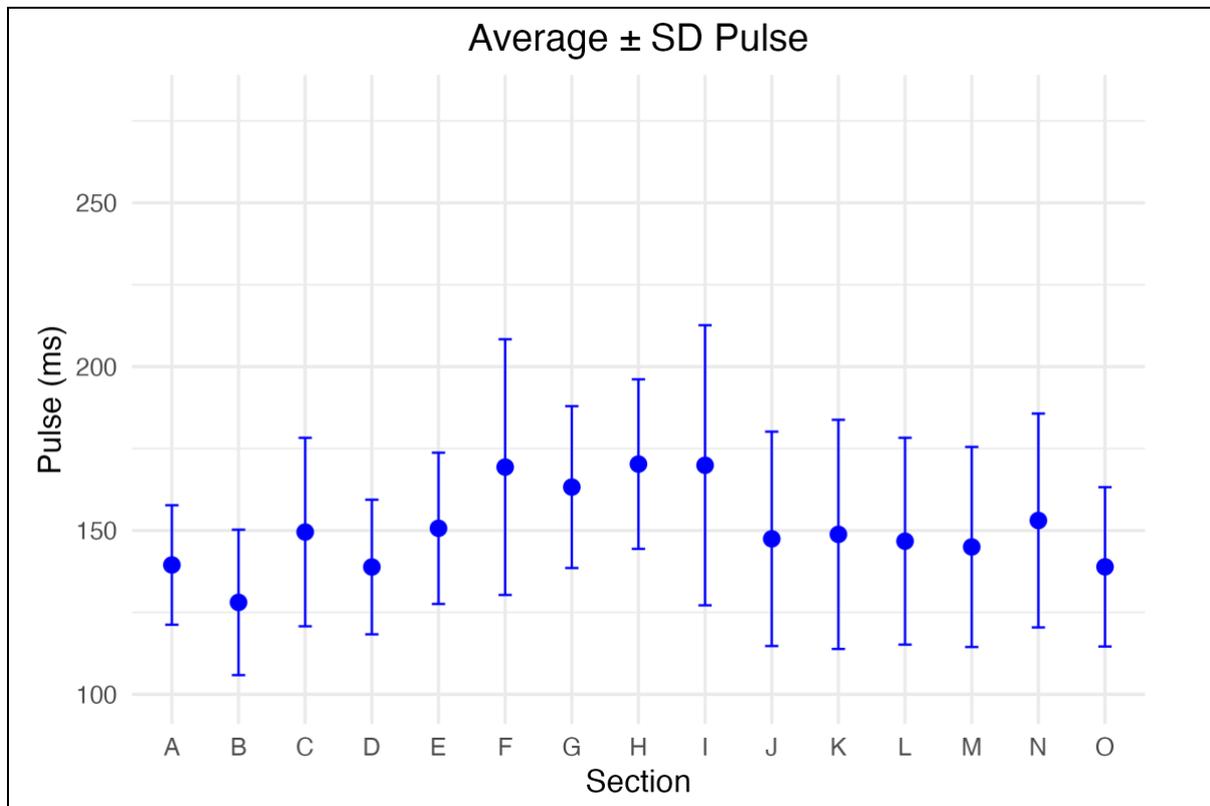
```
legend.position = "right", # Adjust legend position
plot.title = element_text(size = 20, face = "bold"), # Increase plot title size
axis.title = element_text(size = 14) # Increase axis title size
) +
guides(
 color = guide_legend(order = 1), # Move the 'Name' legend up
 size = guide_legend(order = 2) # Move the 'SD_Pulse' legend down
)

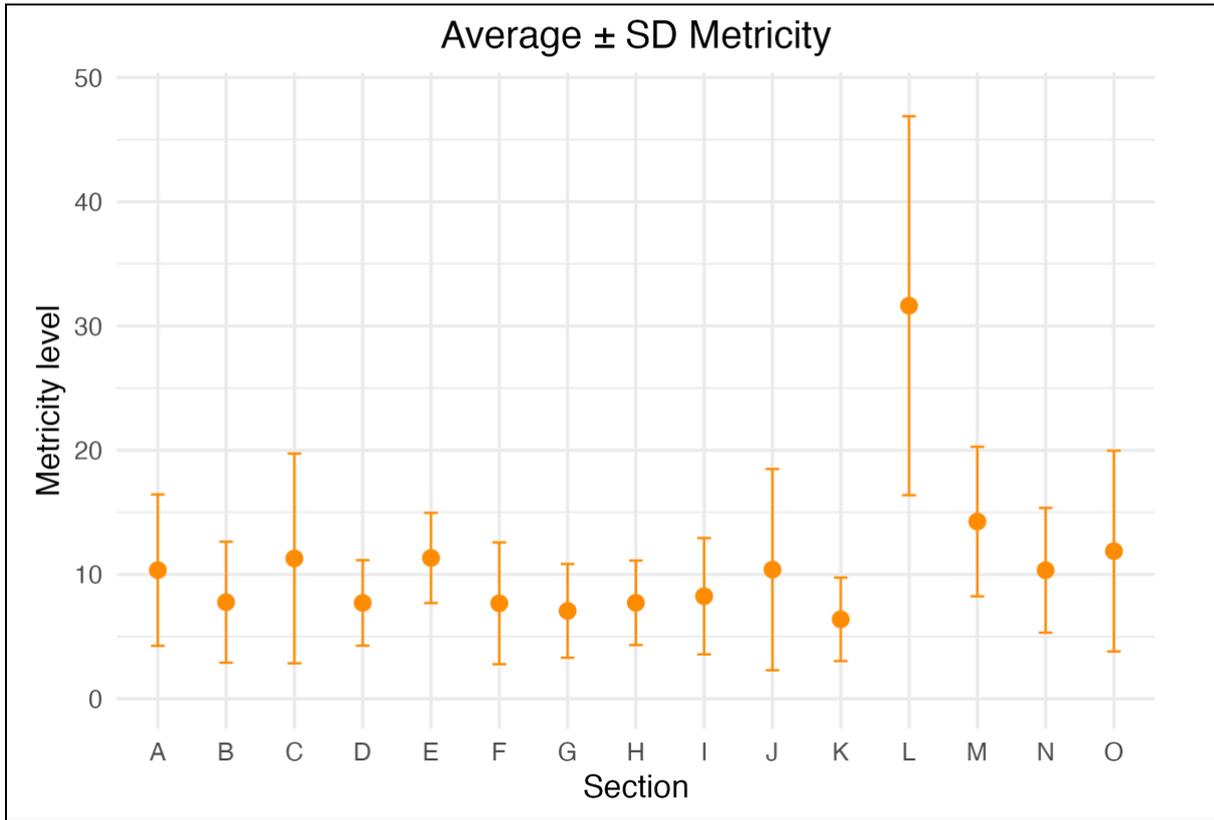
Save the plot to a file
print(p)
ggsave("pulse_vs_metricity_plot.png", plot = p, width = 10, height = 8)
‘
```

9.4 Appendix III: Average and standard deviation of pulse and metricity of taksims studies in Chapter 6 and Chapter 7

9.4.1 Kadri Şençalar: Uşşak Taksim

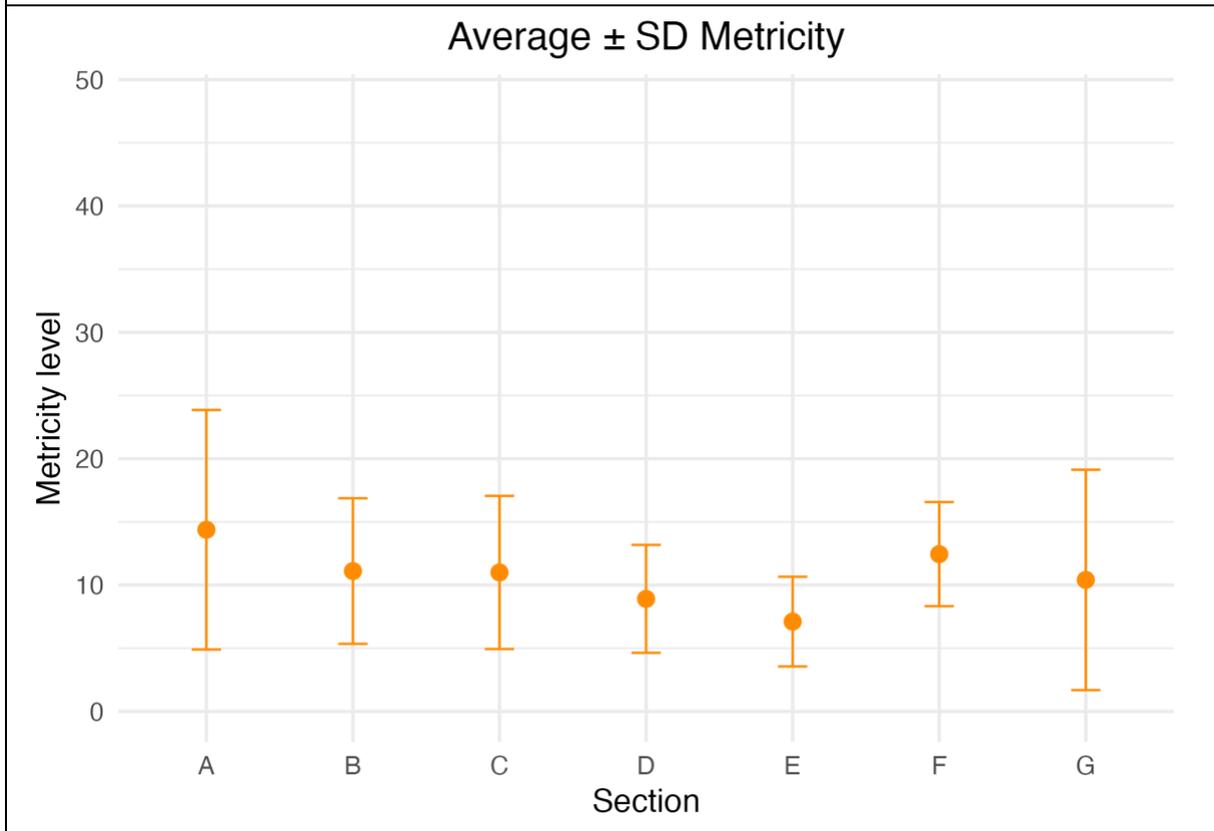
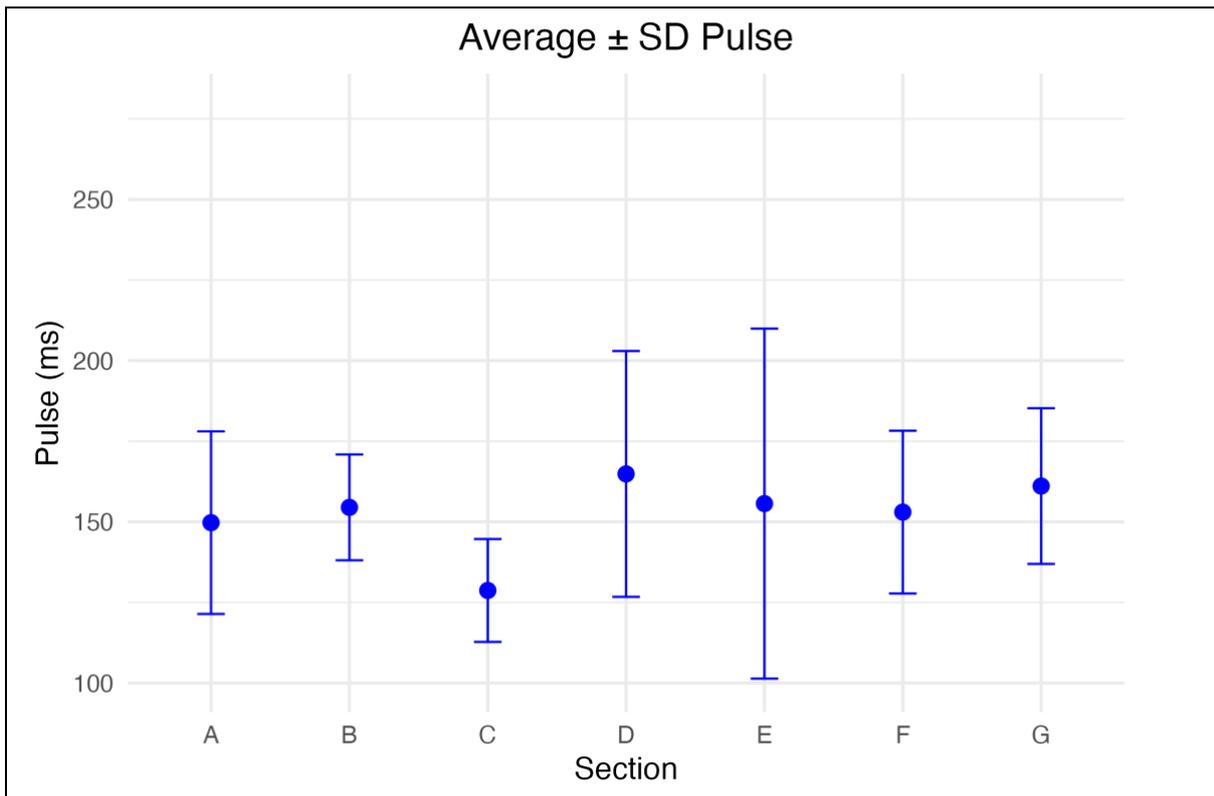
Section	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	139.47	18.23	10.35	6.09
B	128.05	22.19	7.77	4.87
C	149.52	28.76	11.29	8.44
D	138.85	20.54	7.71	3.44
E	150.66	23.08	11.33	3.63
F	169.34	39.02	7.68	4.90
G	163.24	24.69	7.07	3.77
H	170.26	25.87	7.72	3.40
I	169.90	42.74	8.25	4.68
J	147.45	32.71	10.39	8.10
K	148.81	34.97	6.39	3.36
L	146.73	31.56	31.63	15.25
M	144.97	30.53	14.26	6.02
N	153.05	32.63	10.34	5.02
O	138.90	24.31	11.88	8.08
<b>Average</b>	<b>150.61</b>	<b>28.79</b>	<b>10.94</b>	<b>5.94</b>





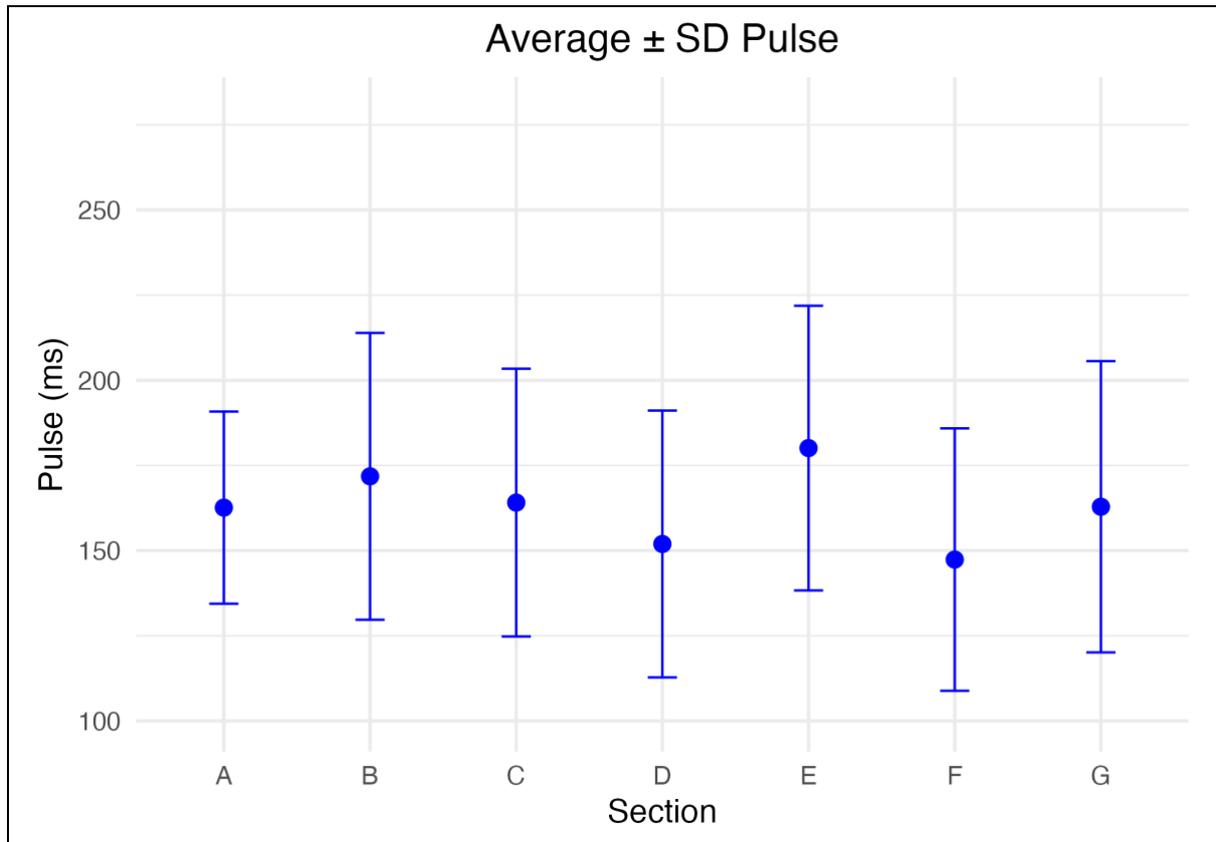
9.4.2 Kadri Şençalar: Hicazkar Taksim

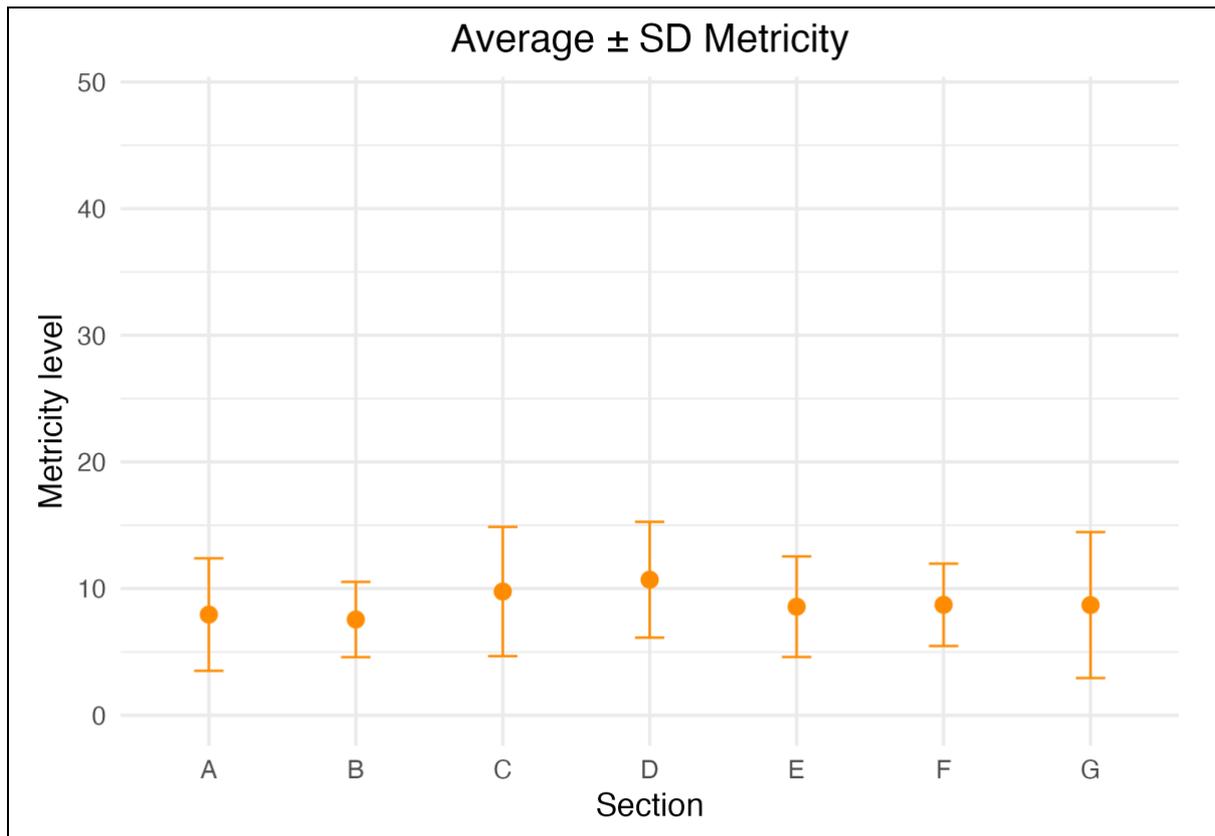
Section	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	149.74	28.32	14.38	9.48
B	154.48	16.41	11.11	5.76
C	128.71	15.95	11.00	6.06
D	164.86	38.13	8.91	4.27
E	155.65	54.28	7.11	3.55
F	153.01	25.24	12.45	4.12
G	161.09	24.15	10.41	8.72
<b>Average</b>	<b>152.51</b>	<b>28.92</b>	<b>10.77</b>	<b>5.99</b>



9.4.3 Kadri Şençalar: Rast Taksim

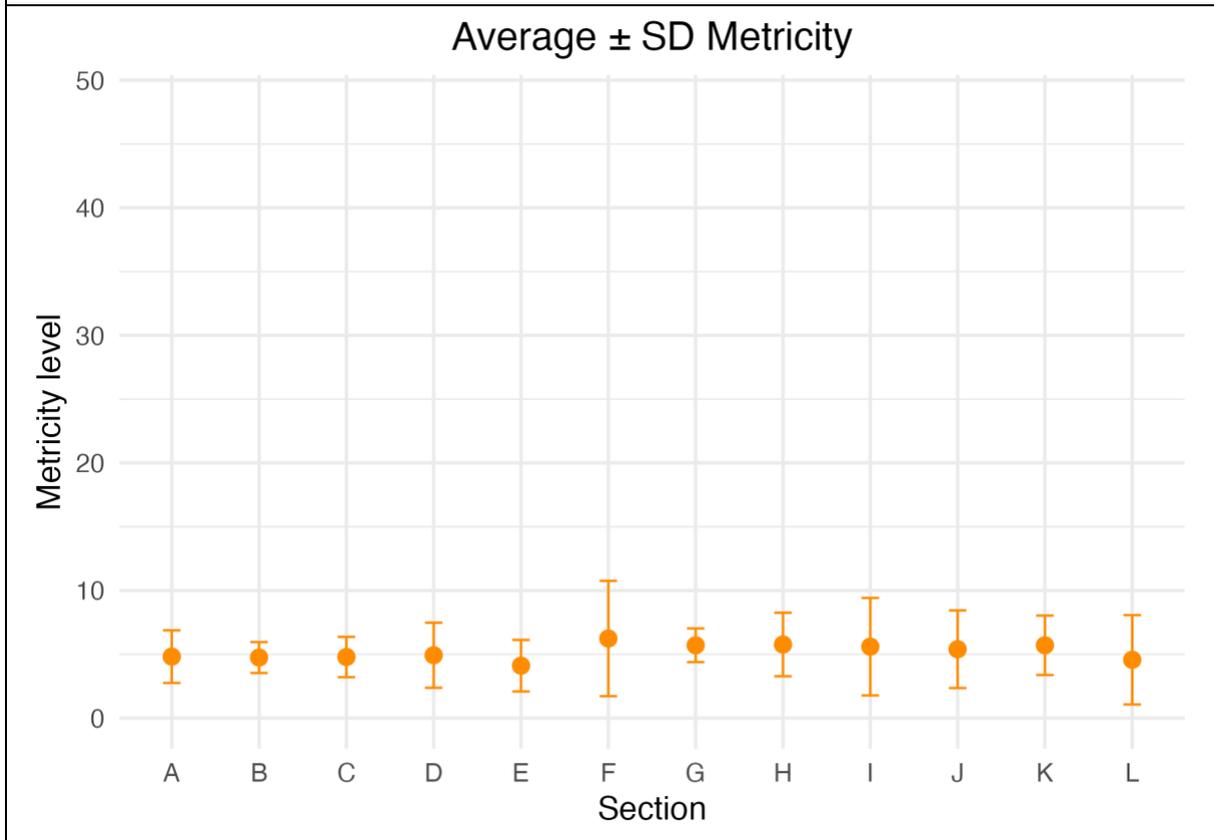
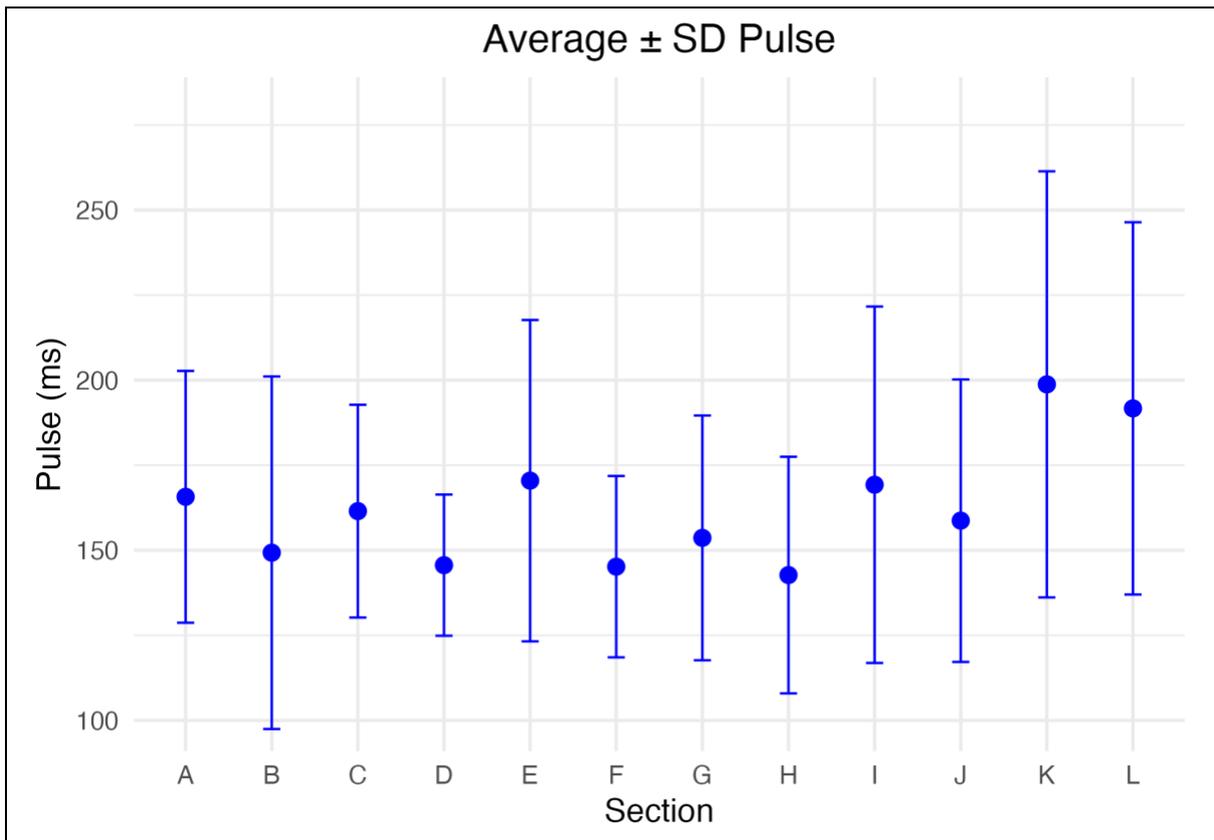
Section	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	162.61	28.21	7.95	4.44
B	171.80	42.11	7.56	2.97
C	164.09	39.31	9.77	5.10
D	151.94	39.17	10.70	4.57
E	180.09	41.79	8.57	3.97
F	147.36	38.52	8.72	3.25
G	162.87	42.76	8.70	5.76
<b>Average</b>	<b>162.97</b>	<b>38.84</b>	<b>8.85</b>	<b>4.29</b>





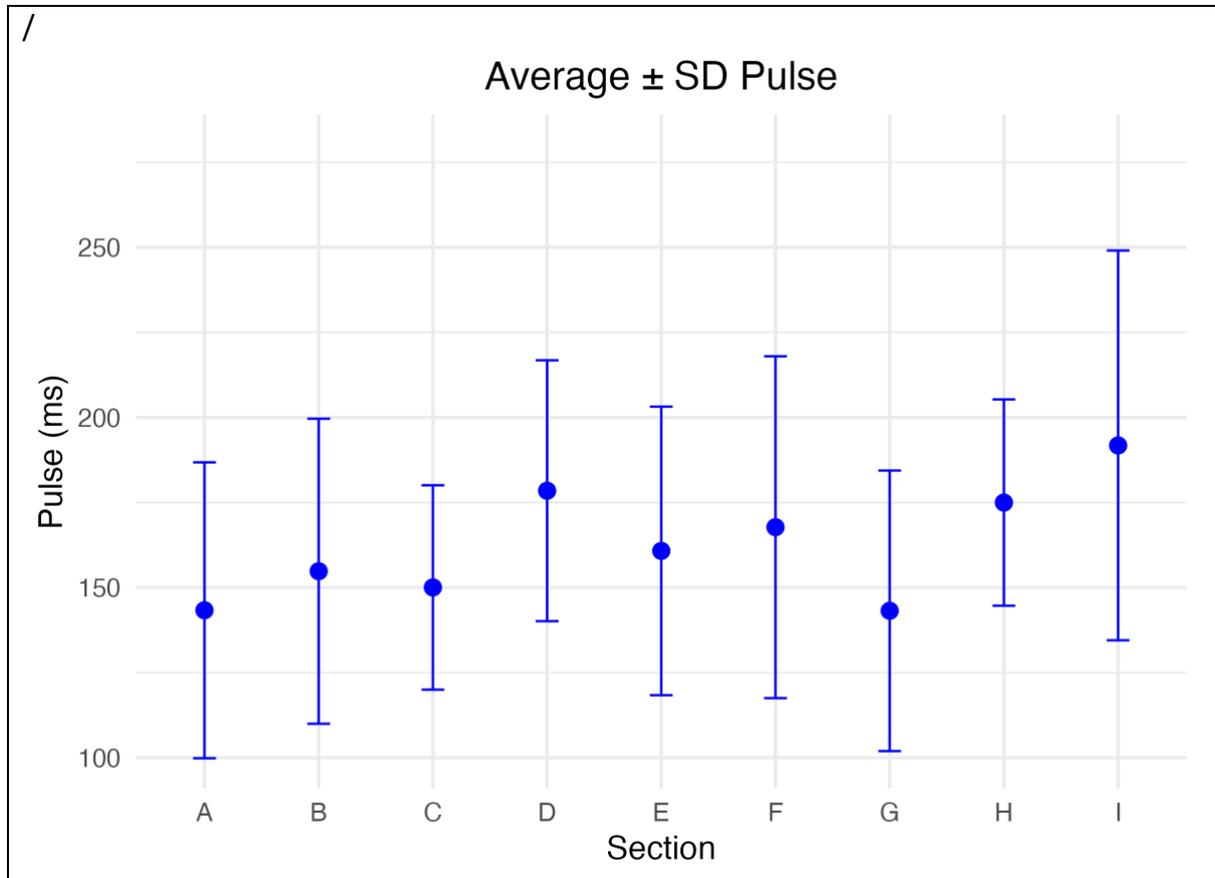
#### 9.4.4 Cinucen Tanrıkorur: Uşşak Taksim

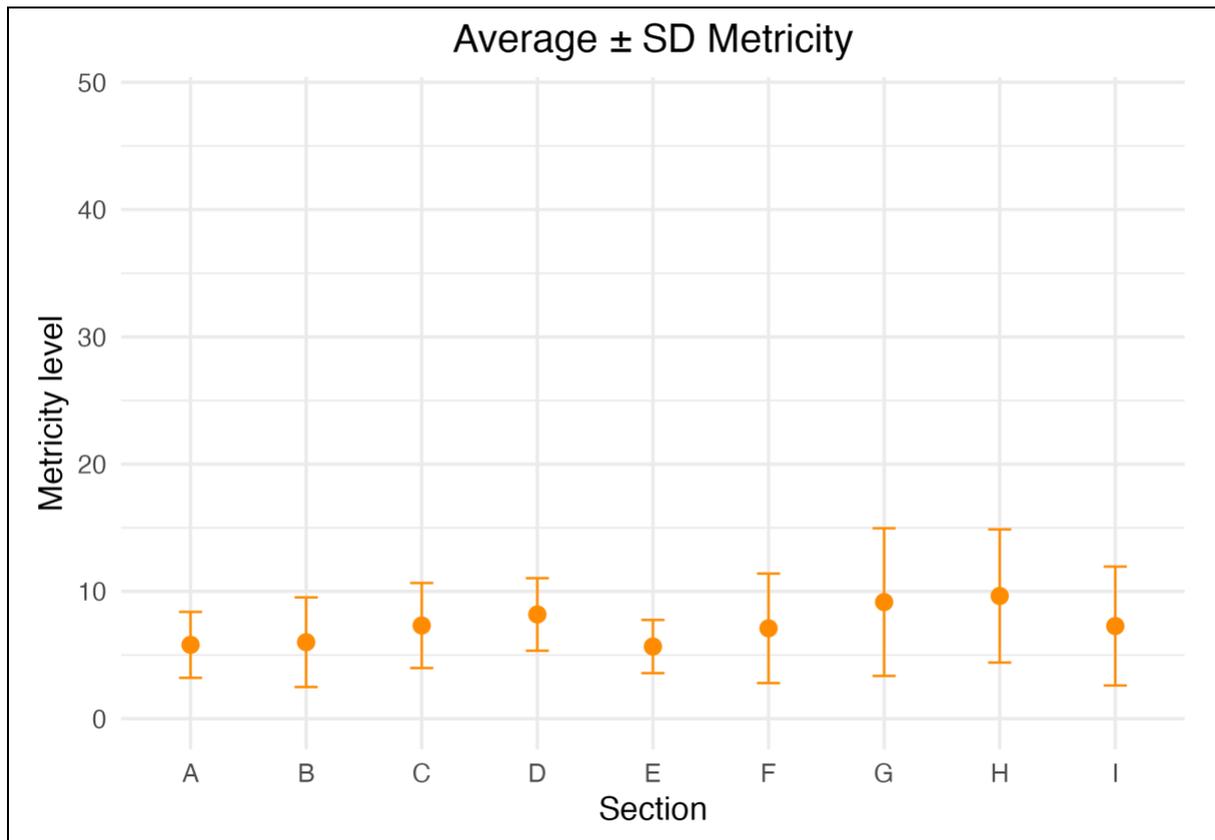
Section	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	165.71	37.01	4.82	2.06
B	149.28	51.81	4.75	1.21
C	161.50	31.27	4.79	1.58
D	145.62	20.75	4.93	2.55
E	170.46	47.23	4.11	2.02
F	145.18	26.65	6.24	4.52
G	153.64	35.97	5.71	1.32
H	142.71	34.77	5.77	2.49
I	169.26	52.38	5.60	3.82
J	158.70	41.52	5.40	3.04
K	198.76	62.62	5.71	2.33
L	191.70	54.71	4.57	3.50
<b>Average</b>	<b>162.71</b>	<b>41.39</b>	<b>5.20</b>	<b>2.54</b>



9.4.5 Cinucen Tanrıkorur: Hüseyini Taksim

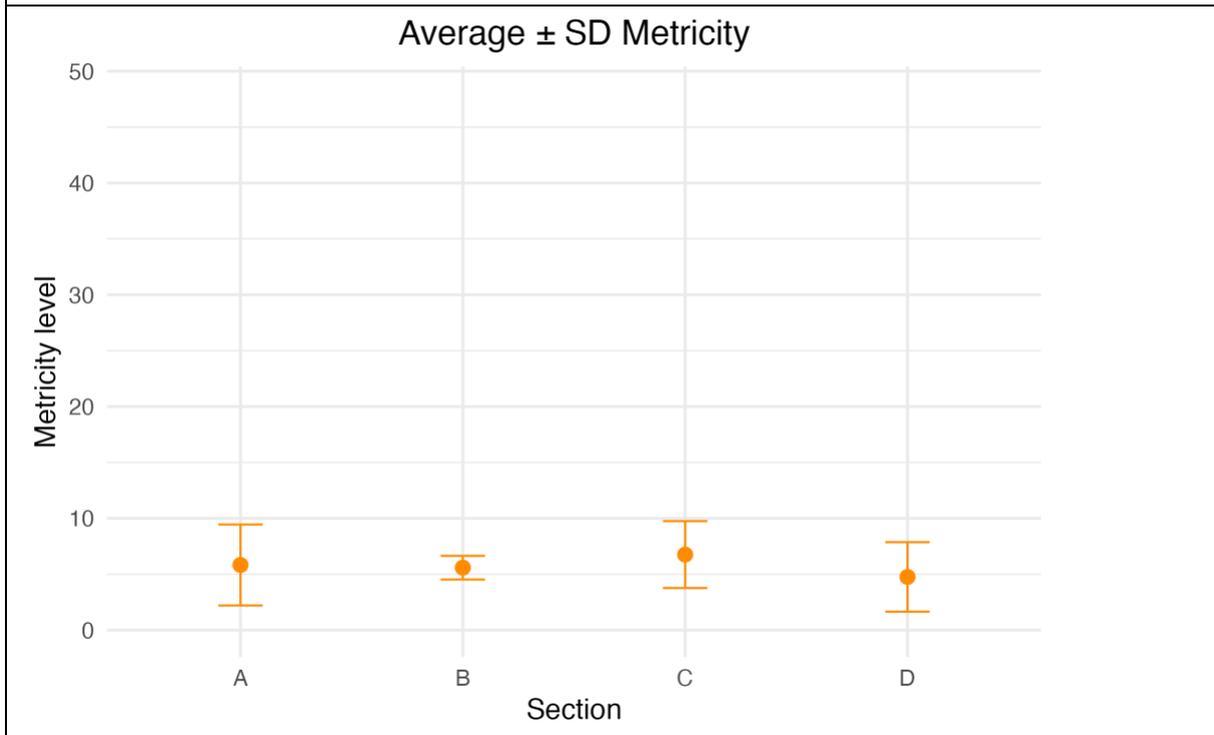
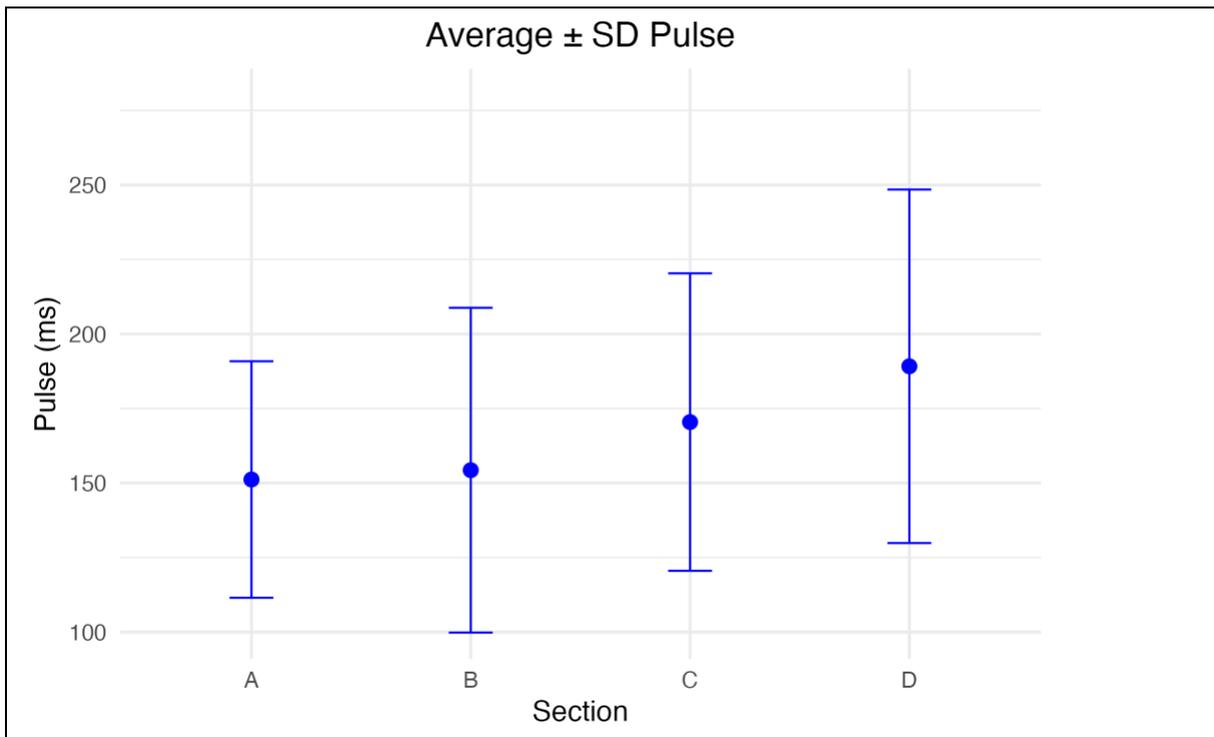
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	143.32	43.49	5.80	2.59
B	154.80	44.83	6.01	3.52
C	150.03	30.04	7.32	3.34
D	178.46	38.34	8.19	2.85
E	160.77	42.41	5.67	2.09
F	167.74	50.24	7.10	4.30
G	143.17	41.23	9.16	5.80
H	174.98	30.32	9.64	5.23
I	191.78	57.28	7.28	4.67
<b>Average</b>	<b>162.78</b>	<b>42.02</b>	<b>7.35</b>	<b>3.82</b>





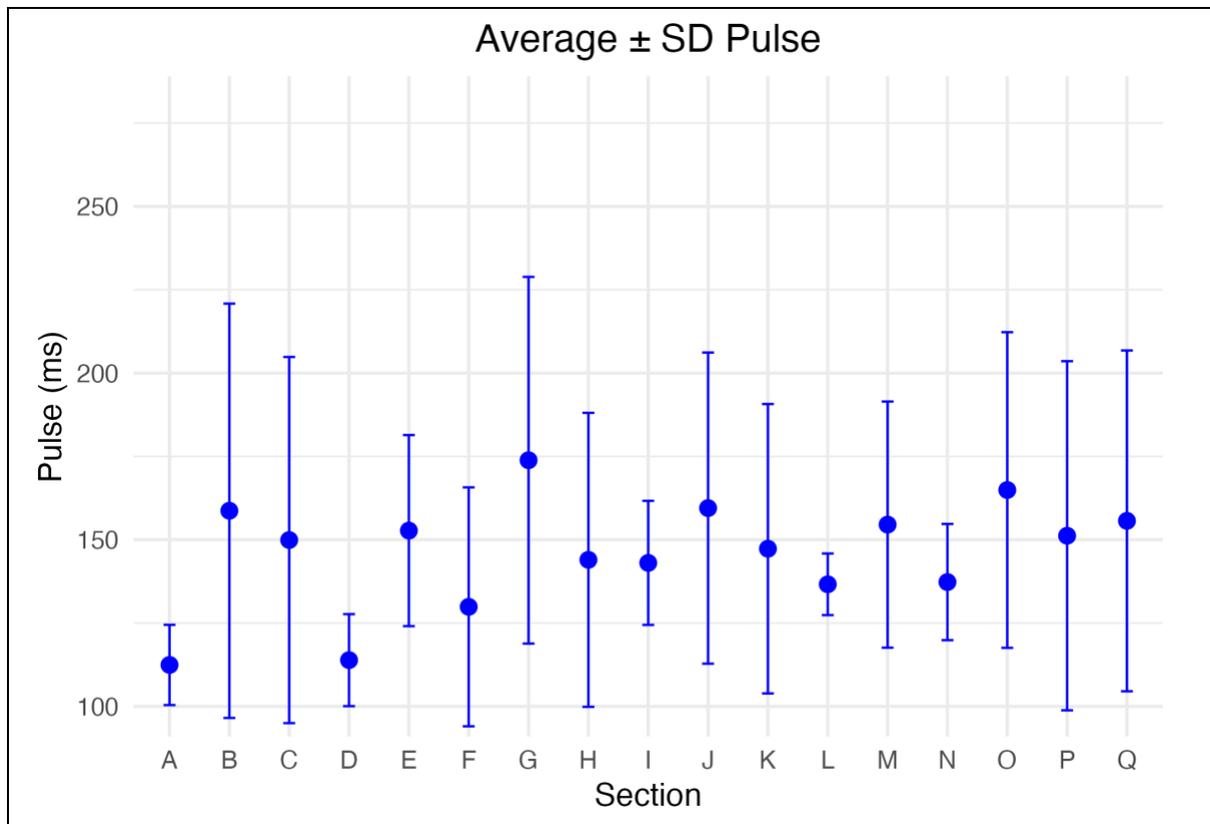
9.4.6 Cinucen Tanrikorur: Penggâh Taksim

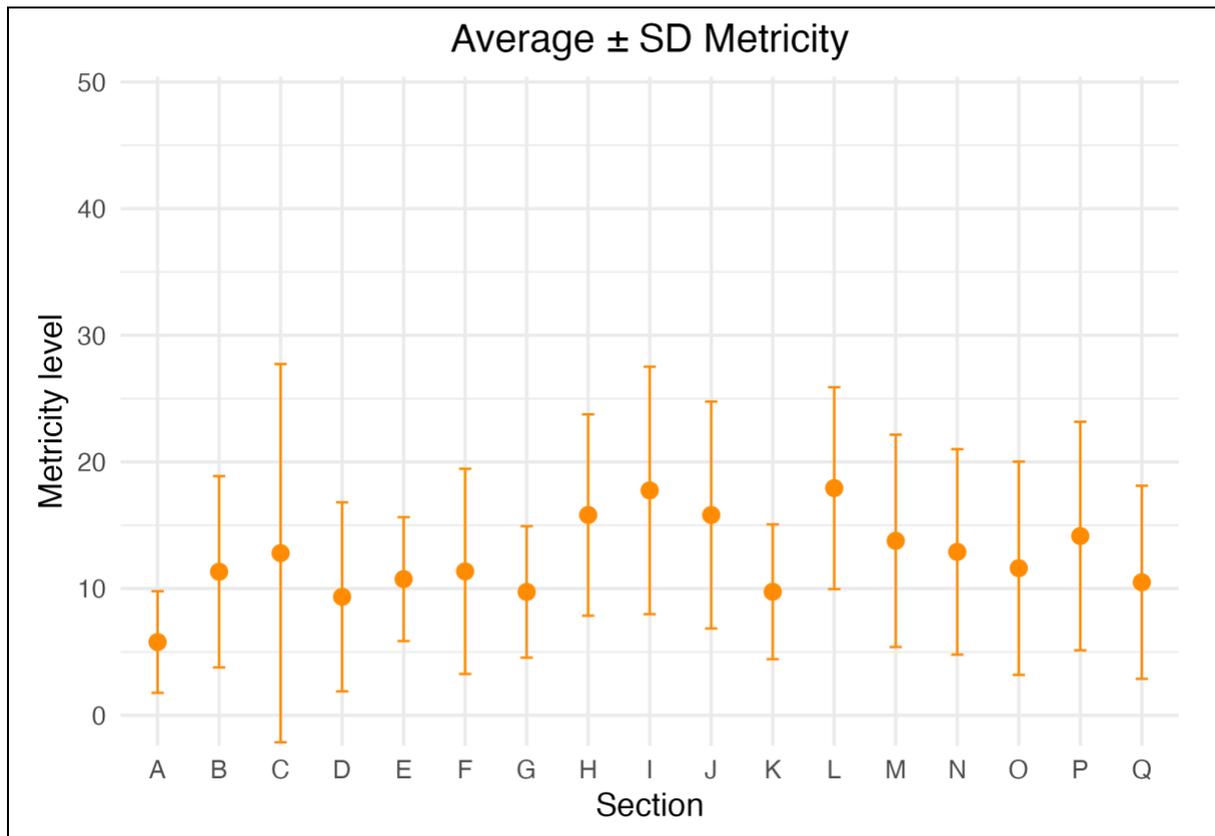
Section	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	151.19	39.66	5.83	3.62
B	154.32	54.48	5.59	1.06
C	170.46	49.89	6.76	2.99
D	189.17	59.29	4.76	3.11
<b>Average</b>	<b>166.28</b>	<b>50.83</b>	<b>5.73</b>	<b>2.69</b>



9.4.7 Yorgo Bacanos: Rast Taksim

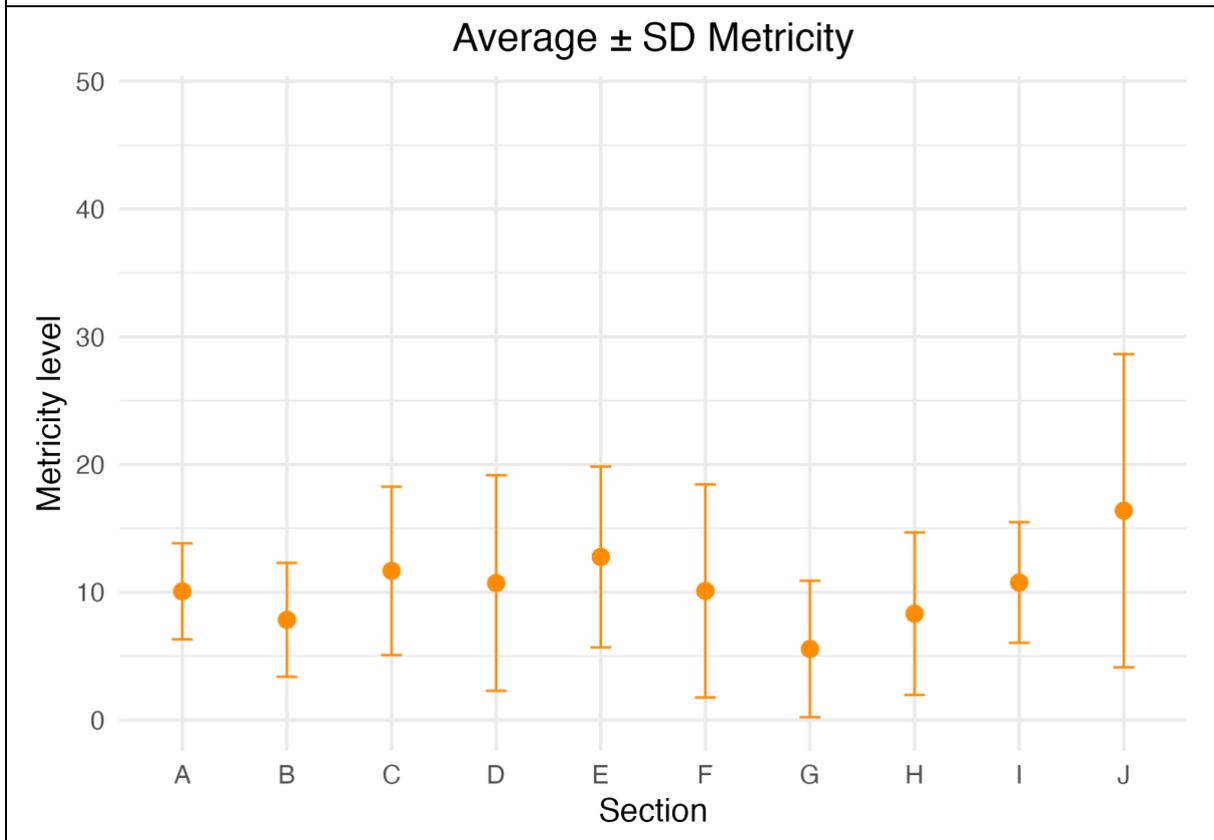
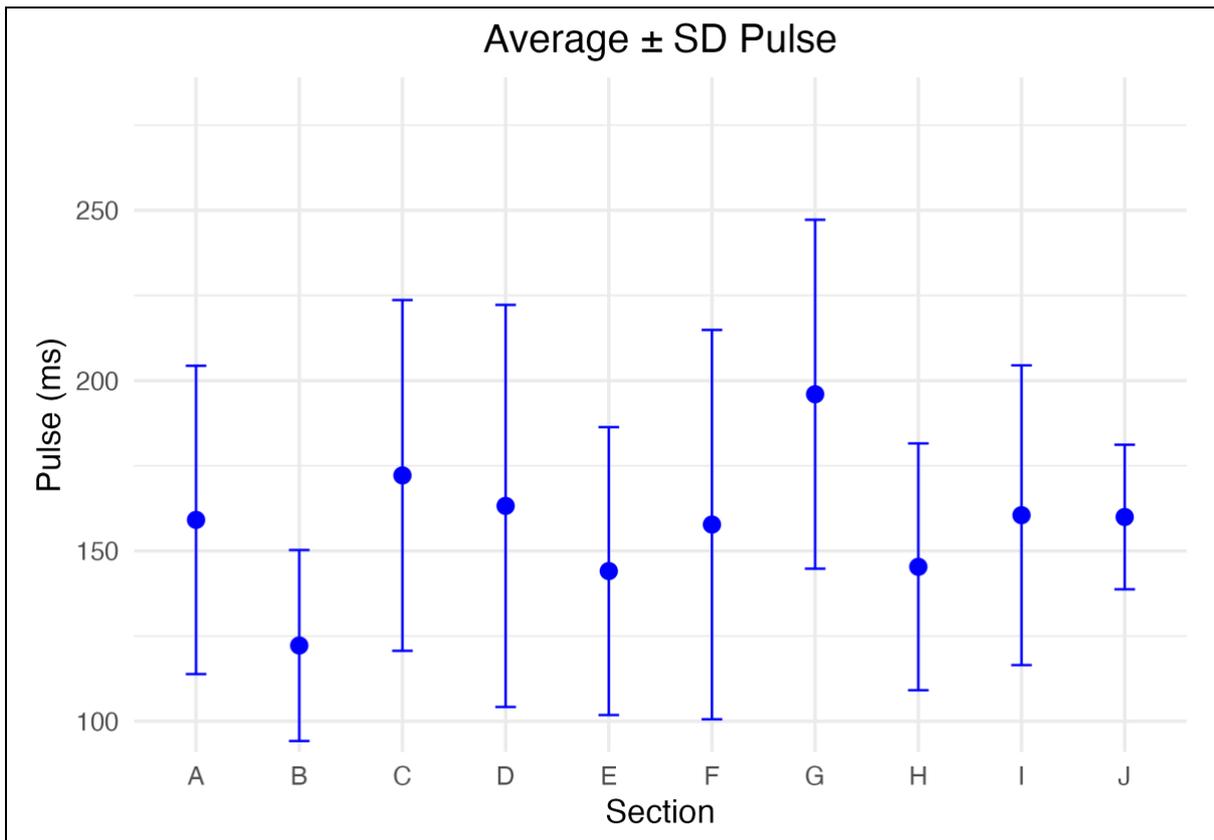
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	112.44	12.03	5.78	4.01
B	158.69	62.15	11.33	7.55
C	149.91	54.92	12.80	14.93
D	113.88	13.80	9.35	7.46
E	152.74	28.66	10.75	4.89
F	129.87	35.84	11.36	8.10
G	173.85	55.00	9.74	5.19
H	143.97	44.10	15.81	7.95
I	143.05	18.61	17.75	9.77
J	159.49	46.67	15.81	8.96
K	147.30	43.41	9.75	5.32
L	136.63	9.24	17.93	7.97
M	154.54	36.92	13.77	8.38
N	137.30	17.43	12.90	8.11
O	164.92	47.35	11.61	8.42
P	151.20	52.37	14.15	9.02
Q	155.66	51.12	10.50	7.62
<b>Average</b>	<b>146.20</b>	<b>37.04</b>	<b>12.42</b>	<b>7.86</b>





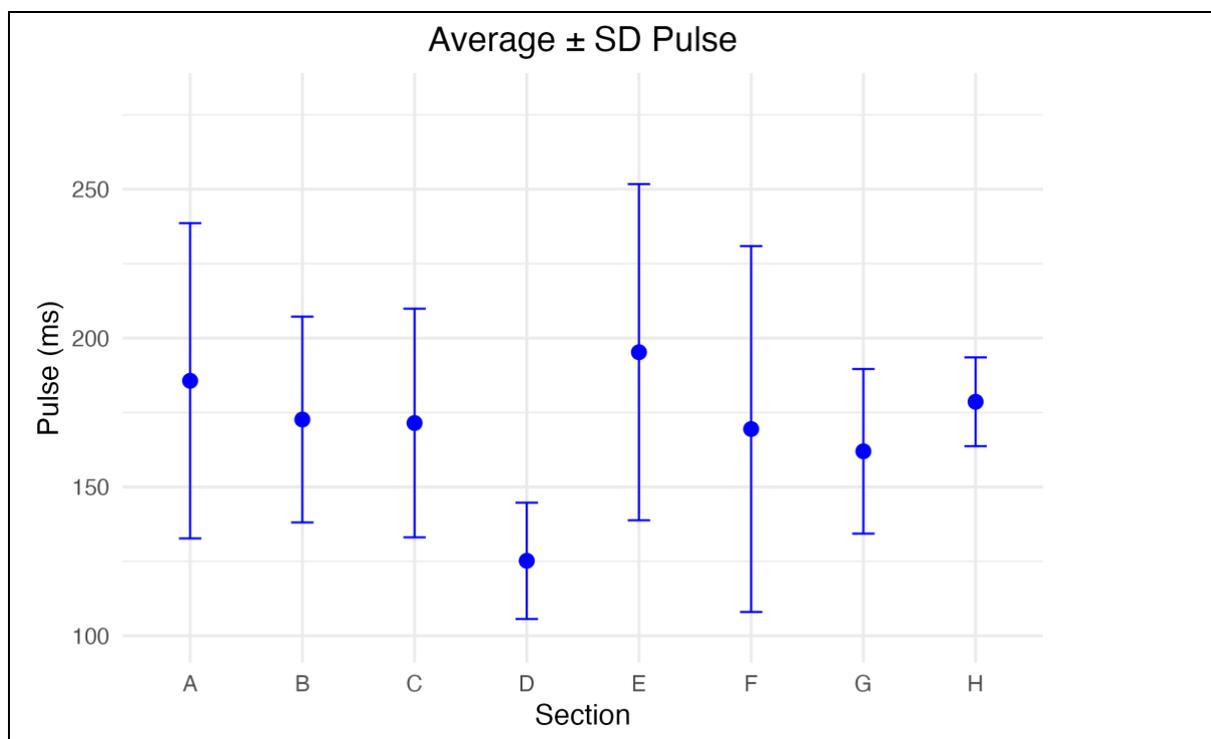
9.4.8 Evgenios Voulgaris: Nikriz Taksim

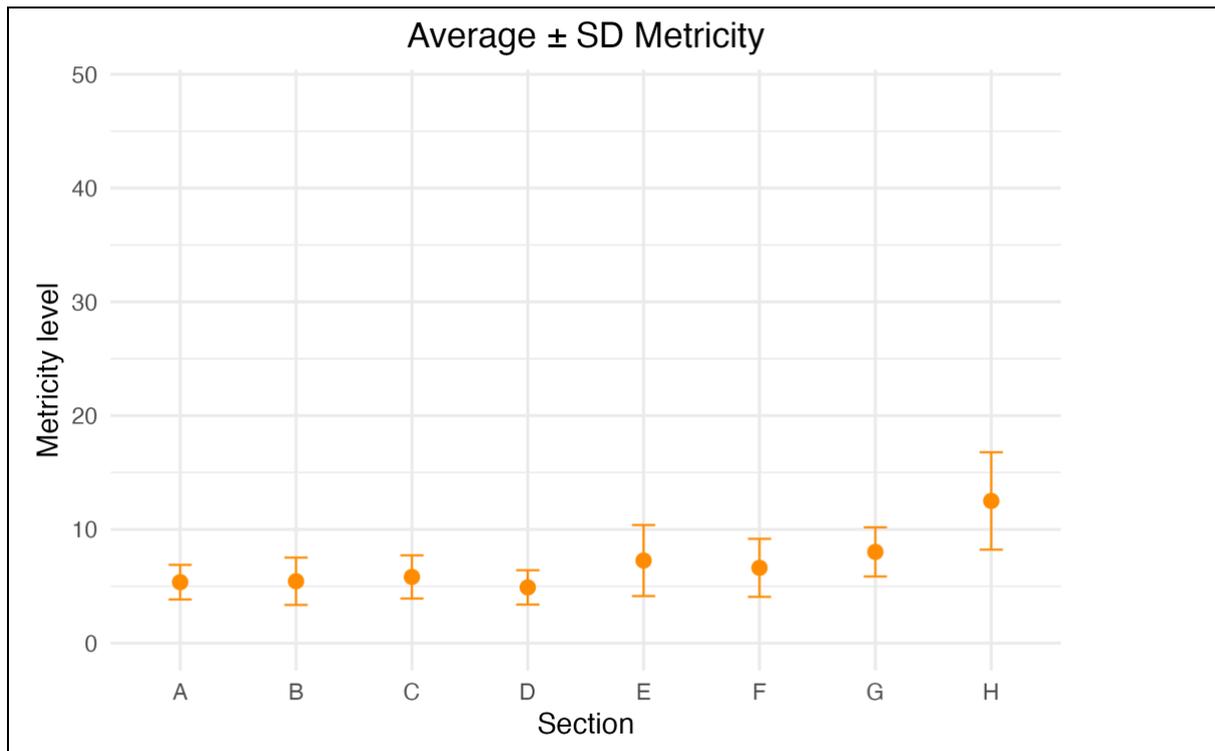
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	159.10	45.26	10.07	3.76
B	122.23	28.03	7.84	4.46
C	172.16	51.49	11.67	6.59
D	163.21	59.02	10.72	8.44
E	144.08	42.26	12.76	7.08
F	157.73	57.15	10.10	8.34
G	196.00	51.22	5.56	5.34
H	145.33	36.23	8.32	6.36
I	160.48	44.00	10.76	4.72
J	159.95	21.22	16.38	12.26
<b>Average</b>	<b>158.03</b>	<b>43.59</b>	<b>10.42</b>	<b>6.73</b>



9.4.9 Evgenios Voulgaris: Nihavent Taksim

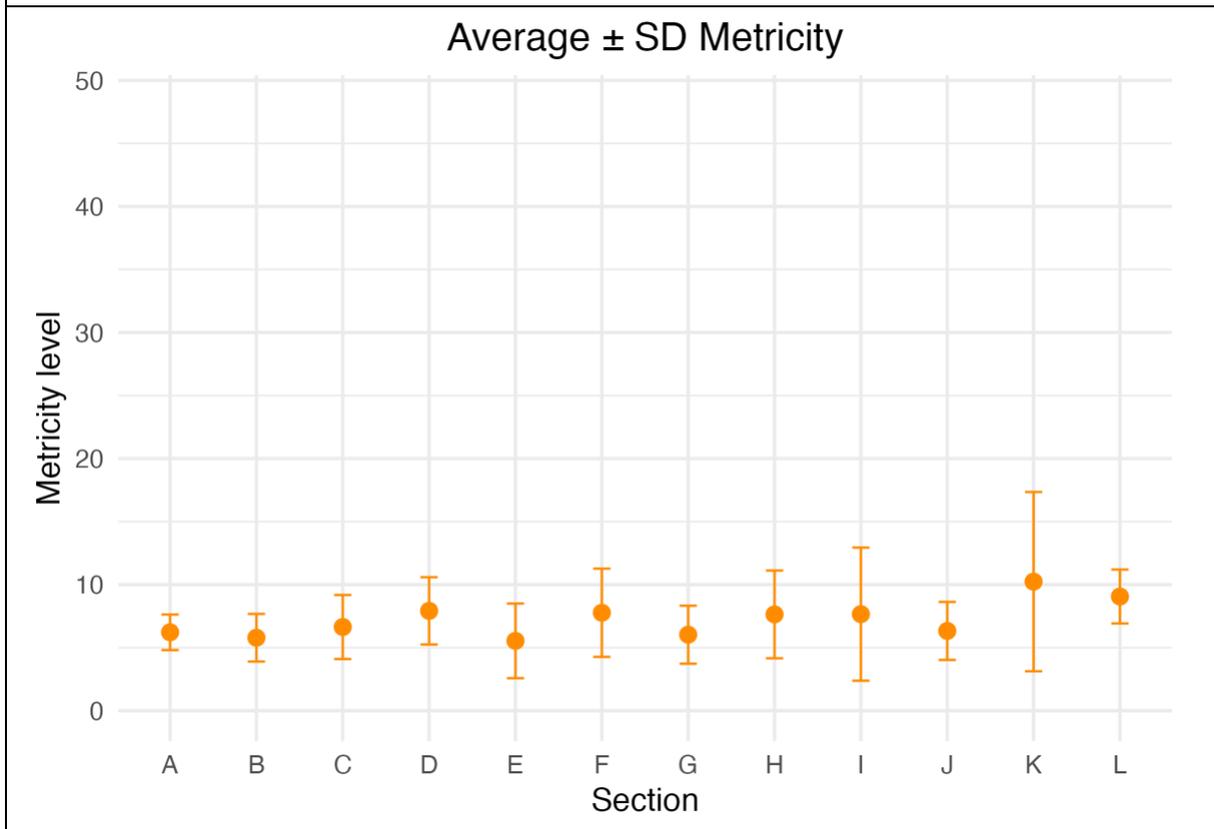
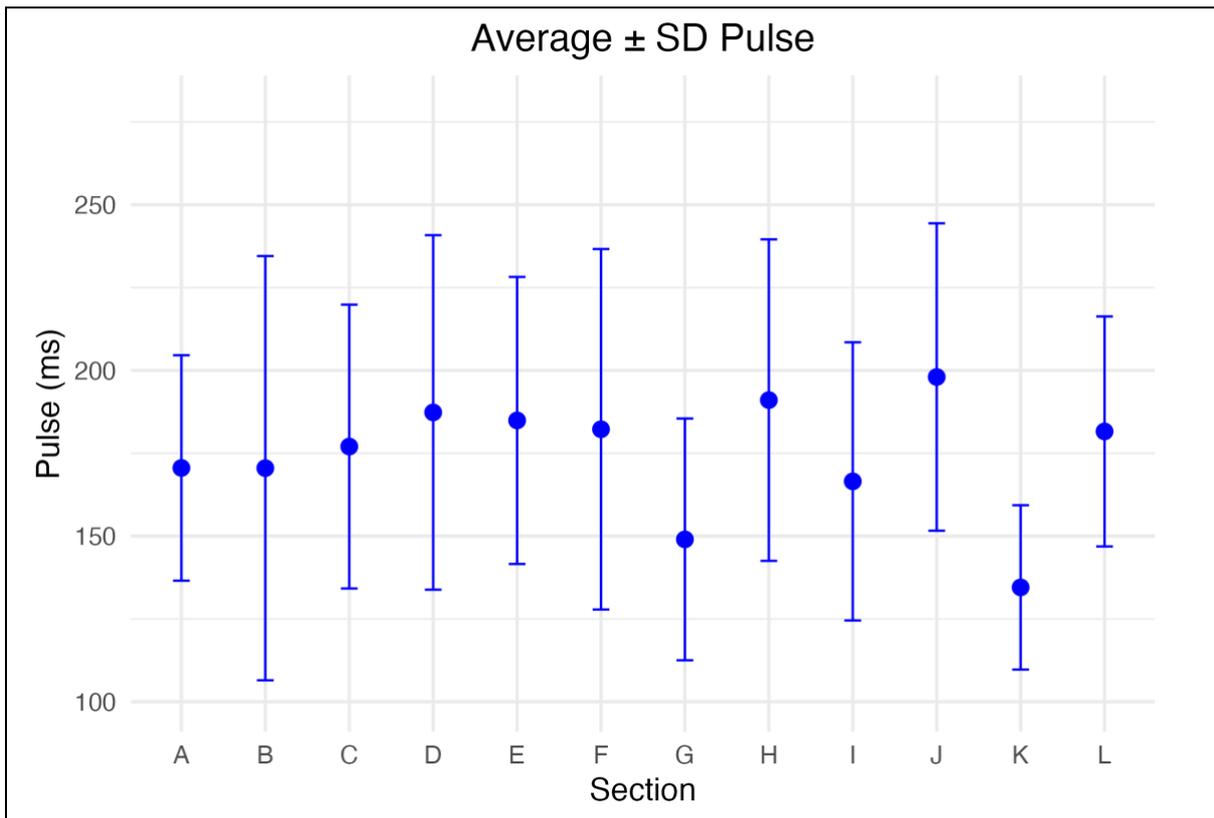
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	185.65	52.95	5.36	1.52
B	172.64	34.57	5.44	2.08
C	171.47	38.41	5.82	1.90
D	125.18	19.53	4.90	1.51
E	195.25	56.47	7.26	3.12
F	169.45	61.45	6.62	2.55
G	161.97	27.65	8.02	2.16
H	178.60	14.92	12.50	4.28
<b>Average</b>	<b>170.03</b>	<b>38.24</b>	<b>6.99</b>	<b>2.39</b>





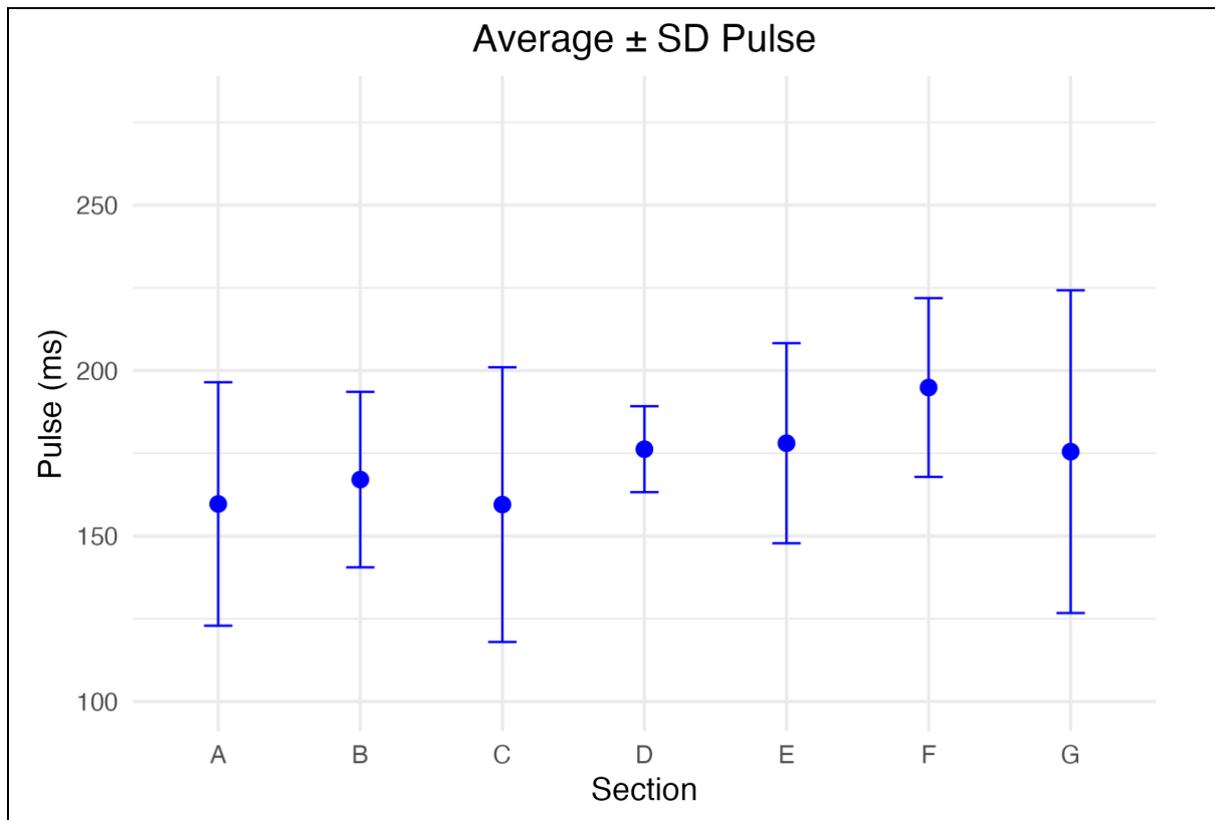
9.4.10 Kyriacos Tapakis: Uşşak Taksim

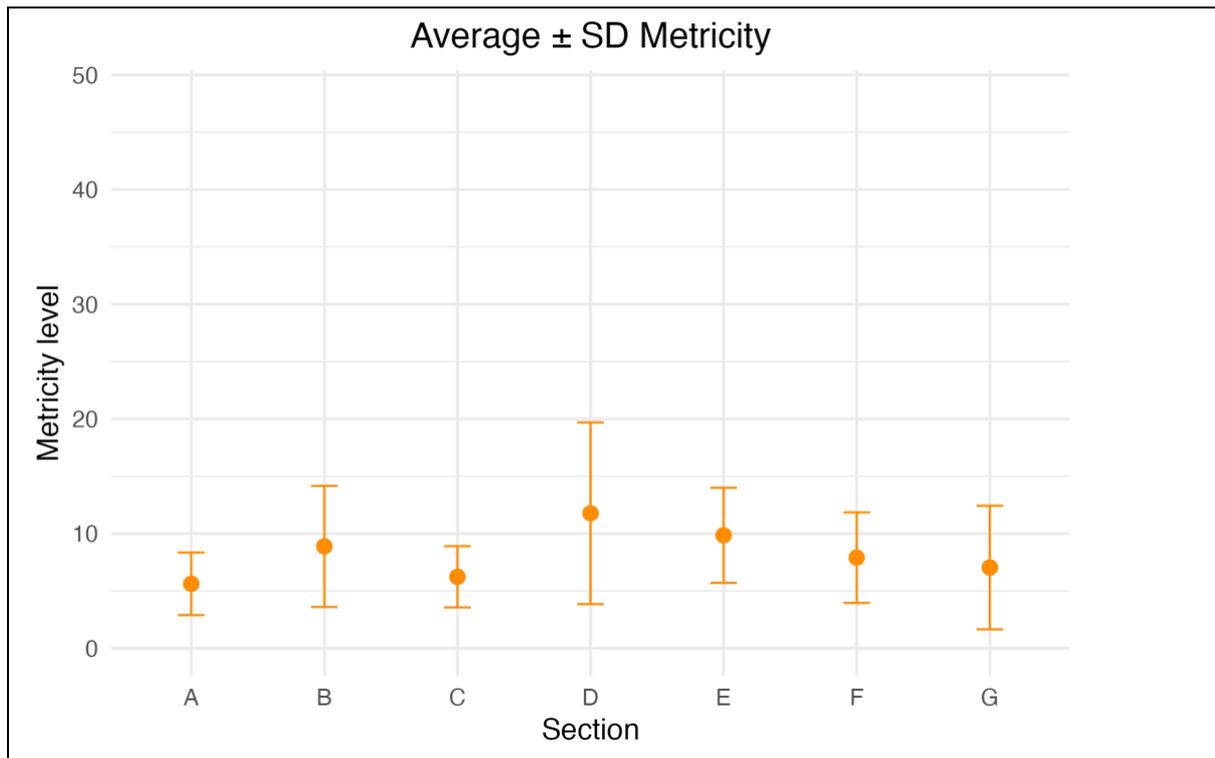
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	170.55	34.02	6.22	1.41
B	170.49	64.02	5.79	1.89
C	177.01	42.83	6.64	2.54
D	187.31	53.50	7.92	2.67
E	184.89	43.32	5.54	2.96
F	182.23	54.40	7.77	3.50
G	148.99	36.48	6.03	2.30
H	191.03	48.52	7.64	3.48
I	166.50	41.98	7.66	5.28
J	198.00	46.39	6.33	2.30
K	134.50	24.80	10.24	7.11
L	181.57	34.71	9.06	2.14
<b>Average</b>	<b>174.42</b>	<b>43.75</b>	<b>7.24</b>	<b>3.13</b>



9.4.11 Kyriacos Tapakis: Rast Taksim

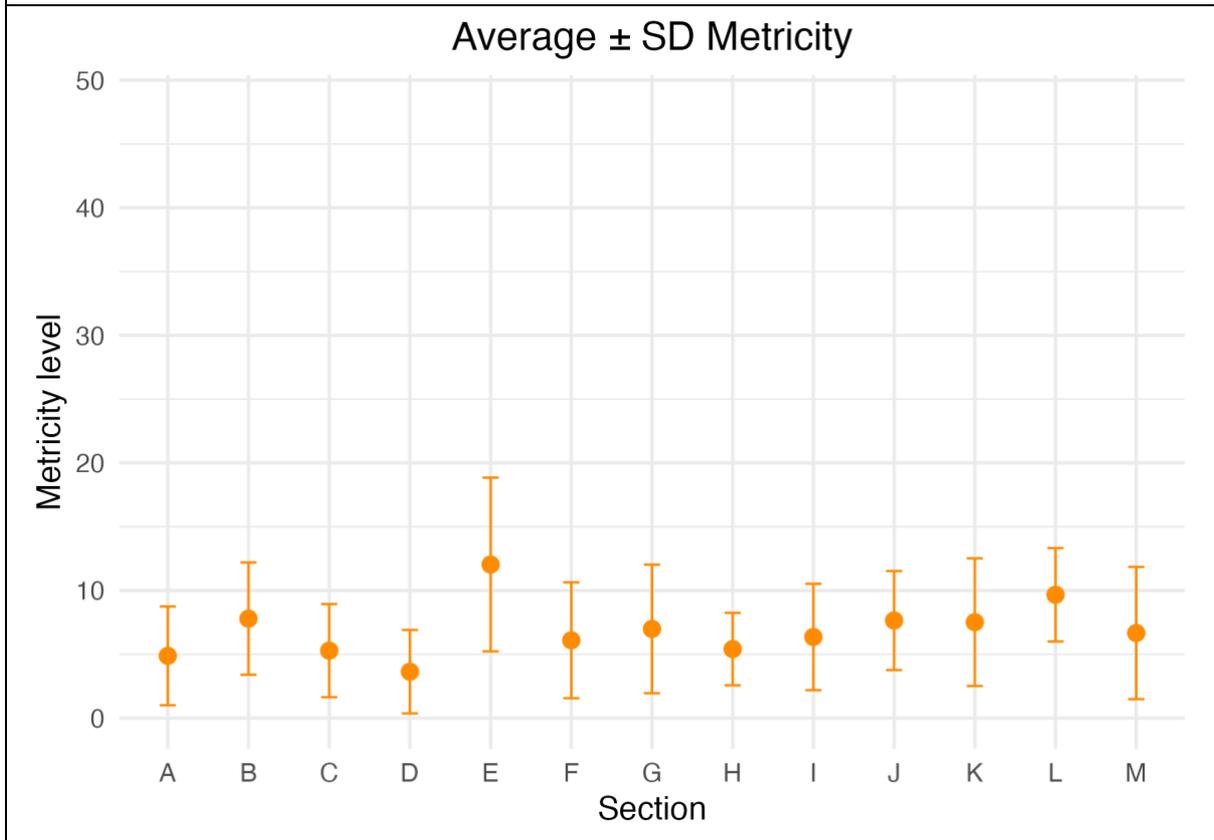
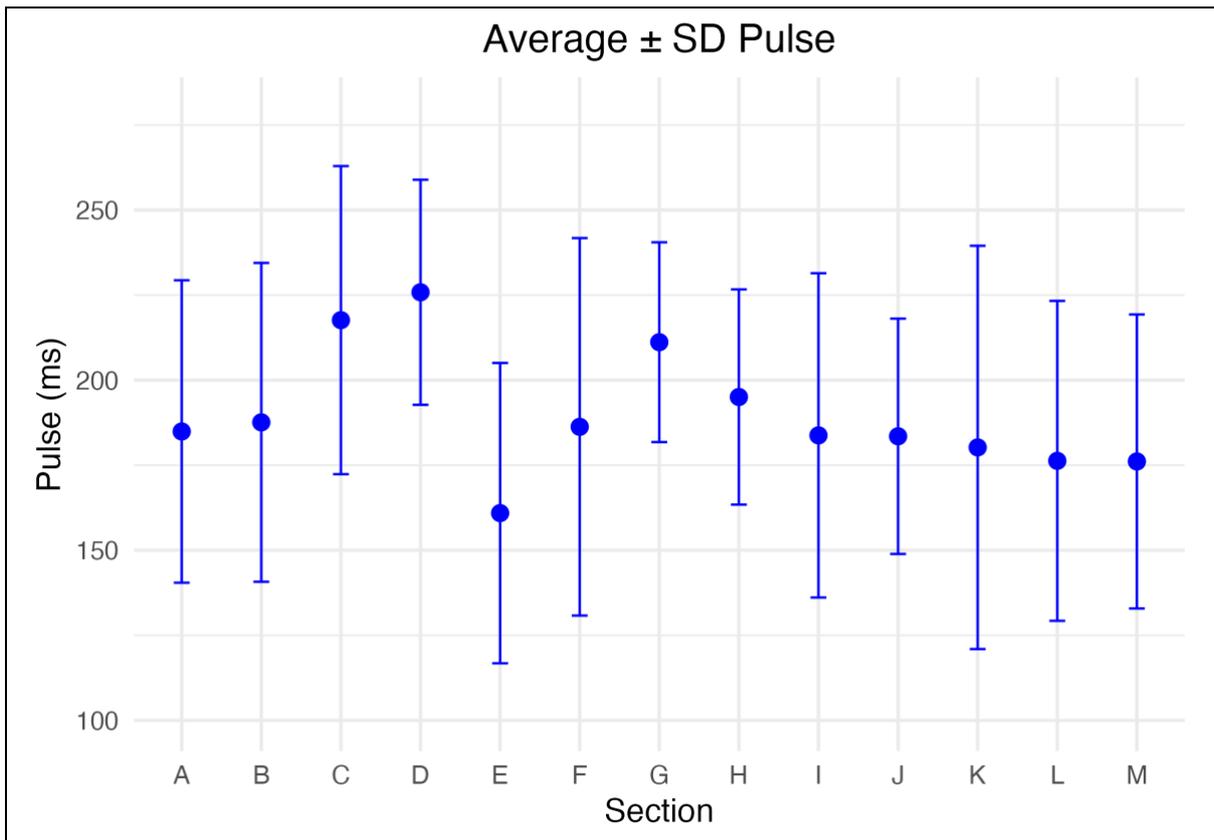
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	159.69	36.79	5.62	2.73
B	167.06	26.52	8.88	5.28
C	159.50	41.51	6.23	2.67
D	176.24	12.99	11.77	7.92
E	178.05	30.24	9.85	4.15
F	194.88	27.02	7.90	3.95
G	175.50	48.77	7.04	5.39
<b>Average</b>	<b>172.99</b>	<b>31.98</b>	<b>8.18</b>	<b>4.58</b>





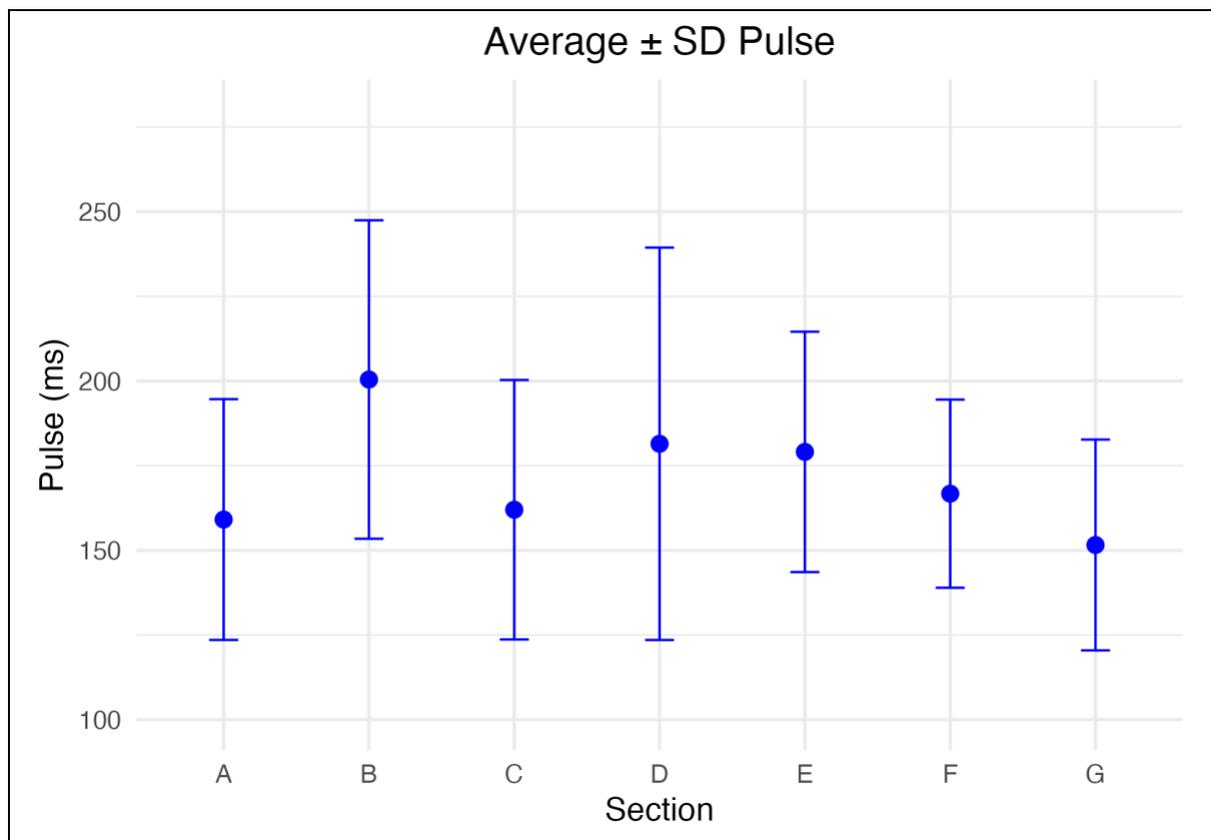
9.4.12 Alexandros Papadimitrakis: Uşşak Taksim

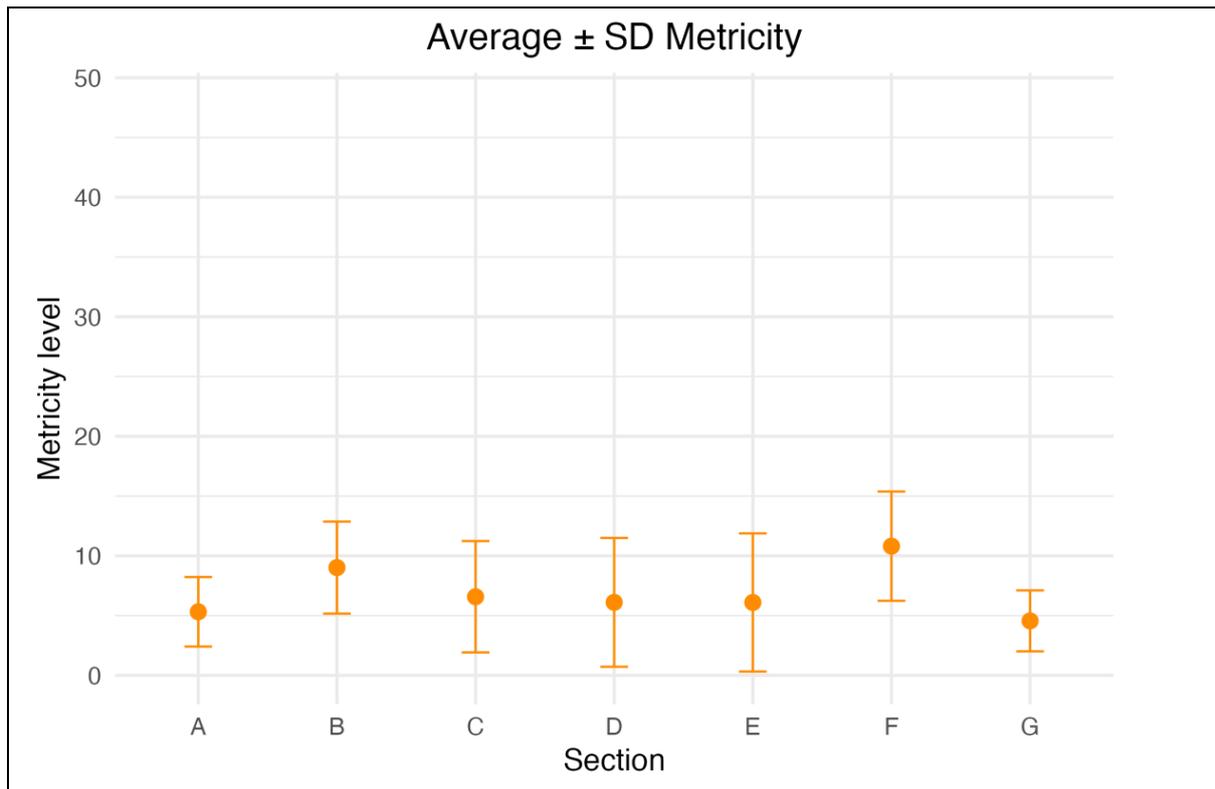
Section	Pulse	SD_Pulse	Metricity	SD_Metricity
A	184.91	44.45	4.88	3.87
B	187.60	46.86	7.80	4.40
C	217.64	45.28	5.29	3.65
D	225.83	33.08	3.64	3.27
E	160.92	44.14	12.04	6.81
F	186.28	55.48	6.10	4.54
G	211.16	29.36	6.99	5.04
H	195.05	31.63	5.41	2.84
I	183.77	47.66	6.36	4.17
J	183.50	34.59	7.65	3.88
K	180.23	59.27	7.52	5.00
L	176.28	47.02	9.67	3.66
M	176.10	43.21	6.67	5.18
<b>Average</b>	<b>189.94</b>	<b>43.23</b>	<b>6.92</b>	<b>4.33</b>



9.4.13 Yurdal Tokcan: Nihavent Taksim 1

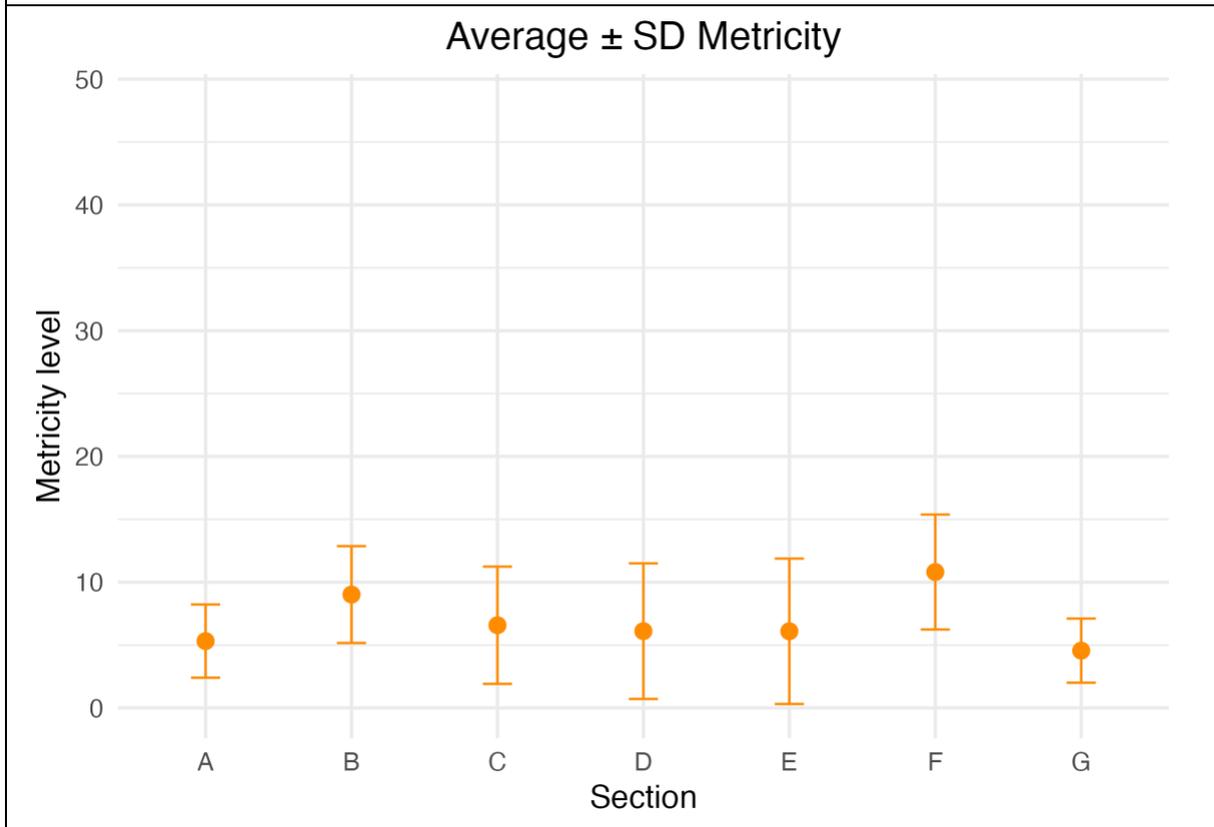
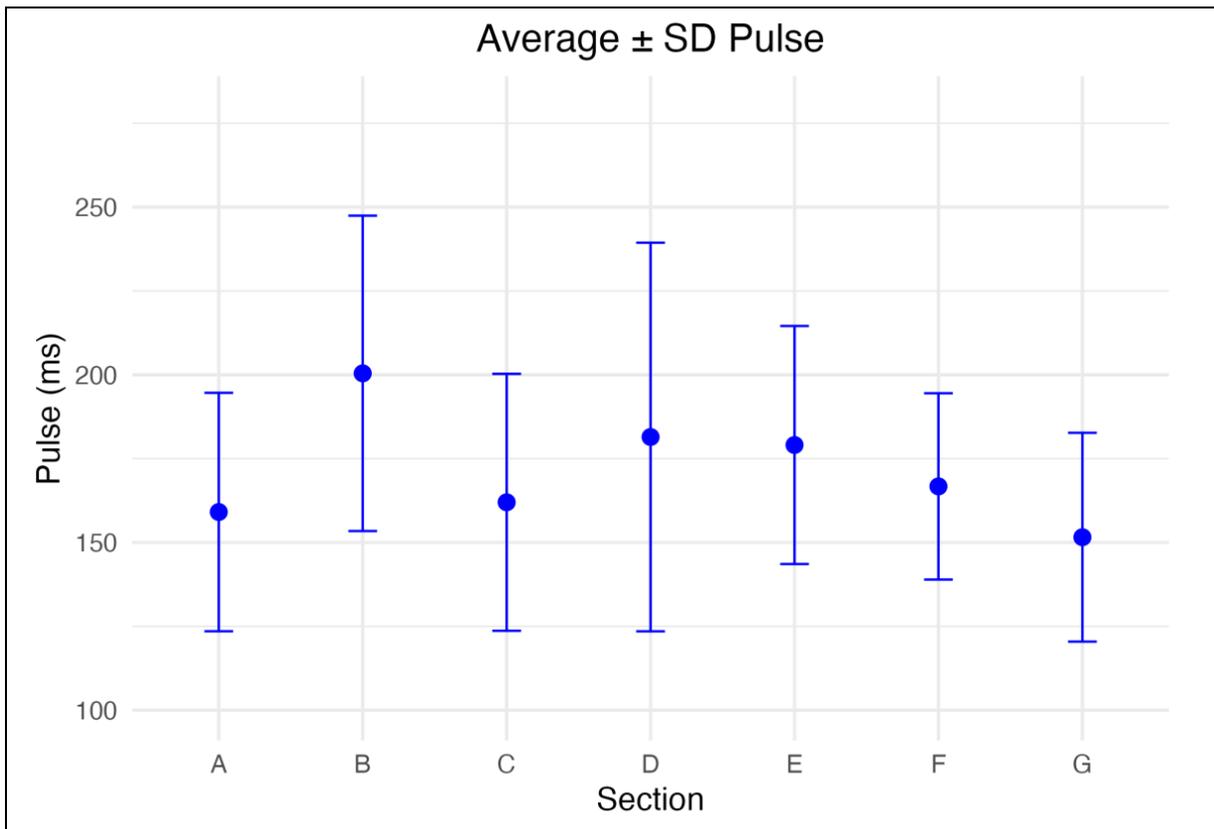
Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	159.09	35.55	5.32	2.91
B	200.44	47.02	9.02	3.85
C	161.99	38.31	6.58	4.66
D	181.46	57.94	6.11	5.39
E	179.07	35.49	6.10	5.78
F	166.73	27.78	10.81	4.57
G	151.58	31.13	4.56	2.55
<b>Average</b>	<b>171.48</b>	<b>39.03</b>	<b>6.93</b>	<b>4.24</b>





9.4.14 Yurdal Tokcan: Nihavent Taksim 2

Phrase	Average_Pulse	SD_Pulse	Average_Metricity	SD_Metricity
A	159.09	35.55	5.32	2.91
B	200.44	47.02	9.02	3.85
C	161.99	38.31	6.58	4.66
D	181.46	57.94	6.11	5.39
E	179.07	35.49	6.10	5.78
F	166.73	27.78	10.81	4.57
G	151.58	31.13	4.56	2.55
<b>Average</b>	<b>171.48</b>	<b>39.03</b>	<b>6.93</b>	<b>4.24</b>



## Bibliography

- Abramovay, J. (2025): Rhythm Beyond Measure: Computational and Ethnographic Approaches to Analysing Free-Rhythm Taksim Improvisation. Durham University. (dataset). DOI: <http://doi.org/10.15128/r1707957760>
- Akkoç, C. (2002). Non-Deterministic Scales Used in Traditional Turkish Music. *Journal of New Music Research*, 31(4), 285–293. <https://doi.org/10.1076/jnmr.31.4.285.14169>
- Aksoy, B. (2015). Preliminary Notes on the Possibility (or Impossibility) of Writing Ottoman Musical History. In M. Greve (Ed.), *Writing the History of "Ottoman Music"*: (1st ed., pp. 13–32). Ergon-Verlag. <https://doi.org/10.5771/9783956507038-13>
- Amit, V. (2003). *Constructing the Field* (V. Amit, Ed.). Routledge. <https://doi.org/10.4324/9780203450789>
- Anagnostou, P. (2018). Did You Say Rebetiko? Musical Categories, Their Transformation, and Their Meanings. *Journal of Social History*, 52(2), 283–303. <https://doi.org/10.1093/jsh/shy031>
- Andrikos, N. (2020). Towards a Re-Approach of Makam Theory Based on Practice and Repertoire: The Case of the Segah Phenomena. *Etnomüzikoloji Dergisi*, 3(2), 224–243. <https://dergipark.org.tr/en/pub/etnomuzikoloji/issue/57697/820262>
- Arnon, Y. (2008). Improvisation as Verbalization - the use, meaning and function of Pauses in the Turkish makam. *Dutch Journal of Music Theory*, 36–47.
- Atkins, R. (1969, December 5). records Jazz. *Tribune*, 33(48), 11. <http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/magazines/records-jazz/docview/1861505455/se-2?accountid=14533>
- Atlı, H. S., Şentürk, S., Bozkurt, B., & Serra, X. (2017). *Synthesis of Turkish Makam Music Scores Using An Adaptive Tuning Approach*. <https://doi.org/10.5281/zenodo.580743>
- Ayangil, R. (2008). Western Notation in Turkish Music. *Journal of the Royal Asiatic Society*, 18(4), 401–447. <https://doi.org/DOI: 10.1017/S1356186308008651>
- Azadehfar, M. R. (2011). *Rhythmic Structure in Iranian Music*. Tehran Arts University Press. <https://books.google.nl/books?id=0V2eEcJtKrcC>
- Baloğlu, B. Ş. (2022). Meşru Beğeni Politikalarının Mağduru Udî Kadri Şençalar. *Social Sciences Studies Journal*, 98(98), 1830–1839. <https://doi.org/10.29228/sssj.62414>
- Bayramcan B. (2024). *yüzyıl Türk müziğinin önemli portrelerinden udî Kadri Şençalar ve taksimleri üzerine bir inceleme / A study on the prominent figure of udî Kadri Şençalar in*

*20th century Turkish music and his improvisations*. Master Dissertation, Technical University of Istanbul.

Behar, C. (2006). The Ottoman musical tradition. In S. N. Faroqhi (Ed.), *The Cambridge History of Turkey: Volume 3: The Later Ottoman Empire, 1603–1839* (Vol. 3, pp. 391–407). Cambridge University Press. <https://doi.org/DOI: 10.1017/CHOL9780521620956.019>

Beken, M. N., & Schuyler, P. (1998a). Musicians, audience and power: The changing aesthetics in the music at the Maksim gazino of Istanbul [University of Maryland, Baltimore County]. In *ProQuest Dissertations and Theses*.  
<http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/dissertations-theses/musicians-audience-power-changing-aesthetics/docview/304465890/se-2?accountid=14533>

Beken, M. N., & Schuyler, P. (1998b). Musicians, audience and power: The changing aesthetics in the music at the Maksim gazino of Istanbul [University of Maryland, Baltimore County]. In *ProQuest Dissertations and Theses*.  
<http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/dissertations-theses/musicians-audience-power-changing-aesthetics/docview/304465890/se-2?accountid=14533>

Bello, J. P., Daudet, L., Abdallah, S., Duxbury, C., Davies, M., & Sandler, M. B. (2005). A tutorial on onset detection in music signals. *IEEE Transactions on Speech and Audio Processing*, 13(5), 1035–1047. <https://doi.org/10.1109/TSA.2005.851998>

Benadon, F. (2006). Slicing the Beat: Jazz Eighth-Notes as Expressive Microrhythm. *Ethnomusicology*, 50(1), 73–98. <http://www.jstor.org/stable/20174424>

Benetos, E., & Holzapfel, A. (2015). Automatic transcription of Turkish microtonal music. *The Journal of the Acoustical Society of America*, 138(4), 2118–2130.  
<https://doi.org/10.1121/1.4930187>

Böck, S., Korzeniowski, F., Schlüter, J., Krebs, F., & Widmer, G. (2016). madmom: A New Python Audio and Music Signal Processing Library. *Proceedings of the 24th ACM International Conference on Multimedia*, 1174–1178.  
<https://doi.org/10.1145/2964284.2973795>

Born, G. (2020). Diversifying MIR: Knowledge and Real-World Challenges, and New Interdisciplinary Futures. *Transactions of the International Society for Music Information Retrieval*, 3(1), 193–204. <https://doi.org/10.5334/tismir.58>

Bourgeau, A. (2022). *Entretien avec Ross Daly (novembre 2020 & février 2021)*.  
[https://597b5d0b-C709-43f7-B6af-Cf9a8cd214c3.Filesusr.Com/Ugd/7cce3b\\_733ebc57579e48d697af957b1139d450.Pdf](https://597b5d0b-C709-43f7-B6af-Cf9a8cd214c3.Filesusr.Com/Ugd/7cce3b_733ebc57579e48d697af957b1139d450.Pdf)

- Bozkurt, B. (2015). *Computational Analysis of Overall Melodic Progression for Turkish Makam Music*. Delatour France. <https://doi.org/10.5281/zenodo.1211460>
- Bozkurt, B., Ayangil, R., & Holzapfel, A. (2014). Computational Analysis of Turkish Makam Music: Review of State-of-the-Art and Challenges. *Journal of New Music Research*, 43(1), 3–23. <https://doi.org/10.1080/09298215.2013.865760>
- Bozkurt, B., Gedik, A. C., & Karaosmanoglu, M. K. (2009). Music information retrieval for Turkish music: problems, solutions and tools. *2009 IEEE 17th Signal Processing and Communications Applications Conference*, 804–807. <https://doi.org/10.1109/SIU.2009.5136518>
- Brossier, P., Tintamar, Müller, E., Philippsen, N., Seaver, T., Fritz, H., cyclopsian, Alexander, S., Williams, J., Cowgill, J., & Cruz, A. (2019). *aubio/aubio: 0.4.9*. Zenodo. <https://doi.org/10.5281/zenodo.2578765>
- Budak, M., & Güray, C. (2024). Yorgo Bacanos'un Mahur Aranağme İcrasının Analizi. *Conservatorium / Konservatoryum*, 0(0), 0–0. <https://doi.org/10.26650/CONS2024-1453714>
- Cholevas, M. (2007). Makam: Modality and style in Turkish art music. *Journal of Interdisciplinary Music Studies*, 1(2), 197–203.
- Cholevas, M. (2022). *Makampedia: from taksim mastery to makam theory*. Dissertation, University of Macedonia. <https://doi.org/10.12681/eadd/51954>
- Church, M. (2015). *The Other Classical Musics: Fifteen Great Traditions*. Boydell & Brewer. <https://doi.org/DOI:10.1017/9781782045359>
- Clayton, M. (2008). *Time in Indian Music: Rhythm, Metre, and Form in North Indian Rag Performance*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195339680.001.0001>
- Clayton, M. (2017). The Ethnography of Embodied Music Interaction. In M. Lesaffre, P.-J. Maes, & M. Leman (Eds.), *The Routledge Companion to Embodied Music Interaction* (pp. 215–222). Routledge.
- Clayton, M. (2020). Empirical methods in the study of music performance. In G. Borio, G. Giuriati, A. Cecchi, & M. Lutz (Eds.), *Investigating Musical Performance* (pp. 10–24). Routledge.
- Clayton, M. (2023). Hindustani Rhythm and Computational Analysis: A Musicological Perspective. In P. Rao, H. A. Murthy, & S. Prasanna (Eds.), *Indian Art Music: A Computational Perspective* (pp. 171–186). Scheme for Promotion of Academic and Research Collaboration. [https://play.google.com/books/reader?id=g-2rEAAAQBAJ&pg=GBS.PA173&hl=en\\_GB&pli=1](https://play.google.com/books/reader?id=g-2rEAAAQBAJ&pg=GBS.PA173&hl=en_GB&pli=1)

- Clayton, M. R. L. (1996). Free-rhythm: Ethnomusicology and the study of music without metre. *Bulletin of the School of Oriental and African Studies*, 59(2), 323–332. <https://doi.org/10.1017/s0041977x00031608>
- Condit-Schultz, N. (2019). Deconstructing the nPVI: A Methodological Critique of the Normalized Pairwise Variability Index as Applied to Music. *Music Perception*, 36(3), 300–313. <https://doi.org/10.1525/mp.2019.36.3.300>
- Contadini, A., Norton, C., & Wright, O. (2013). *The Renaissance and the Ottoman World*. Ashgate. <https://books.google.nl/books?id=eqaV2Xtf7KcC>
- Cooper, G. W., & Meyer, L. B. (1960). *The Rhythmic Structure of Music*. University of Chicago Press. <https://books.google.nl/books?id=n-iVmQEACAAJ>
- Danielsen, A., Johansson, M., & Stover, C. (2023). Bins, Spans, and Tolerance: Three Theories of Microtiming Behavior. *Music Theory Spectrum*, 45(2), 181–198. <https://doi.org/10.1093/mts/mtad005>
- Danielsen, A., Nymoen, K., Anderson, E., Câmara, G. S., Langerød, M. T., Thompson, M. R., & London, J. (2019). Where is the beat in that note? Effects of attack, duration, and frequency on the perceived timing of musical and quasi-musical sounds. *Journal of Experimental Psychology: Human Perception and Performance*, 45(3), 402–418. <https://doi.org/10.1037/xhp0000611>
- Danielson, Virginia., Marcus, S. L., & Reynolds, D. F. (2002). The Garland encyclopedia of world music. Vol. 6, The Middle East. In *Middle East*. Routledge.
- Datseris, G., Ziereis, A., Albrecht, T., Hagmayer, Y., Priesemann, V., & Geisel, T. (2019). Microtiming Deviations and Swing Feel in Jazz. *Scientific Reports*, 9(1), 19824. <https://doi.org/10.1038/s41598-019-55981-3>
- Davis, J. A., & Lynch, C. (2021). *Listening Across Borders*. Routledge. <https://doi.org/10.4324/9780429027215>
- de Oliveira Pinto, T. (2018). *Music as Living Heritage: An Essay on Intangible Culture*. Edition EMVAS.
- Dixon, S. (2001). Automatic Extraction of Tempo and Beat From Expressive Performances. *Journal of New Music Research*, 30(1), 39–58. <https://doi.org/10.1076/jnmr.30.1.39.7119>
- During, J. (1985). Théories et pratiques de la gamme iranienne. *Revue de Musicologie*, 71(1/2), 79–118. <https://doi.org/10.2307/928594>
- Duxbury, C., Bello, J. P., Sandler, M., & Davies, M. (2003). Complex Domain Onset Detection for Musical Signals. *Proceedings of the 6th Int. Conference on Digital Audio Effects (DAFx-03)*.

- Ederer, E. B. (2011). *The Theory and Praxis of Makam in Classical Turkish Music 1910–2010* [University of California, Santa Barbara]. In *ProQuest Dissertations and Theses*.  
<http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/dissertations-theses/theory-praxis-i-makam-classical-turkish-music/docview/908611090/se-2?accountid=14533>
- Eerola, T., & Clayton, M. (2024). onsetsync - Analysis and Visualisation of Synchronisation of Music Onset Data. *Journal of Open Source Software*, 9(93).  
<https://doi.org/https://doi.org/10.21105/joss.05395>
- Egan (Pádraig Mac Aodhgáin), P. (2021). Insider or outsider? Exploring some digital challenges in ethnomusicology. *Interdisciplinary Science Reviews*, 46(4), 477–500.  
<https://doi.org/10.1080/03080188.2021.1872144>
- Ellis, D. P. W. (2007). Beat Tracking by Dynamic Programming. *Journal of New Music Research*, 36(1), 51–60. <https://doi.org/10.1080/09298210701653344>
- Elsner, J., Jähnichen, G., & Talam, J. (2014). *Maqām : Historical Traces and Present Practice in Southern European Music Traditions*. Cambridge Scholars Publishing.  
<http://ebookcentral.proquest.com/lib/durham/detail.action?docID=1716681>
- Erol, M. (2015). *Greek Orthodox Music in Ottoman Istanbul : Nation and Community in the Era of Reform*. Indiana University Press.  
<http://ebookcentral.proquest.com/lib/durham/detail.action?docID=4188032>
- Feldman, W. (1990). Cultural Authority and Authenticity in the Turkish Repertoire. *Asian Music*, 22(1), 73–111. <https://doi.org/10.2307/834291>
- Feldman, W. (1993). Ottoman Sources on the Development of the Taksim. *Yearbook for Traditional Music*, 25, 1–28. <https://doi.org/10.2307/768680>
- Feldman, W. (2017). The Art of Melodic Extension Within and Beyond the Usûl . In Zeynep Helvacı, J. Olley, & R. M. Jaeger (Eds.), *Rhythmic cycles and structures in the art music of the Middle East* (pp. 154–176). Ergon Verla.
- Feldman, W. (2019). The Emergence of Ottoman Music and Local Modernity. *YILLIK: Annual of Istanbul Studies*, 1(1), 173–179. <https://doi.org/10.53979/yillik.2019.10>
- Feldman, W. (2023). *Music of the Ottoman Court: Makam, Composition and the Early Ottoman Instrumental Repertoire*. Brill.  
<https://doi.org/https://doi.org/10.1163/9789004531260>
- Feroz, A. (1993). *The Making of Modern Turkey* (1st edition.). Routledge.  
<https://doi.org/10.4324/9780203418048>
- Finnegan, R., & Turin, M. (1976). *Oral Literature in Africa*. Open Book Publishers.  
<http://ebookcentral.proquest.com/lib/durham/detail.action?docID=3384109>

- Frigyesi, J. (1993). Preliminary Thoughts toward the Study of Music without Clear Beat: The Example of “Flowing Rhythm” in the Jewish Nusah. In *Source: Asian Music* (Vol. 24, Issue 2).
- Frigyesi, J. (1994). Free-rhythm? *Asian Music*, 26(1), 212–214.
- Garfias, R. (1981). Survivals of Turkish Characteristics in Romanian Musica Lautareasca. *Yearbook for Traditional Music*, 13, 97–107. <https://doi.org/10.2307/768360>
- Gedik, A. C., & Bozkurt, B. (2009). Evaluation of the Makam Scale Theory of Arel for Music Information Retrieval on Traditional Turkish Art Music. *Journal of New Music Research*, 38(2), 103–116. <https://doi.org/10.1080/09298210903171152>
- Gill-Gürtan, D. (2011). Performing Meşk, Narrating History: Legacies of Transmission in Contemporary Turkish Musical Practices. *Comparative Studies of South Asia, Africa and the Middle East*, 31(3), 615–630. <https://doi.org/10.1215/1089201X-1426773>
- Giri, S. (2022). Participatory Ethnomusicology: An Epistemic Approach to Social Justice, Human Rights, and the Sustainability of the Traditional Arts of Minorities. *The International Journal of Traditional Arts*, 4(1).  
<http://tradartsjournal.ncl.ac.uk/index.php/ijta/article/view/54>
- Gobo, G., & Molle, A. (2017). *Doing Ethnography* (Second Edition).  
<https://doi.org/10.4135/9781529682847>
- Gordon, J. W. (1987). The perceptual attack time of musical tones. *The Journal of the Acoustical Society of America*, 82(1), 88–105. <https://doi.org/10.1121/1.395441>
- Grosche, P., Müller, M., & Kurth, F. (2010). Cyclic tempogram—A mid-level tempo representation for musicsignals. *2010 IEEE International Conference on Acoustics, Speech and Signal Processing*, 5522–5525. <https://doi.org/10.1109/ICASSP.2010.5495219>
- Grosche, P., Muller, M., & Kurth, F. (2010). Cyclic tempogram—A mid-level tempo representation for musicsignals. *2010 IEEE International Conference on Acoustics, Speech and Signal Processing*, 5522–5525. <https://doi.org/10.1109/ICASSP.2010.5495219>
- Hasty, C. (1997). *Meter as Rhythm*. Oxford University Press.
- Hasty, C. (2020). *Meter as Rhythm*. Oxford University Press New York.  
<https://doi.org/10.1093/oso/9780190886912.001.0001>
- Herskovits, M. J., & Herskovits, F. S. (1936). Suriname Folk-Lore. In *Suriname Folk-Lore*.  
<http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/books/suriname-folk-lore/docview/2138596584/se-2?accountid=14533>
- Holzappel, A. (2013). *Tempo And Prosody In Turkish Taksim Improvisation*. Proceedings of the 3rd Workshop on Folk Music Analysis, Meertens Institute; Department of Information and Computing Sciences, Utrecht University , 2013, p. 1-6

Holzappel, A. (2015a). A Corpus Study on Rhythmic Modes in Turkish Makam Music and Their Interaction with Meter. *GMTH Proceedings*, 393–405. <https://doi.org/10.31751/p.199>

Holzappel, A. (2015b). Relation Between Surface Rhythm and Rhythmic Modes in Turkish Makam Music. *Journal of New Music Research*, 44(1), 25–38. <https://doi.org/10.1080/09298215.2014.939661>

Holzappel, A. (2018a). Ethical Dimensions of Music Information Retrieval Technology. *Transactions of the International Society for Music Information Retrieval*.

Holzappel, A. (2018b). *Structure and interaction in Cretan leaping dances: Connecting ethnography and computational analysis*.

Holzappel, A., & Bozkurt, B. (2012). Metrical strength and contradiction in turkish Makam music. *Proceedings of the 2nd CompMusic Workshop*, 79–84.

Holzappel, A., & Stylianou, Y. (2011). Scale Transform in Rhythmic Similarity of Music. *IEEE Transactions on Audio, Speech, and Language Processing*, 19(1), 176–185. <https://doi.org/10.1109/TASL.2010.2045782>

Huang, R. S., Holzappel, A., Sturm, B. L. T., & Kaila, A.-K. (2023). Beyond Diverse Datasets: Responsible MIR, Interdisciplinarity, and the Fractured Worlds of Music. *Transactions of the International Society for Music Information Retrieval*, 6(1), 43–59. <https://doi.org/10.5334/tismir.141>

İncilli, M. (1994). *Yorgo Bacanos'un Taksimleri Üzerine Bir Çalışma*.

Jacoby, N., Margulis, E. H., Clayton, M., Hannon, E., Honing, H., Iversen, J., Klein, T. R., Mehr, S. A., Pearson, L., Peretz, I., Perlman, M., Polak, R., Ravnigani, A., Savage, P. E., Steingo, G., Stevens, C. J., Trainor, L., Trehub, S., Veal, M., & Wald-Fuhrmann, M. (2020). Cross-cultural work in music cognition: Challenges, insights, and recommendations. *Music Perception*, 37(3), 185–195. <https://doi.org/10.1525/MP.2020.37.3.185>

Janney, E., Taylor, H., Scharff, C., Rothenberg, D., Parra, L. C., & Tchernichovski, O. (2016). Temporal regularity increases with repertoire complexity in the Australian pied butcherbird's song. *Royal Society Open Science*, 3(9), 160357. <https://doi.org/10.1098/rsos.160357>

Jones, A. M. (1950). The Kalimba of the Lala Tribe, Northern Rhodesia. *Africa*, 20(4), 324. <http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/scholarly-journals/kalimba-lala-tribe-northern-rhodesia/docview/1298701463/se-2?accountid=14533>

Jones, A. M. (1963). African Music in Ghana. By J. H. Kwabena Nketia. London: Longmans, 1962. Pp. 148, including 30 pp. music transcription and 2 maps. 30s. *Africa*, 33(3), 281–281. <https://doi.org/DOI: 10.2307/1157432>

- Kallimopoulou, E. (2016). *Paradosiaká: Music, Meaning and Identity in Modern Greece*. Routledge. <https://doi.org/10.4324/9781315247397>
- Karaosmanoğlu, M. (2014). "Yarman-36 Makam Tone-System" For Turkish Art Music. <https://doi.org/10.13140/RG.2.2.23727.33441>
- Koç, F. (2013). The Comparison of Methods Used for Oud Education in Turkish Music. *Procedia - Social and Behavioral Sciences*, 106, 2645–2651. <https://doi.org/https://doi.org/10.1016/j.sbspro.2013.12.305>
- Koslovsky, J., & Schuijjer, M. (2023). *Music Performance Encounters*. Routledge. <https://doi.org/10.4324/9781003295785>
- Landau, J. (2023). *Atatürk and the Modernization of Turkey*. Brill. <https://doi.org/https://doi.org/10.1163/9789004661417>
- Lerdahl, F., & Jackendoff, R. S. (1983). *A Generative Theory of Tonal Music*. The MIT Press. <https://doi.org/10.7551/mitpress/12513.001.0001>
- Lewis, G., & Piekut, B. (2016). *The Oxford Handbook of Critical Improvisation Studies*. Oxford University Press. <https://books.google.com.br/books?id=1oTADAAAQBAJ>
- List, G. (1963). The Boundaries of Speech and Song. *Ethnomusicology*, 7(1), 1–16. <https://doi.org/10.2307/924141>
- Lloyd, L. S., & Rastall, R. (2001). Pitch nomenclature. In *Oxford Music Online*. Oxford University Press. <https://doi.org/10.1093/gmo/9781561592630.article.21857>
- London, J. (2002). Rhythm in twentieth-century theory. In T. Christensen (Ed.), *The Cambridge History of Western Music Theory* (pp. 695–725). Cambridge University Press. <https://doi.org/DOI: 10.1017/CHOL9780521623711.024>
- London, J. (2012). *Hearing in Time: Psychological Aspects of Musical Meter*. Oxford University Press. <https://books.google.com.br/books?id=8vUJCAAQBAJ>
- Minagawa, T. (1957). JAPANESE Noh MUSIC. *Journal of the American Musicological Society*, 10, 181. <http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/scholarly-journals/japanese-noh-music/docview/1289885475/se-2?accountid=14533>
- Morel, G. (1980, June 1). Indian Music and Modern Jazz. *New Boston Review*, 5(2), 24. <http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/magazines/indian-music-modern-jazz/docview/1347836005/se-2?accountid=14533>
- Musical Diary. (1950, May 17). *The Jerusalem Post (1950-2008)*, 4. <http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/historical-newspapers/musical-diary/docview/929511709/se-2?accountid=14533>

- Nettl, B. (1985). *The Western impact on world music : change, adaptation, and survival*. Schirmer Books.
- Nettl, B., & Babiracki, C. M. (1987). *The Radif of Persian Music: Studies of Structure and Cultural Context in the Classical Music of Iran*. Elephant & Cat.  
<https://books.google.nl/books?id=oDPaAAAAMAAJ>
- Nettl, B., & Riddle, R. (1973). Taqsim Nahawand: A Study of Sixteen Performances by Jihad Racy. *Yearbook of the International Folk Music Council*, 5, 11–50. [https://doi.org/DOI: 10.2307/767493](https://doi.org/DOI:10.2307/767493)
- Neuman, D. (2012). Pedagogy, Practice, and Embodied Creativity in Hindustani Music. *Ethnomusicology*, 56(3), 426–449. <https://doi.org/10.5406/ethnomusicology.56.3.0426>
- O’Connell, J. M. (2000). Fine Art, Fine Music: Controlling Turkish Taste at the Fine Arts Academy in 1926. *Yearbook for Traditional Music*, 32, 117–142. [https://doi.org/DOI: 10.2307/3185245](https://doi.org/DOI:10.2307/3185245)
- O’Connell, J. M. (2003). A Resounding Issue: Greek Recordings of Turkish Music, 1923-1938. *Middle East Studies Association Bulletin*, 37(2), 200–216. [https://doi.org/DOI: 10.1017/S0026318400045752](https://doi.org/DOI:10.1017/S0026318400045752)
- O’Connell, J. M. (2005). In the Time of Alaturka: Identifying Difference in Musical Discourse. *Ethnomusicology*, 49(2), 177–205. <http://www.jstor.org/stable/20174375>
- Ohriner, M. (2016). Attending to Free-rhythm. *Indiana Theory Review*, 32(1–2), 1–40. <https://doi.org/10.2979/inditheorevi.32.2.01>
- Ohriner, M. (2019). *Flow*. Oxford University Press.  
<https://doi.org/10.1093/oso/9780190670412.001.0001>
- Olivier Lartillot, P. T. (2007). Matlab Toolbox for Musical Feature Extraction From Audio. *International Conference on Digital Audio Effects*.
- Olivier Lartillot, P. T. T. E. (2008). A Matlab Toolbox for Music Information Retrieval. In C. Preisach, H. Burkhardt, L. Schmidt-Thieme, & R. Decker (Eds.), *Data Analysis, Machine Learning and Applications, Studies in Classification, Data Analysis, and Knowledge Organization*. Springer-Verlag.
- Özcan, N. (2010). Tanrikorur, Cinuçen. In *TDV Islamic Encyclopedia*. TDV Islamic Research Center.
- Özgür, İ. (2006). Arabesk Music in Turkey in the 1990s and Changes in National Demography, Politics, and Identity. *Turkish Studies*, 7(2), 175–190.  
<https://doi.org/10.1080/14683840600714616>

- Öztürk, O. M. (2018a). How was the traditional makam theory westernized for the sake of modernization? *Rast Müzikoloji Dergisi*, 6(1), 1769–1787.  
<https://dergipark.org.tr/en/pub/rastmd/issue/39297/462868>
- Öztürk, O. M. (2018b). The concept of makam-based melody and its problematic in musical analysis. In R. Sultanova & M. Rancier (Eds.), *Turkic Soundscapes*. Routledge.
- Patel, A. D., & Daniele, J. R. (2003). An empirical comparison of rhythm in language and music. *Cognition*, 87(1), B35–B45. [https://doi.org/https://doi.org/10.1016/S0010-0277\(02\)00187-7](https://doi.org/https://doi.org/10.1016/S0010-0277(02)00187-7)
- Pautz, Z. E. W. (1957). Types Of Musical Mysticism: A Study Of The Technical Means Used By Composers Of Various Periods To Express Mysticism In Music [The University of Wisconsin - Madison]. In *ProQuest Dissertations and Theses*.  
<http://ezphost.dur.ac.uk/login?url=https://www.proquest.com/dissertations-theses/types-musical-mysticism-study-technical-means/docview/301923765/se-2?accountid=14533>
- Pennanen, R. P. (2004). The Nationalization of Ottoman Popular Music in Greece. *Ethnomusicology*, 48(1), 1–25. <http://www.jstor.org/stable/30046238>
- Pine, R., & Konidari, V. (2023). *Title Borders and Borderlands: Explorations in Identity, Exile and Translation (Durrell Studies 1)*. Cambridge Scholars Publishing.
- Poulos, P. (2006). *Inheriting innovation: a study of taksim within a 20th Century lineage of Turkish tanbur players*.
- Poulos, P. (2011). Rethinking Orality in Turkish Classical Music: A Genealogy of Contemporary Musical Assemblages. *Middle East Journal of Culture and Communication*, 4(2), 164–183. <https://doi.org/10.1163/187398611X571337>
- Poulos, P. C. (2022). Greeks, Jews, and Music Sociality in Late Ottoman Istanbul. *Journal of the Ottoman and Turkish Studies Association*, 9(1), 51–69.  
<https://doi.org/10.2979/tur.2022.a876781>
- Powers, H. S., Wiering, F., Porter, J., Cowdery, J., Widdess, R., Davis, R., Perlman, M., Jones, S., & Marett, A. (2001). *Mode*. Oxford University Press.  
<https://doi.org/10.1093/gmo/9781561592630.article.43718>
- R Core Team. (2024). *Spectrum. R Documentation*. Retrieved April 3, 2024, from <https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/spectrum>.
- Racy, A. J. (2000). The Many Faces of Improvisation: The Arab Taqasim as a Musical Symbol. *Ethnomusicology*, 44(2), 302–320. <https://doi.org/10.2307/852534>
- Ravignani, A., & Norton, P. (2017). Measuring rhythmic complexity: A primer to quantify and compare temporal structure in speech, movement, and animal vocalizations. *Journal of Language Evolution*, 2(1), 4–19. <https://doi.org/10.1093/jole/lzx002>

- Reckford, T. (1987). *Chant in popular Iranian Shi'ism*. Dissertation, University of California.
- Rice, T. (2003). The Ethnomusicology of Music Learning and Teaching. *College Music Symposium*, 43, 65–85. <http://www.jstor.org/stable/40374471>
- Rice, T., & Garfias, R. (2011). *Ethnomusicological Encounters with Music and Musicians: Essays in Honor of Robert Garfias*. Ashgate. <https://books.google.nl/books?id=I-GQyz0RVUC>
- Roeder, J. (2019). Formative processes of Durational Projection in Free-rhythm. In R. Wolf, S. Blum, & C. Hasty (Eds.), *Thought and Play in Musical Rhythm*. Oxford University Press, 2019.
- Roeder, J. (2020). *Interactions of Folk Melody and Transformational (Dis)continuities in Chen Yi's Ba Ban*.
- Rowell, L. (1981). The Creation of Audible Time. In J. T. Fraser, N. Lawrence, & D. Park (Eds.), *The Study of Time IV: Papers from the Fourth Conference of the International Society for the Study of Time, Alpbach—Austria* (pp. 198–210). Springer New York. [https://doi.org/10.1007/978-1-4612-5947-3\\_16](https://doi.org/10.1007/978-1-4612-5947-3_16)
- Royer-Artuso, N. (2015). Improvisation et variation dialectale dans le monde du maqām: Une étude comparative des styles «arabes» et «turcs». *Revue Des TRaditions Musicales Des Mondes ARabe eT MédiTeRRanéen*, 1(9), 99–122.
- Sachs, C. (1953). *Rhythm and Tempo: A Study in Music History*. Norton. <https://books.google.nl/books?id=jvcsAAAAMAAJ>
- Senturk, S., & Serra, X. (2016). A Method for Structural Analysis of Ottoman-Turkish Makam Music Scores. *6th. International Workshop on Folk Music Analysis*, 39–46.
- Serra, X. (2017). The Computational Study of a Musical Culture through Its Digital Traces. *Acta Musicologica*, 89(1), 24–44. <https://www.jstor.org/stable/26350040>
- Signell, K. (1974). Esthetics of Improvisation in Turkish Art Music. *Asian Music*, 5(2), 45–49. <https://doi.org/10.2307/833887>
- Signell, K. (1976). The Modernization Process in Two Oriental Music Cultures: Turkish and Japanese. *Asian Music*, 7(2), 72–102. <https://doi.org/10.2307/833790>
- Signell, K. L. (1986). *Makam: Modal Practice in Turkish Art Music*. Da Capo Press Music.
- Skoulios, M. (2012). Modern Theory and Notation of Byzantine Chanting Tradition: A Near Eastern Musicological Perspective. *Near Eastern Musicology Online*, 1, 15–34.
- Srinivasamurthy, A., & Serra, X. (2014). A supervised approach to hierarchical metrical cycle tracking from audio music recordings. *2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 5217–5221. <https://doi.org/10.1109/ICASSP.2014.6854598>

- Stephen Blum. (2007). Āvāz. In K. Fleet, G. Krämer, D. Matringe, J. Nawas, & Devin J. Stewart (Eds.), *Encyclopaedia of Islam*, THREE.
- Stokes, M. (1992). *The Arabesk Debate: Music and Musicians in Modern Turkey*. Oxford University Press. <https://doi.org/10.1093/oso/9780198273677.001.0001>
- Stokes, M. (2010). 10. "Beloved Istanbul": Realism and the Transnational Imaginary in Turkish Popular Culture. In W. Armbrust (Ed.), *New Approaches to Popular Culture in the Middle East and Beyond* (pp. 224–242). University of California Press. <https://doi.org/doi:10.1525/9780520923096-013>
- Stokes, M. (2020). Migration and Music. *Music Research Annual*, 1(0), 1–24. <https://musicresearchannual.org/stokes-dec-2020/#:~:text=fundamental%20issues,8>
- Stover, C. (2015). *Christopher Hasty's Meter as Rhythm*. <https://www.chrisstovermusic.com/hastys-meter-as-rhythm>.
- Stubbs, F. W., & Barlow, J. K. (1994). The art and science of taksim: An empirical analysis of traditional improvisation from 20th century Istanbul [Wesleyan University]. In *ProQuest Dissertations and Theses*.
- Tenzer, M., & Roeder, J. (Eds.). (2011). *Analytical and Cross-Cultural Studies in World Music*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195384581.001.0001>
- Touma, H. H. (1971). The Maqam Phenomenon: An Improvisation Technique in the Music of the Middle East. *Ethnomusicology*, 15(1), 38–48. <https://doi.org/10.2307/850386>
- Tragaki, D. (2009). *Rebetiko Worlds*. Cambridge Scholars. <https://books.google.nl/books?id=pbkLBwAAQBAJ>
- Tragaki, Dafni. (2018). *Made in Greece : studies in popular music* (First edition.). Routledge, an imprint of Taylor and Francis.
- Tsuge, G. (1974). *Avaz- a study of the rhythmic aspects of classical Iranian*.
- Tugny, R. P. de. (2011). *Escuta e poder na estética tikmū'ün*. Museu do Índio/Funai.
- Turino, T. (2008). *Music as Social Life: The Politics of Participation*. University of Chicago Press.
- Tzanetakis, G., Kapur, A., Schloss, W., & Wright, M. (2007). Computational Ethnomusicology. *Journal of Interdisciplinary Music Studies*, 1, 1–24.
- Valero-Mas, J. J., & José M. Inesta. (2015). Interactive onset detection in audio recordings. *Late Breaking/Demo Extended Abstract, 16th International Society for Music Information Retrieval Conference (ISMIR)*.

- Volk, A. (2008a). The Study of Syncopation Using Inner Metric Analysis: Linking Theoretical and Experimental Analysis of Metre in Music. *Journal of New Music Research*, 37(4), 259–273. <https://doi.org/10.1080/09298210802680758>
- Volk, A. (2008b). Persistence and change: Local and global components of metre induction using Inner Metric Analysis. *Journal of Mathematics and Music*, 2(2), 99–115. <https://doi.org/10.1080/17459730802312399>
- Volk, A. & W. Bas De Haas. (2013). A Corpus-Based Study On Ragtime Syncopation. <https://doi.org/10.5281/ZENODO.1415846>
- Voulgaris, E., & Vantarakis, B. (2009). *Urban and Folk Songs of Pre- War Greece:1922-1940*. Fagottobooks.
- Wichman-Walzak, E. (1991). *The Aural Dimension of Beijing Opera*. University of Hawaii Press. <https://doi.org/doi:10.1515/9780824846565>
- Widdess, R. (1994). Involving the Performers in Transcription and Analysis: A Collaborative Approach to Dhrupad. In *Source: Ethnomusicology* (Vol. 38, Issue 1). Winter.
- Will, U., Clayton, M., Wertheim, I., Leante, L., & Berg, E. (2015). Pulse and Entrainment to Non-Isochronous Auditory Stimuli: The Case of North Indian Alap. *PLOS ONE*, 10(4), e0123247-. <https://doi.org/10.1371/journal.pone.0123247>
- Wright, O. (1978). *The Modal System of Arab and Persian Music, A.D. 1250-1300* (illustrated ed., Vol. 28). Oxford University Press.
- Wright, O. (1992). *Words Without Songs: A Musicological Study of an Early Ottoman Anthology and Its Precursors*. School of Oriental and African Studies, University of London. <https://books.google.nl/books?id=CaA5j2Ndr5oC>
- Yahya, G. (2002). *Ünlü Virtüöz Yorgo Bacanos'un Ud Taksimleri*. Ankara : T.C. Kültür Bakanlığı.
- Yarman, O. (2008). *79-Tone Tuning & Theory for Turkish Maqam Music (As A Solution To The Non-Conformance Between Current Model And Practice)*.
- Yeston, M. (1976). *The Stratification of Musical Rhythm*. Yale University Press. <https://books.google.nl/books?id=E9KSnQEACAAJ>
- Zhou, R., & Reiss, J. D. (2010). Music Onset Detection. In *Machine Audition* (pp. 297–316). IGI Global. <https://doi.org/10.4018/978-1-61520-919-4.ch012>

