Khyam Allami

Échos-monde: Towards a hybrid repertoire of contemporary and experimental acoustic, electroacoustic and electronic Arabic music

Portfolio & Thesis submitted in partial completion of the requirements for the degree of Doctor of Philosophy

Royal Birmingham Conservatoire
Birmingham City University, UK

12 April 2022

Table of Contents

Abstract

The pluriversal richness of Arabic musical culture provides a fertile ground for artistic experimentation. Whilst the 20th century witnessed many developments of its theory and practice, innovative exploration of its core principles and logics has been conspicuously rare. This doctoral research considers how to achieve experimental composition whilst maintaining both one's culture and individuality. Through this, it aims to create a repertoire of musical works based on, and inspired by, the cross-pollination of Arabic music fundamentals with experimental compositional techniques, instrumentation and technologies.

Music-making today has become inextricably reliant on sonic technologies, and whereas research about this is detailed and varied, the impact of these technologies on transcultural musical practice has been little discussed. Drawing on Édouard Glissant's theories of Relation for navigation, this research interweaves the practice of composition with critical study, identifying and addressing the scholarly, technological and creative challenges encountered. By using tuning as a prism, it highlights the repressed possibilities of transcultural music-making as a result of the inherited biases embedded within sonic technologies and the music theory underpinning them, positing them as dominant remnants of Anglo-European colonial logics. In response, it offers solutions through a body of creative work and open access technological tools, that could be used to inspire a transcultural sonic imaginary.

Acknowledgements

I would like to express my gratitude, thanks and appreciation to the following hearts, minds and spirits who have provided me with sustenance and inspiration throughout this research.

My family: Yalda Younes for her immeasurable love, patience and critical perspectives. My mother Fawzia Alwaji for her consistent support of my seemingly idiosyncratic life choices. My father Abdulla Sakhi for his linguistic, political and cultural guidance. My sister Maram Abbas and brother in law Lou'ai Abbas for their grounding presence, and of course my niece and nephew Ruby and Maxim for their witty and magical imaginary.

My supervisors: Seán Clancy for the generosity, sensitivity, insight and foundational tethering, and Scott Wilson for the poignant contributions and support. My collaborators: Arnaud Mercier, Julia Tieke, Julie Normal, Joseph Kai, Nakul Krishnamurthy, Tarik Barri, members of the chorus and orchestra of Opera North, Tero Parviainen and Samuel Diggins, Charles Matthews and John "jhno" Eichenseer, and the Apotome crew; Tyler Friedman, Beste Aydin (Nene H), Enyang Ha, Tomoni Inoue (Tot Onyx), Lucy Railton, Faten Kanaan, Deena Abdelwahed, Harsya Wahono and Freddy Njau (Slikback) for all the energy and excitement. Those who commissioned and facilitated my work: Jo Nockles, Kathryn Gasic, Jane Earnshaw, Jamie Saye and all at Opera North, Jan Rohlf, Taïca Replansky, Lilli Maxine Ebert and all at CTM Festival, and the JACK Quartet.

Although I cannot express in detail the contributions of many others, I hope my recognition of their presence is felt acutely: Carrie Churnside, Julie Tims, Ruth Wootton and all BCU, Sian Vaughan, Leslie Bode and all at M4C, Marc Sabat, Thomas Nicholson, Regine Brosius and Regina Werner at UdK Berlin, Ute Wassermann, Simon Wojan, Mohammad Abdallah, Budhaditya Chattopadhyay, Cenk Ergun, Ayman Hassan, David Walker and all at KM28, Andrea Belfi, Evan Balster, Jessica Ekomane, Andrea Neumann, Magda Mayas, Liliane Chlela, Aya Metwalli, Dirar Kalash, Jad Abbas (Muqata'a), Nora Akawi, Adham Zidan, Ma'n Abu Taleb and all at Ma3azef, Radio Al-Hara, Bonaventure Soh Bejeng Ndikung and all at SAVVY Contemporary, Kamila Metwalli, Maya at Nusasonic, Wok, Merv Espina, Cheryl Ong and Yuen Chee Wai at The Observatory, Nayla Majdalani, Dr Lily Hamourtziadou, Owen Wright, Rachel Harris, Annie Goh, Faisal Bibi, Rima Najdi, Jawad Chaaban, Lara Nohra, Sharif Sehnaoui, Abigail Toll, Shub Roy and the core team of Amplify Berlin, Moisés Horta Valenzuela Huerta and Hanoi Hantrakul.

List of Contents Submitted

1. Khyam Allami - PhD Thesis and Commentary.pdf
2. Scores
    2.1. Constellations I Huzam [score].pdf
    2.2. Atadata [score].pdf
    2.3. Ma-a a-ba ud me-na gin [score].pdf
3. Supporting Assets
    3.1. Requiem for the 21st Century [audio].wav
    3.2. Constellations I - Huzam [audio].wav
    3.3. Atadata [audio].wav
    3.4. Apotome Live [video].mov
    3.5. Naghamiya I - Istiftah Al-Rast [audio].wav
    3.6.
        3.6.1. '32 - Part I [audio].wav
        3.6.2. '32 - Part IV [audio].wav
    3.7. NKHT [audio].wav
    3.8. Ma-a a-ba ud me-na gin [audio].wav
    3.9. Mkhalef [audio].wav
4. Appendices Assets
        App 3.1 Requiem Extracts [folder] - Contents list in Appendix 3
        App 4.1 Apotome autonomous audio-visual generation.mov
        App 4.2. Apotome demo MPE Ableton Live 11.mov
        App 5. Allami, K. (2021a) - Apotome and Leimma user guide.pdf
        App 6.1. '32 - Part II [audio].wav
        App 6.2. '32 - Part III [audio].wav
        App 9. Allami 24 tone Tuning system (2022).pdf
        App 11. Allami, K. (2019) Microtonality and the Struggle.pdf
        App 12. Allami, K. (2021b) The Third Place.pdf

List of Compositions Submitted

	TITLE	Submitted Length	Actual Length
1	Requiem for the 21st Century	Approx 9’	Extracts in Appendix approx 45’
2	Constellations I: Huzām	Approx 10’54”	10’54”
3	Aṭadata	Approx 6’18”	6’18”
4	Apotome	Approx 10’	30’
5	Naghamīya: Istiftāḥ Al-Rāst	5’33”	5’33”
6	’32	Part I - approx 16’ Part IV - approx 12’30”	Part I - approx 16’ Part II - approx 18’ Part III - approx 17’ Part IV - approx 12’30” Total approx 63’30”
7	NKHṬ	Approx 24’	Approx 24’
8	Mkhalef	Approx 24’	Approx 24’
9	Ma-a a-ba ud me-na-gin Ma-a di-di-in	Approx 20’	Approx 20’
	TOTAL TIME	Approx 138 min Approx 2 hrs 18 min	Approx 228 min Approx 3 hrs 48 min

Notes

This research portfolio is submitted in partial completion of the requirements for the degree of Doctor of Philosophy. It includes texts, scores, photographs, audio files and video files of the work generated as part of my doctoral research as defined in the List of Contents Submitted.

The portfolio includes nine compositions, each unique in its compositional approach, method and execution, but all related within the research topic's framework.

I recognise that both this documentation and the audio recordings of the compositions are of considerable length, whilst also recognising the need for such length to articulate the complexities of the research project holistically.

I hope that the examiners can take this into due consideration whilst reviewing the materials. I will of course be happy to expand on any information that is implied, or had to be left out, during the viva voce examination.

Preface

> "In Relation, analytic thought is led to construct unities whose interdependent variances jointly piece together the interactive totality. These unities are not models, but revealing *échos-monde*. Thought makes music."
>
> Édouard Glissant, *Poetics of Relation* (1997: 92)

This practice-based doctoral research project traces processes and compositional outcomes that aim towards creating a hybrid repertoire of musical works based on the fundamental principles of Arabic music and culture, cross-pollinated with experimental compositional techniques, instrumentation and technologies. The primary question it navigates is, how can experimental composition be achieved, whilst equally situating the relational characteristics of one's musical culture(s) and one's individuated musical practice?

The creative intention seemed simple enough to aim for until the process became entangled in many paths, from historical musicology to issues of 20th and 21st century musical identity, politics and sonic technologies. This led to the secondary interrogations; what are the creative hurdles? where do they stem from? and how can one respond to them?

To navigate these complexities, this research relies on concepts and terminologies from the writings of Martiniquean cultural theorist Édouard Glissant, to help frame, ground and articulate them. Specifically his philosophy of Relation.

My personal and professional backgrounds both had a significant role in their contribution to the nature and results of this research. Due to political tensions and necessary self-exile, I was born to Baghdadi, Iraqi-Arab parents in Damascus, Syria. Aged nine in 1990, during the build up to the first Gulf war, my parents were able to secure refugee status in the United Kingdom and we moved to London. After discovering punk rock and metal during my turbulent and rebellious adolescent years, I developed a conscious rejection of my native history and language. In hindsight, this was clearly a result of the uprootedness, combined with the inability to maintain connections due to the travel restrictions of the refugee status itself.

Aged 23 in 2004, following the US/UK led invasion of Iraq, I began to study the oud with Iraqi teacher Ehsan Emam in earnest, an attempt to reconnect with, and rebalance, my drifting sense of identity. This led me to study ethnomusicology at both undergraduate and graduate level with a focus on Middle Eastern music and the oud, alongside Indian music and a short parallel study of the Tabla with Sanju Sahai-ji. In this period I travelled to study oud in Cairo and Istanbul, leading to the release of my debut solo oud album *Resonance/Dissonance* (Allami, 2011). Consequently I

spent the next years living, performing and travelling across the major capitals of the Arabic speaking region.

These lived experiences, connections and myriad musical collaborations, particularly within the alternative musical scenes of these cities, had a profound impact on my understanding of Arabic music and the socio-historical complexities that have shaped it. Meanwhile, as I continued working and travelling between the Middle East and Europe I experienced many opportunities alongside the latent orientalism and discrimination, both of which led to a heightened political awareness.

All of the above is encapsulated in the interweaving transculturality of this research project, from the desire to experiment and search within the depths of what Arabic music is and could potentially be, to the reliance on related art forms, the return to ancient histories, the role of music technology and its impact on the imaginary, and the political and philosophical interrogations enabled by the poetics of Glissant.

To briefly summarise, the work is presented in two parts. Part One contains three chapters: Chapter 1 defines its theoretical frameworks, positionality and context, Chapter 2 serves to elucidate the conceptual artistic themes that are of prime importance, whilst Chapter 3 interrogates the inherited biases of music technology that impacted the development of this research. Part Two contains commentaries on all the submitted compositions, outlining the artistic concepts, research-based processes and musical details that define them.

Terminology and Transliteration

As the focus of this research is the cultivation of an opaque imaginary that tries to move through, in a Relational manner, what I refer to as repressed possibilities, the adoption of more suitable verbal terminologies feels necessary.

I am not satisfied by using the terms ‘modal’ or ‘modality’ to represent concepts related to the Arabic maqām tradition. Nor am I comfortable with adding hyphened suffixes such as maqām-esque or maqām-based, as this perpetuates an othering and an unnecessary separation. Therefore I propose the use of anglicisations based on the Arabic word مـــقام *maqām,* these being *maqāmic* (n. and adj.), *maqāmise* (v.) and *maqāmism* (n.).

In that the addition of the suffix -ic forms adjectives that relate as “‘after the manner of’, ‘of the nature of’, ‘pertaining to’” (“-ic, suffix.” OED Online 2022), maqāmic captures the idea of a musical process that is in the manner of, the nature of or pertaining to, the practice of maqām. i.e. maqāmic phrasing, to represent melodic phrasing that is in the manner of micro-modal melodies, but that does not necessarily follow conventions of melodic development within maqāmic practice. This is inline with the Arabic conjugation مقامي (m. sing. *maqāmī*) or مقاميّة (sing. *maqāmīya*).

Similarly, the addition of the suffixes -ise or -ism can either form a verb, or “the name of a system of theory or practice” (“-ism, suffix.” and “-ise, suffix.” OED Online 2022), the verb to *maqāmise*, as in to make maqāmic, alongside maqāmism as a name for a system of practice based on

the maqāmāt, both support the verbalisation of *maqāmic* concepts. Again this is also inline with the Arabic conjugation مقاميّة maqāmīya.

Although this is by no means the first time the anglicisation maqāmic has been used (see Gerson-Kiwi, 1964 and Shiloah, 1980), it is nearly absent in scholarship by both Arab and non-Arab scholars writing in any language other than Arabic. This inability of both groups to bend Anglo-European languages and musical logics towards a more adequate representation of Arabic and Middle Eastern musical theories and systems, contrasts with the unquestioned willingness to inadequately integrate Anglo-European musical logics (scale, quarter-tone, staff notation etc.) in order to make things more palatable to Anglo-European readers (for example Racy, 1983: 131). Maqāmism on the other hand is a term I have not come across in Arabic nor in this anglicised form in English, but in the spirit of the experimental nature of this research project and its compositional portfolio, I find it apt as a noun to represent the overarching approach of this work.

The Arabic equivalents of maqāmic or maqāmism are not commonplace terms in Arabic, but their conjugation and their subsequent anglicisation will help render the representation of certain logics, ideas and practices in a more succinct, and relative manner.

I choose to use the term ‘conventional’ or ‘conventions’, as opposed to ‘traditional’, when discussing the local musics of the Arabic speaking regions, in order to centre its current theory and practice within its own historical and cultural context. This provides a framework for the ‘unconventional’ approaches of this research project and, as a byproduct,

avoids the myriad orientalist and Anglo-European-centric associations and connotations of ‘traditional’ and ‘traditionalism’, alongside any mediated perspective they might influence.

With regards to the subject of tuning, I choose to use the terms ‘tuning’ and ‘intonation’ instead of ‘microtonality’ or ‘microtonal’. Although I have used this terminology very directly in the past for the sake of readership/ familiarity (Allami, 2019), I have become more sensitive to its centring of twelve-tone equal divisions of the octave (12-EDO) as the system against which others are related. Similarly I avoid the terms ‘Western’ and ‘non-Western’ and choose to define musical cultures directly (i.e Arabic, Anglo-European etc.).

When needing to illustrate multiple musical cultures or a musical practice that is transitive across different musical cultures, I choose to use the term ‘transcultural’, rather than more frequently used terms like ‘glocal’, ‘multi-cultural’, ‘multi-ethnic’ etc... in order to recognise the cross-pollination that vitalises cultural practice.

My use of the term Relation which stems directly from Glissant’s *Poetics of Relation* (Glissant, 1997) is always capitalised according to Glissant’s usage. Other key terms such as opacity, filiation, errantry etc. are used in normal sentence case, also following Glissant.

Diacritical marks such as (ḥ and ā) for the romanisation of Arabic follow the United States Library of Congress ALA-LC Arabic romanisation convention (see United States Library of Congress, 2012), except in the case

of oud, where I choose to use the more common Francophone spelling as opposed to the properly transliterated *ʿūd*.

Non-English language words are italicised only in their first instance, after which they are treated with the same formatting conventions as any others.

PART ONE:
Theoretical and Conceptual Frameworks. Repressed Possibilities.

Chapter 1:
Theoretical Framework

1.1 Glissantian Relation

In his landmark work *Poétique de la Relation* (Poetics of Relation)[1] and in much that followed, Martiniquean philosopher, poet and writer Édouard Glissant remodels the French language to articulate an interrelated series of philosophies. In recent years, his writings have become central to discourses on literature (Dash, 1998), politics (Davis, 2019) and contemporary art (Loock, 2012). In music however, little has been articulated aside from publications dealing directly with Caribbean music (Cyrille, 2002 and Rommen, 2015 for example), Martin (2008) with regards to African-American jazz, and the common use of *créolisation* to mean a definition of "relationships among different cultures and [the creation of] the conditions for their interplay, [resulting in] original phenomena that can never be foreseen" (Martin, 2008: 109)[2].

Rather than attempt to apply Glissantian ideas to an already extant musical practice, this research project seeks to create new works based on-and-with them. Central to this endeavour are his concepts of opacity,

[1] This work was originally published in French (Glissant, 1990) and subsequently translated into English by Betsy Wing (Glissant, 1997).

[2] In a critical discussion Stewart notes that creolization "is probably the last word that anyone should try to pin down with a monolithic definition. It carries multiple meanings and is constantly applied in novel ways." (2016:18) That said, Martin's definition fits within the context of Glissant's "polymorphous" work throughout his lifetime.

métissage, Relation, the *échos-monde*, and their specific reliance on the imaginary.

In his works, Glissant uses 'transparency' and 'opacity' (1997b: 111-120) in direct opposition to the common linguistic usage of 'transparent' and 'opaque' to indicate a manner, perspective or behaviour that is obvious and direct, or obscure in meaning and lacking lucidity, respectively.[3] I read Glissantian "opacity"[4] and "the right to opacity"[5] in line with Martin and Davis as relating to the individual and to culture, in two ways. The first, as an individuated presence and the right to be fully present in one's "density and fluidity" (Martin 2008: 109). The second, in the acknowledgement of culture as entangled correlations of differences with "irreducible specificity" (op. cit.), and its right to be present, presented and represented according to its own logics—which are themselves both hybrid and Relational—in order to "protect a totality, not to defend one's specific language or culture" (Davis, 2019: 60).

My choice to delineate this research as 'hybrid' is used in both the literal sense—to illustrate its artistic form and structure, and its use of various instrumentation, techniques and approaches in the compositions—and in the Glissantian sense of *métissage.* This is a term that both Martin (2008: 108) and Wing (translator of *Poétique de la Relation* into English)

[3] See "transparent, adj. (and n.)"., (2022) and "opaque, adj. and n."., (2022)

[4] See Glissant (1997: 189-194).

[5] See Davis (2019: 65) with regards to his reading of Glissant's "*nous réclamons le droit à l'opacité*" in the French language *Le discours antillais* (Glissant, 1997a: 14) and its misleading translation as "we demand the right to obscurity" in the English language translation of Caribbean Discourse (Glissant 1989: 2).

prefer not to translate, but instead highlight as "a relational practice affirming the multiplicity and diversity of its components" (Wing in Glissant 1997b: 214).

Relation, as a philosophy and practice in the works of Glissant, and as summarised by Davis and Martin with reference to politics and music, "describes and prescribes a planetary consciousness" (Davis, 2019: 60) of manifold entanglements (*emmêlements*). These entanglements interweave (*trament*) through a continuous flux of relativity "in the polysemic understanding of this adjective: they are related to each other and their relationship makes them relative" (Martin 2008: 108).

Of principle importance to Relation is the concept of a rhizomatic network of identity that maintains "the idea of rootedness but challenges that of a totalitarian root" (Glissant 1997b: 11). Within this Glissant lays out interweaving and interdependent concepts including 'errantry', 'exile', 'filiation' and 'expanse' (*l'étendue*), that define Relation within the contexts of colonial logics and cultural practice. Here Glissant presents the duality of "arrowlike nomadism" and "circular nomadism" as trajectories. He defines the arrowlike as being that of colonial "discovery and conquest" (Op. cit.: 19), and the circular as that of native trajectories having the function of ensuring "the survival of the group by means of this circularity" (Op. cit.: 12). With these trajectories he goes on to define filiation as a work that is "set out upon the fixed linearity of time, always toward a projection, a project" (Op. cit.: 47), and expanse as: "Transversality. Quantifiable infinity.

Unrealized quantity. Inexhaustible tangle. Expanse [extending] is not merely space; it is also its own dreamed time" (Op. cit: 58).

As Wing notes in her discussion of Glissant's idiosyncratic usages, "directed by Relation, errantry follows neither an arrowlike trajectory nor one that is circular and repetitive, nor is it mere wandering—idle roaming. Wandering, one might become lost, but in errantry one knows at every moment where one is—at every moment in relation to the other" (Op. cit: xvi). In relating the concept of exile, the arrow like trajectory, and its role in the literature of antiquity, Glissant adds that "whereas exile may erode one's sense of identity, the thought of errantry-the thought of that which relates-usually reinforces this sense of identity" (op. cit.: 20).

Against this backdrop, Glissant also defines two types of identity. A "Root identity" which "rooted the thought of self and of territory and set in motion the thought of the other and of voyage", and a "Relation identity", that "exults the thought of errantry and of totality" (op.cit.: 143-144). Both of which serve to elucidate the complexity and multiplicity of individual and cultural identities within which this research project is ultimately situated.

Glissant's names for the multiple identities and relations between things in the world are, as Loock summarises, "*tout-monde* (the world in its entirety), *échos-monde* (the world of things resonating with one another) and *chaos-monde* (a world that cannot be systematized)" (2012). It is the *tout-monde*, a "totality in process" (Martin 2008: 109), that is continuously affected by the varying *échos-monde,* which are a product of the *creolisations* being sounded, informed and even shaped by the *chaos-monde* that

surrounds them. In this context, each of the works submitted as part of this research project can be seen and heard as singular *écho-monde* unto themselves. Born of the *chaos-monde* that underpins them, they form a plural *échos-monde* which is interdependent on the singular *écho-monde* that resonate within it, and ultimately try to give-on-and-with *(donner-avec)*[6] to the *toute-monde* that we inhabit.

As I will articulate further below, in leading up to this research project, realising an un-mediated aural imaginary with regards to the possibilities of Arabic music was a complex path to navigate. Not due to any lack of imagination, but to the rarity of related aural references, technological tools, and supportive infrastructures that could help nurture, inspire and ultimately realise such imaginaries. Due to these, the amount of energy that it took to bring to existence any result of an inquisitive, non-conventional and Relational Arabic imaginary was always difficult to justify, but ultimately necessary to achieve anything.

Glissant states that "analysis helps us to imagine better" (1997b: 170), and I have been happy to follow his lead. Particularly because it is through his words that I have been able to situate my research and practice, create a fertile ground for the sowing of imaginary seeds and work to nurture their growth.

---

[6] "Another word complex, the verbal phrase: donner-avec, relays the concept of understanding into the world of Relation, translating, contesting, then reconstituting its elements in a new order. The French word for understanding, *comprendre*, like its English cognate, is formed on the basis of the Latin word, *comprehendere*, "to seize," which is formed from the roots: *con-* (with) and *prendere* (to take). Glissant contrasts this form of understanding—appropriative, almost rapacious—with the understanding upon which Relation must be based: *donner- avec*. *Donner* (to give) is meant as a generosity of perception" (Wing's note regarding her translation in Glissant 1997b: xiv).

Although highly complex, Glissant's Relational philosophy verbalises and articulates many concepts that permeate this research project, both in relation to itself and its contexts. In grounding and framing itself on and within Glissant's work, the research commits itself to a poetics of Relation that "interweaves and no longer projects" and inscribes itself in a circularity, as opposed to any kind of trajectory[7].

1.2 Arabic / Contemporary / Experimental

While information and resources regarding the history and the current state of contemporary or experimental Arabic music is disparate and scattered, there are a number of Arab musicians and composers working with similar concerns to this research project, as will be further discussed below. Conversely, the research, studies and resources related to contemporary and experimental Anglo-European music, alongside the musicians and composers working within this field, are numerous. However, a critical look at the research and practice relating to these cultural spheres denotes a continuously modulating asymmetry in both the discourses and musical outputs.

When setting foot on such a research path, one is immediately faced with major hurdles of semantics and definitions, all rooted in political and cultural narratives, and intertwined in a web of colonial, post-colonial and

[7] "in a circularity, we are not referring to a circuit, a line of energy curved back onto itself. Trajectory, even bent or inflected, no longer applies." (Glissant 1997b.: 32)

decolonial discourses and debates. Therefore, it would be difficult to maintain a coherent discourse without relying on definitions for what is meant by 'contemporary', 'experimental', and particularly 'Arabic music'.

According to the *Grove Music Online* dictionary,"Arab music" is simply "music traditions in the Arabic-speaking world" (Wright et al., 2001), to this we shall return shortly. In the same source, "experimental music" is defined as "a diverse set of musical practices that gained momentum in the middle of the 20th century, characterized by its radical opposition to and questioning of institutionalized modes of composition, performance, and aesthetics." (Sun 2010). Gottschalk presents it with more detail as being made up of the following components: indeterminacy, change, experience, non-subjectivity and research, adding that "various equations could be proposed out of these component arcs to emulate my image of experimental music's nature and potential" (2016: 5).

It is generally accepted that experimental music was an American phenomenon that also took hold in the UK, in which its composers shared "a rejection of musical institutions and institutionalized musical values" (Sun 2010). Contemporary or avant-garde music on the other hand, is regarded as a European development (Griffiths 2010) and, according to Botstein,"a consequence of the fundamental conviction among successive generations of composers since 1900 that the means of musical expression in the 20th century must be adequate to the unique and radical character of the age" (2001). Very quickly we find ourselves in an endless debate as to what constitutes a contemporary, experimental, or even modernist or

avant-garde approach to music, alongside where and how these ideas developed culturally and geographically.

Most importantly though, the exclusion of both African-American voices and the exceptionalism with regards to the transcultural musical and philosophical influences on such movements, is dire. In the introduction to his 2008 book on the experimental African American musicians' collective, the Association for the Advancement of Creative Musicians (AACM), Lewis succinctly pointed out that:

> "for some time, historians of experimentalism in music have stood at a crossroads, facing a stark choice: to grow up and recognize a multicultural, multiethnic base for experimentalism in music, with a variety of perspectives, histories, traditions, and methods, or to remain the chroniclers of an ethnically bound and ultimately limited tradition that appropriates freely, yet furtively, from other ethnic traditions, yet cannot recognize any histories as its own other than those based in whiteness." (Lewis 2008: xiii)

In outlining the achievements of the AACM, Lewis summarises their history since their founding in 1965 as follows:

> "the AACM musicians developed new and influential ideas about timbre, sound, collectivity, extended technique and instrumentation, performance practice, intermedia, the

relationship of improvisation to composition, form, scores, computer music technologies, invented acoustic instruments, installations, and kinetic sculptures."

What becomes clear then, is that contemporary and experimental movements, on both sides of the Atlantic, took influence form a variety of cultures, disciplines, histories and ideas, and shared the desire to push boundaries, create new forms and methods of music making, and challenge audience's perceptions of what music can be, i.e. not only as artistic entertainment but also as an experience and a holistic means of expression. Therefore, it is this definition that this research project will follow.

Returning to Arabic music, indeed the definition is complex. The region of the globe in which Arabic is an official language includes 23 countries across continents and territories, the populations of which also speak multiple other languages such as the Kurds in Iraq, the Armenians in Lebanon and the Imazighen in North Africa amongst others. By the same token, the music of the region has a long history and is widely varied with many distinct local and regional traditions.

That said, there are shared musical concepts across many of these regions which are based on the theory and practice of melodic and rhythmic idioms defined and documented by Arabic speaking scholars and historians in the Arabic language since the 9th century. These practices are particularly prevalent in modern day Egypt, Lebanon, Syria, Palestine and Iraq, and have

equally been influenced by traditions from neighbouring regions such as modern day Turkey and Iran.

Their melodic and rhythmic frameworks, loosely defined under the categories of *maqām* and *iqāʿ* respectively, are commonly referred to as the main constituting elements of Arabic art, folk and popular musics. This is therefore what this research project refers to when using the term Arabic music.

During the early stages it quickly became clear that it would be overwhelming to explore both the complex systems of maqām and iqāʿ within this research. Therefore, I chose to focus principally on the melodic framework of the maqām, with no commentary or output directly related to rhythm, as will be discussed further in Chapter 2. It is for this reason I refer regularly to maqāmic music.

1.3 Acoustic / Electro-acoustic / Electronic

Experimental approaches to music making have long utilised acoustic, electro-acoustic and electronic techniques and instrumentation, to explore and realise innovative ideas (see Wittje, 2016). In the context of Arabic music making such exploration remains rare and limited to traditional instrumentation, approaches based on fusion, or that which stems from the affordances of modern sonic technologies (synths, sample libraries etc.).

As will be articulated and explored in due course, issues of suitable instrumentation for the rendering of Arabic, and particularly maqāmic, music making, have been pertinent since the pivotal 1932 Cairo Congress for Arabic music. Although such discussions and considerations are relevant, they also perpetuate colonial logics with regards to what constitutes 'modernisation' or the advancement of a musical culture.

In order to maintain an experimental freedom in my research, I have chosen to follow a similar path to the experimentation referenced earlier by Lewis with regards to the AACM. This is particularly relevant to my interests in interrogating the fundamentals of maqāmic music making, as opposed to relying on literal representations of what is commonly associated with it i.e. instrumental timbre, conventional melodic and structural approaches etc. It also aligns with my interest in utilising sonic technologies, therefore allowing me to explore their impact on the imagination of transcultural and hybrid forms of music making, let alone their actualisation.

1.4 Arab Avant-Gardism?

In the 2013 book *The Arab Avant-Garde* published by Wesleyan University Press, one of the only academic sources dedicated to contemporary and experimental Arabic music, editor Kay Dickinson points out in her introduction that: "although individual artists certainly pay their dues, the canon of Western literature that describes the avant-garde's inception distressingly lacks reference to contributions from the Arab world"

(Burkhalter et al., 2013: 3), a statement supported by a consecutive overview of the literature in question. Although commendable in its intention to interrogate the exclusion she is highlighting, what lacks is a significant argument as to how Arab artists, or even Arab influence, participated in the "inception" she is referring to.

Aside from the Egyptian composer Halim El-Dabh[8], who is credited with being the first composer to create a piece in the style of *musique concrète* (Khoury 2013: 165), there are no other Arab musicians surveyed in *The Arab Avant-Garde* who can be directly linked to the development of the avant-garde, contemporary or experimental music movements of the 20th century. Instead Dickinson focuses on the "oppressive etymologies" and how through the marginal "naming, extracting, fetishizing and leitmotifing [of] "the East's" musical heritage, these citations [...] simultaneously fix and dehistoricize Arab music in detrimental ways" (Burkhalter et al., 2013: 3).

Whilst her highlighting of colonial legacies and their problematics is an absolute necessity in this field, as I elaborate on further below, it does seem, at times, a little misguided. This is not helped by the book featuring only four Arab voices out of the ten contributors[9] and focusing mostly on artists working during the latter end of the 20th century, decades after the

[8] Whose name in Arabic is حليم الضبع and is often mispronounced as Ḥalīm Al-Dabḥ as opposed to the proper Al-Ḍhab'.

[9] *The Arab Avant-Garde* is edited by Dickinson alongside Burkhalter, T, and Harbert, B. J., and features contributions by them alongside Shayna Silverstein, Kamran Rastegar, Saed Muhssin, Sami W. Asmar, Michael Khoury, Marina Peterson and Caroline Rooney, listed here in order of their book chapters (Burkhalter et al., 2013).

development and acceptance of contemporary, experimental and avant-garde musical forms, philosophies and concepts.

In a later chapter Burkhalter reconsiders the term avant-garde by disassociating it from its equation with "Stockhausen, Boulez and Cage", before redefining it based on Hegarty, Jauk and Van der Berg as "artists of the avant-garde are those who seek to break with a dominant musical canon [..] to reposition music (and art) within society" (Burkhalter, 2013: 92). In the same chapter, Burkhalter combines a case study of musicians and music from Beirut alongside "music from other cities in the Arab world, Africa, and Latin America to strengthen [his] argument" (op. cit. 89). He defines his main questions as:

> "whether these musicians from Beirut and beyond are able and allowed to create independent musical positions, and thus form a new multisited [*sic*] musical avant-garde of today, or whether they are still struggling for equal "Third World" or "Black" representation and thus continuing to create musical pamphlets—or a twenty-first century version of Afro-Futurism? Or are they still being forced to mainly fulfil the expectations and adapt to the worldview of their Euro-American producers and audiences, and thus offering what [Burkhalter refers to] as "World Music 2.0," an updated version of "world music," instead of new vanguard positions?" (op. cit. 90).

Despite the problematic framing, line of enquiry and sweeping overview of the aforementioned regions and many musicians' practice, particularly regarding the scene in Cairo post-2011, Burkhalter tries to navigate the complexity of the situation by highlighting issues of access, distribution, identity, politics, exoticism and more. After a focus on the work of artists/musicians Raed Yassine and Mazen Kerbaj as representatives of Beirut's avant-garde music scene, he concludes by saying "many, myself included, somehow *wish that the "Global South" creates a zeitgeist.* These musicians from Africa, Asia, and Latin America *deserve a new avant-garde*, not a World Music 2.0 network" (op. cit. 111, my italics).

Continuing, he states that he would "*unfortunately*, use the category World Music 2.0 for these new musics that cross from Africa, Asia and Latin America to the Euro-American platforms", before defining these "World Music 2.0" musicians as ones who "construct confident past-colonial [*sic*], transcultural positions, and form (finally and distinctly) new multisited [*sic*] avant-gardes of the twenty first century", concluding that "these musicians are still caught in the old postcolonial structures and dependencies, especially whenever they aim to reach international platforms" (op. cit. 111, my italics). Platforms being defined earlier as Euro-American labels, performance venues/festivals, peer-to-peer file sharing networks, radio, print and digital media (op. cit. 90).

Issues of the economics intimately linked to these platforms are correlated by Burkhalter to Anglo-European arts funding and NGOs (op. cit. 99), and are dealt with in a separate chapter by Peterson (2013), but only

insofar as physical travel and performance opportunities are concerned. Whereas the impact of the same funding, with its often orientalist and Anglo-European logics projected upon actual cultural production, particularly after the uprisings of 2011, is barely considered.

Although Burkhalter does acknowledge his "thirty-nine-year-old Swiss male" perspective early on, he immediately justifies his perspective by listing his experience as "an ethnomusicologist who has worked for many years in music journalism, [...] on the board of Swiss funding body Pro Helvetia, organised various concerts and festivals and runs the online magazine *Norient*" (op. cit. 90). Although many of my lived personal and professional experiences across Beirut, Cairo and other Arab speaking capitals since the late 2000's are represented within the realities Burkhalter reflects upon, it is unfortunate to read such a distinct amount of "whiteness of sound studies" (Stadler, 2015) and "hungry listening"[10] (Robinson, 2020) latent in his mediation and representation of them.

Inadvertently, *The Arab Avant-Garde* does highlight five massive artistic and scholarly problems. The first is the lack of holistic scholarly works that provide critical reflections on the musical, social, political and economic situations of Arabic music, through which the inner workings of

[10] Robinson's indigenous-centred work combines two Halq'eméylem words to form the term hungry listening: "shxwelitemelh (the adjective for settler or white person's methods /things) and xwélalà:m (the word for listening)" (2020:2). In discussing the positionality and temporality of listening Robinson states: "Indeed, the pace of listening is in direct correlation with the starving attitude of settler colonial perception. […] Hungry listening consumes without awareness of how the consumption acts in relationship with those people, the lands, the waters who provide sustenance. Moving beyond hungry listening toward anticolonial listening practices requires that the"fevered" pace of consumption for knowledge resources be placed aside in favour of new temporalities of wonder disoriented from antirelational and non situated settler colonial positions of certainty" (2020:53).

narratives such as those in *The Arab Avant-Garde* can be related.[11] Robinson's *Hungry Listening* (2020), for example, is a milestone for influence in this regard, even if it deals directly with a different musical and cultural context.

The second identifiable problem is the lack of a rigorous representation of Arabic music and its current practice. Although some chapters in the *Arab Avant-Garde* make a necessary contribution[12], it only mentions the relevance of practitioners who were active from 2000 onwards in passing, such as Egyptian artist/musician/writer Hassan Khan, the Lebanese composer Mahmoud Turkmani, the musician/singer/composer Kamilya Jubran. Let alone the impact of sha'bi music on many experimental artists as I mention briefly in the next section. The Arabic language magazine/ website Ma3azef[13] has made major strides in this area, but more in-depth critical work is clearly necessary.

The third problem lies in the lack of dedicated, detailed studies on the influence of musics from across Africa, the Middle East, South, East and Southeast Asia, and the Americas, to list a few, over the contemporary, experimental and avant-garde composers praised for their emancipation of Anglo-European art music from its classical and romantic musical heritage. A lack of scholarly acknowledgement of the musical and conceptual

[11] Distinctly, any such venture must also rely on multi-disciplinary and transcultural sources, particularly in the realm of decolonial, feminist and anti-racist scholarship, in order to tackle these complexities cohesively.

[12] See for example the chapter "Contemporary Syrian Art Music" which focuses on the work of Zaid Jabri and Hassan Taha (Silverstein, 2013)

[13] https://ma3azef.com The only Arabic language online magazine dedicated to Arabic music today.

hybridity of these Anglo-European movements, alongside a critical study of their exceptionalism, that has led to inadequate framings of contemporary transcultural musical practices. Kofi Agawu's works on music from the African continent (2003, 2016a and 2016b) and George E. Lewis's works on the role of African-American musicians in experimental and improvised music in the United States and Europe (Lewis, 2000, 2009, 2012), are pertinent examples to follow.

Although traces of such acknowledgements can be found in some academic literature, it is too often minimised to generalised statements and anecdotal references. An example can be found in Griffiths' tome *Modern Music and After* which is littered with references to the influence of "African" and "Far Eastern" music on pioneering French composer and conductor Pierre Boulez, but none with any substance or definition (2010: 4, 11, 16). This regularly encountered and vague reference to multiple continents' musical cultures in such superficial terms, continues to perpetuate colonial narratives to the detriment of the authors and artists in question. Much like Burkhalter's statements quoted earlier.

Despite the lack of detail, it is blatantly obvious from these references, and by many Anglo-European composers' own admissions,[14] that the musics and concepts of the aforementioned cultures did indeed have an intrinsic role to play in the development of modernist and experimental Anglo-European music. A poignant reference to this can be found in

[14] For examples see: Ligeti (1991), for Messiaen see Messiaen (1956) and Baggech (1998), and Reich(2002).

Kárpáti's 1964 article on Hungarian composer Béla Bartók in which he states:

> "The concept of a true synthesis of East and West could only arise in the 20th century. During preceding centuries, European bourgeois culture, conscious of its undoubtedly advanced position, regarded itself as the sole vehicle of universal human culture. From this position, it looked condescendingly upon the culture of peoples living outside Europe. It was not above adopting certain elements from them, but these were considered mainly as exotic curiosities. [...] Considering, however, that the Romantic composer could hardly have known anything about Eastern music, he built up a schematic system out of fragments in which Arabic, Turkish, Hindu and Chinese elements were all mixed together without any semblance of logic." (Kárpáti 1964: 180)

Kárpáti's concise framing and reference to "a schematic system" echoes Dickinson's previously cited critique of the "citations" of musical heritages (Burkhalter et al., 2013: 3). Here, it seems that both Dickinson and Kárpáti are referring to what can be identified as Orientalism in music, much along the same lines as what Edward Said described as common practice in art and literature during the same historical period (2003 [1978]: 40-42), the ongoing impact of which cannot be understated even today.

The fourth identifiable problem is the rarity of rigorous self-critical and self-reflexive studies by Arabic speaking voices that can interrogate what Said describes as "latent Orientalism" (2003 [1978]: 206), though as it is perpetuated by Arab speaking artists/musicians/composers themselves and how it relates to all of the above. This reflection is necessary in order to recognise and understand where and how these logics have become inherited and embodied, as opposed to demeaning the artists or works themselves.[15]

Here it is important to note that Said's works on music (1991, 2008) and his clear reverence of Anglo-European art music[16], unfortunately do not provide us with any such music-specific frameworks to rely on. Contrarily, at times they perpetuate the similar supremacist perspectives of Anglo-European culture that he himself critiques.[17]

To situate this argument, albeit in reference to a different multi-disciplinary cultural practice, I refer to trans poet and curator Anaïs Duplan who in their research on the work of experimental artists of colour since the 1960s, *Blackspace: On the Poetics of an Afrofuture*, articulates a similar perspective:

> "In theorising black social artistic critique only as the performance of oppositional responses to a dominant hegemonic voice, we under-prioritise the fact that negotiated

[15] See Gibrayel's Masters thesis (2017) for a reflection on this topic with regards to design.

[16] Also clear in his co-founding of the East-West Diwan Orchestra with Daniel Barenboim.

[17] See Said (1991:98) for his adult reflection on attending a performance by Umm Kulthum when he was very young as an example.

> and oppositional messages can also be encoded into media works, rather than merely decoded, received, or interpreted." (Duplan, 2020: 22)

Although a proper elaboration of these points is beyond the scope of this research project, they are articulated here in context, energised and inspired by Duplan, to highlight a major problematic, and dilemma, that this research project is acutely aware of and does not passively avoid, but rather seeks to actively engage with and through.

The last problem that is inadvertently highlighted by *The Arab Avant-Garde* is the rarity of what can confidently be experienced as experimental Arabic music. By this I refer to works that thrive on the edges of what Arabic music could be, in and of itself, and in-line with the definition of experimental previously outlined.

I acknowledge that a critical view is sensitive, as it unavoidably evaluates musicians and composers' creative choices and output from a subjective perspective. Faced with the void of adequate music criticism or scholarly studies of such musical and extra-musical contexts, particularly from native voices, it is not possible to reference or critique experimental Arabic musical works within their proper contexts, or adequately situate my work in relation to them. My intention therefore is to provide a brief overview of relevant Arabic and transcultural artists in the next sections, in order to engage with and reflect upon these ideas.

1.5 Situation / Context

This section serves to situate and provide a context for this research project by outlining a brief and limited overview of composers and musicians from the Arabic speaking region who work in related compositional frameworks. The references cited are for audio recordings listed in the discography.

In the realm of Anglo-European art music, composers such as Halim El-Dabh (2002), Nouri Iskandar (n.d.), Saed Haddad (2005), Zad Moultaka (2003), Bushra El Turk (2012), Zaid Jabri[18], Hassan Taha (2007) and Samir Odeh-Tamimi (2005) all work with varied compositional, arrangement and timbral techniques, alongside manifold conceptual ideas with Arabic and maqāmic influences. The works demonstrate high level of creative, technical and theoretical practice, though the fundamental Arabic components are often either quite literal, or almost indecipherable.

Many other musicians/composers are particularly engaged with the development of Arabic and maqāmic acoustic, instrumental and sometimes vocal music, such as Hazem Shaheen (2009), Ahmad Al-Khatib (2005), Nizar Rohana (2016), Mustafa Said (2015), Huda Asfour (2018), Amir El Saffar (2021) and Tarek Yamani (2018). All of them are innovative, highly versed and skilled in Arabic music and maqām theory. However it is still rare to come across experimental compositions working with/from Arabic music fundamentals, just as is the use of electro-acoustic methods, with a few

[18] See Aase, (2018) for an interview with and audio examples by Jabri

exceptions like El Saffar who recently began utilising modular synthesis in his solo work (2020).

An important reference for the use of acoustic and electro-acoustic, experimental and contemporary musical concepts and ideas, that go beyond the confines of conventional idioms, is the work of Kamilya Jubran. Whether in her collaborations with electronic musician and trumpeter Werner Hassler (2016, 2019), or with double bass player and composer Sarah Murcia (2017), we can hear a clear grounding in maqāmic frameworks and experimental approaches.

Similarly, the work of her brother Khaled Jubran (2009) alongside that of Tamer Abu Ghazaleh (2016) and Mahmoud Turkmani (2008) can be seen in the same light. In their compositions we hear precise tuning and intonation, innovative melodic and maqāmic developments, explorations of instrumental and vocal techniques, unconventional rhythmic elaborations, various forms of polyphony and counterpoint, including contemporary techniques, and unconventional maqām modulations. It is interesting to note that all the above artists have a background of immersion in maqāmic practice through either societal and/or familial networks, or institutional music education.

Alongside the above artists who draw inspiration from maqāmic music, the following group of musicians/composers create in electronic or electro-acoustic frameworks, yet show more of an affinity with *shaʿbi* music (lit. of the people), particularly from Egypt.

Often personified by the singers Ahmad Adaweyah (1987) and Shaaban Abdel Rahim (1999), Egyptian shaʻbi music is known for its lyrics, uptempo rhythms, and more recently its electronic, programmed beats and breaks as a backing to live acoustic instruments. Maqāmic melodies are a distinct part of shaʻbi music in general, even if in limited scope, but this has rarely permeated into the works of younger generations, as will be discussed below.

In his first album Tabla Dubb (2001)[19], musician/artist/writer Hassan Khan was one of the first to utilise experimental electronic approaches with reference to Egyptian shaʻbi and other local popular styles. The album's title is a clear reference to the tabla, a shaʻbi percussion instrument also known as a دربـــوكـــة *darbūka*, and to the dub-style techniques of playing samples and recordings through a mixing desk, and manipulating them with various effects pedals.[20] His influence on the alternative and electronic music scene in Cairo and elsewhere is little acknowledged outside niche music circles.

In 2011, the explosion of a new Cairo-based shaʻbi genre, Mahragānāt, spread across Egypt and the Arabic speaking regions, marked by artists like Oka, Ortega and Wezza.[21] This was undoubtedly one of the most impacting developments in Arabic music history since Arabic pop in the late 1980s, and

---

[19] This album was originally released by the independent Cairo-based Egyptian label 100Copies as a limited run of 100 CDs but there is little trace of it online anymore due to it disappearing from streaming services at some point in the last coupe of years. Some tracks from the album are available on Khan's soundcloud page under the reference Khan, H (2001) in the discography.

[20] A live performance by Khan filmed in Venice 2012 at the Palazzo Grassi is available at: https://www.youtube.com/watch?v=rtBpt7lbCv8. Khan has since gone on to create a variety of musical interventions, particularly in the context of his work as a contemporary artist but very little has been officially released aside from his Superstructure EP (see Khan, 2019).

[21] See Morayef (2012) and the film Underground/On the Surface (2013).

was mostly due to their subversive lyrics, hard hitting upbeat rhythms, beats, and unwieldy 12-EDO Auto-Tuned vocals. In that period Egyptian artists such as Maurice Louca (2014)[22] and more recently 3Phaz (2021), amongst many others, took much influence from its energy and created works that expanded upon its idioms, often recording with live musicians in studios, then sampling and processing the results alongside sequenced drum machines, percussions and various electronics.

Since then Louca has shifted towards acoustic experimentation, working with a 9-piece live band inspired by African American experimental and jazz musics on his album *Elephantine* (2019). He also began exploring maqāmic ideas and issues relating to tuning by working with instrument makers in Indonesia to craft new pitched percussion instruments, and a luthier in Istanbul to build a guitar with non-standard fretting for his last collaborative acoustic project *Saet El Hazz* (2021), though it's not documented according to which intervals or tuning system(s).

In addition, the recent years have witnessed the release of many vibrant works that engage with Arabic music in diverse experimental, conceptual, electronic and electro-acoustic methods and techniques, such as Msylma (2021), Muqata'a (2021), Safa (2022), Deena Abdelwahed (2020), Nadah El Shazly (2018), Hasan Hujairi (2020), Abdallah Minyawi (2022), Raed Yassin (2020), Two or the Dragon (2021), Jerusalem in my Heart (2021) the multimedia project by Radwan Ghazi Moumneh, the collaborative project Karkhana (2021) and Abu Ghazaleh's work with Louca and Maryam

[22] This is most prominent on his second album Benhayyi Al-Baghbaghan which I mixed and released on my independent label Nawa Recordings in 2014, NAWA002.

Saleh as Lekhfa (2017) amongst many more. In contrast to the previous grouping of artists, the majority mentioned here—aside from Abu Ghazaleh and Two or the Dragon—do not have a background of immersion or study of maqāmic practice or institutional music education.

To conclude, this brief overview presented a limited selection of unique artists from across the Arabic speaking regions, each crafting their own path. As can be clearly heard in many of these works, the asymmetric distinction of electronic and shaʿbī vis-a-vis art music maqāmic influences highlights that for artists today, it is far more engaging to concede to the confines of 12-EDO and experiment with Arabic music material by sampling and remixing, using the timbral presence of Arabic instruments, beats and rhythms, DSP processing, and the use of Anglo-European instrumentation, than it is to experiment with fundamental principles such as those of maqāmic practice.

In my view as an insider, this points to a lack of accessibility to this tradition rather than an indication of muted interest or desire. While it is undeniable that the complexity of maqāmic theory and practice, combined with the often conservative attitudes of its practitioners and the failed state of music education in the region, are a contributing factor, I posit that a major barrier of entry is a direct result of the inherited biases that frame modern sonic technologies. Although astoundingly proficient at allowing the exploration of jazz harmony, synthesis or electronic music production, for example, these tools actively dissuade the exploration and creation of

transcultural musical ideas in meaningful, intuitive and experimental ways, as will be detailed further in Chapter 3.

1.6 Transcultural Experimentalism

Seeing as there exists such little directly relevant scholarly and artistic material for this research to build on, in the spirit of Glissantian transitive Relation it makes sense to look further outside the fields of contemporary Arabic music practice and take into influence the works of varying international composers who have developed experimental approaches to their local musical cultures. As there are more than I have capacity to mention here, they are limited to a brief overview. The references cited are all for audio recordings listed in the discography, unless otherwise marked with a footnote.

The works of pioneering Iranian composers Alireza Mashayekhi (2007) and Dariush Dolat-Shahi (1985) from the 1970s and 80s are of significant importance. Utilising traditional Iranian instruments, a focus on tuning and melodic construction based on the Persian Dastgāh, alongside electro-acoustic and electronic sound pallets, their works present an experimentalism unlike anything heard from the Arab speaking regions. In the same cultural sphere there is also the recent work by Ata Ebtekar aka Sote (2019), whose electronic compositions in collaboration with Iranian santūr and tār players Arash Bolouri and Pouya Damadi are equally interesting.

Turkish composer Cenk Ergun's explorations of tetrachordal theory in his recently commissioned work for JACK Quartet (2020), and Japanese composer Yuji Takahashi's acoustic chamber music works[23] for, or including, local Japanese instruments are fascinating in their unconventional approaches to the acoustic instruments and their experimental compositional stylings which build upon the minimalist and abstract tendencies in Japanese culture.

The Ghost Trance Music and Language Music systems of African-American multi-instrumentalist composer and AACM member Anthony Braxton (2012, 2014), alongside his creative philosophy[24], provide much influence for the interrogation of compositional and improvisational concepts in Arabic music. As do the early solo recorded trombone works by George E. Lewis (1976), alongside his development of and performances with his computer system Voyager (1993)[25], not to mention his potent scholarly achievements.

The contemporary experimental Gamelan compositions by Dewa Alit (2020) combined with the electro-acoustic experimentations by Uwalmassa (2022) and the club-focused electronic music of Gabber Modus Operandi (2021), show how the various local musics of Indonesia can be re-approached from myriad directions. As does the collaboration between British electronic musician Beatrice Dillon and Tabla player Kuljit Bhamra with regards to the use of Indian percussion (2020).

---

[23] See Takahashi's website for PDF scores: https://www.suigyu.com/yuji/chamber.html

[24] https://tricentricfoundation.org/introduction-to-catalog-of-works-1988

[25] See Lewis (2000)

Finally, there are the works of contemporary and experimental Anglo-European composers,[26] particularly those who have worked with varying musical cultures and issues of tuning as primary influences. The uniquely individual and experimental compositions and intellectual work of Clarence Barlow (aka Klarentz Bahlo/Clarlow/Klârens Barlo) in exploring tuning, computer programming and generative music, particularly *ÇOGLU OTOBÜS ISLETMESI*[27] ideally need their own PhD. Interesting also are Christopher Trapani's electro-acoustic experiments with the tonalities and timbres of instruments from various musical cultures, particularly their transcultural combinations and his use of noise (2012).

The recent work of Catherine Lamb (2021) which is grounded in tuning theory, alongside that of principal names in this field such as Harry Partch[28], Ben Johnston (2011) James Tenney (1999) and Marc Sabat (2017) whose scholarly output[29] is often over looked are also of much interest to this research. The deceivingly simple looking notation of composers David Lang[30] and Michael Gordon[31] also provides much inspiration for systematic and procedural compositional approaches.

---

[26] Nyman's classic study Experimental Music: Cage and Beyond (1999) has been an useful resource to discover works, methods and techniques of 20th century Anglo-European composers, particularly chapter 7 (pp. 139-171) and its focus on minimalist scores and the renewed usage of tonality as it was relevant to the modality of the maqāmāt I am interested in exploring. Though its centring of mostly white, male composers was disconcerting.

[27] See Barlow (1980)

[28] See Partch (1979)

[29] See Sabat (n.d.) for extensive documentation.

[30] See Lang (2014)

[31] See Gordon (2012)

Last but not least there are the hugely undervalued perspectives, writings and advocacy on/for tuning by Wendy Carlos (1987), alongside her potent experimental electronic compositions which were ahead of her time (1986).

In all the above, and many more, one is able to find a wealth of inspiration and it is this large and diverse output that my own research and composition attempts to exist in Relation to.

Chapter 2:
Conceptual Framework

2.1 Maqāmicism and Convention

Maqāmic music making is based on musical concepts that are intimately related to the Arabic, Ottoman and Persian art music traditions, and spread across the geographical regions from Morocco all the way to the Uyghur people in Northwest China. Though many of these concepts are shared, each of these regions, and the regions within each region, has a distinctive manner of theorising and practicing them. It is a distinctly Relational musical culture.

Presentations of Arabic maqām theory can be found in Marcus (1989), Maalouf (2011) and in Shumays and Farraj (2019). As I do not follow their direct examples, and in order to facilitate a more fluid continuation of this thesis and the portfolio of compositions, I would like to begin by outlining some of the conventions of maqāmic music making in the Arabic speaking regions as they relate to my practice. This is both to support the navigation of the musicological terminologies and to outline the musicological framework that this research works with, against and through.

In considering maqāmic practice across the Arabic speaking regions theoretically, and in sounding it according to its conventions, there exist a series of defined categorisations and principles of execution that should be adhered to in order to adequately represent the individual character of a chosen maqām.

They are presented here, ordered from the gross to the subtle in order to highlight their construct, though it must be noted that they are also Relational, i.e. deeply interrelated:

Gross	مقام	Maqām
↓	سير	Sayr
↓	أجناس	Ajnās
↓	نغمات	Naghamāt
Subtle	تنغيم	Tanghīm

i) Theoretically, a **maqām** is the gross container of multiple theoretical and practical elements that allow for the rendition of pitch-based phrasings with specific and well-defined melodic characteristics.

I.By following the سـيـر ***sayr***, the path of melodic development, the specific characteristics of a maqām can be rendered. Conventionally this is crafted by relying upon orally transmitted micro-melodic phrases that in-turn rely on pitch-classes/degrees of melodic focus[32] (i.e. tonal centres), for the exposition and development of these constituent parts (see Mashshāqa, 1899: 39-55 in Arabic and Mrad, 2007 in French for examples). During this exposition, consistent referencing of the grounding pitch-class/degree[33] (i.e. root) and the various degrees of melodic focus are relied upon to maintain the

[32] In Arabic these are referred to as درجات التركيز/الارتكاز/مراكز, *darajāt al-tarkīz/al-irtikāz/marākiz*, literally meaning degrees of focus or centre.

[33] In Arabic this is referred to as درجة استقرار المقام, *darajat istiqrār al-maqām*, literally the stabilising/ grounding degree of the maqām.

Relational tonality of the maqām (see Racy, 2000: 309). In addition, certain maqāmāt (sing. maqām) have associated, and very specific, micro-melodic phrases that signify or typify them, much like the conceptualisation of the Radif within the Persian Dastgāh/Avāz as sequences of phrases representative of the musical characteristics (Farhat, 2004:21). This particular notion is more prominent in the Iraqi Maqām tradition (Tsuge, 1972: 62) than in the Arabic maqām tradition found in Egypt, the Gulf or the Levant.

ii) The sayr of a maqām follows, and sometimes deviates from, a structure defined by the أجـــناس ***ajnās*** (tri/tetra/penta-chords, sing. جـــنس *jins*)[34] each of which has its own internal Relational character. A combination of ajnās in consecutive ascending and sometimes differing descending sequences are used to create the structural form of a maqām (Racy, 2000: 308).

iii) Each jins is a grouping of نـــغَمـات ***naghamāt*** (pitch-degrees/pitch-classes, sing. *naghma*)[35] which since the mid-18th century (the so-called "modern period" as defined by Marcus, 1989: 13) are delineated by individual names of Persian and Ottoman origin. Each naghma has

[34] From the Greek γένος genus (Farmer, 1929:107).

[35] In that *naghma* can be used to mean both pitch-degree/class and melody in Arabic music literature, I choose to use it with its feminine plural *naghamāt* as defined. The same root can also be conjugated in the masculine as نغم *naghm* and أنغام *anghām* which in the Arabic of today are more often used to mean melody/melodies. These complexities of Arabic music terminology are well discussed in Marcus 1989: 9.

its own delineation of pitch, though there is no consensus on the exact value of some of them.

iv) Lastly and most importantly, the most subtle and foundational element is the تَـنـغـيـم ***tanghīm***, tuning and intonation. The verb tanghīm is etymologically lined to naghma/naghamāt and could be translated as 'to intone' or more literally 'to make into a naghma' (i.e. pitch-class). This term was communicated to me by Palestinian musician and composer Khaled Jubran during a conversation about the subject and although it is rarely used in Arabic to refer to tuning, or to the creation of a tuning system or even intonation, I find it more accurate than using the more commonplace Arabic term دوزان *dozān*. This is a word of Turkish origin, *düzen*, meaning 'layout, order or array'[36], though in Arabic it is used to mean 'the tuning of sth.' or 'to tune sth.' i.e. a musical instrument. This element is further expanded upon below.

2.2 Arabic Composition and Improvisation

Concepts of instrumental musical composition in Arabic music and maqāmic practice in particular, are deeply intertwined with improvisation. Though there are compositional forms that became a staple of 20th century instrumental Arabic maqāmic composition, many of these have their roots in Ottoman music such as the Samāʿī, Bashraf and Longa. Composition in

[36] See https://tureng.com/en/turkish-english/d%C3%BCzen

maqāmic practice in general is often micro-structural, such as the afore mentioned sayr, or macro-structural, such as the realisation of long-form performances of the Waṣla in Egypt and the Levant, or the Iraqi Maqām in the cities of Baghdad and Moṣul.

In all of these forms, the convention is to start from a principle maqām and expand out into إنـــتقالات *intiqālāt*, modulations between the ajnās and the maqāmāt, a key element that has a documented existence going back to the medieval period (Marcus, 1992: 172). This is shared between Arab and Ottoman practice due to their less constrictive guidelines in comparison with the Azeri Mugham, Persian Dastgāh or the Iraqi Maqām.

The Intiqālāt also play a primary role in the principle form of solo instrumental performance, the تَقسيم *taqsīm* (sing. تقاسيم *taqāsīm* pl.). Literally translated as 'to divide, or divisions', it is an improvised form which, as with other compositional forms, is conventionally based on a principle maqām, the exposition of which is akin to dividing its constituent parts of ajnās and naghamāt and developing the melodic phrasing around them according to the sayr, as was elaborated earlier in this chapter. This is often followed by a series of intiqālāt to related ajnās or maqāmāt, before finally returning to the principle maqām from which the improvisation commenced[37].

In his recent doctoral thesis, Palestinian oud player Nizar Rohana elaborates on the taqsīm as a "genre" through detailed analysis of taqsīm recordings by Egyptian oud players and composers Moḥammad Al-Qaṣabjī

[37] For an elaboration on the art and symbolism of taqsīm see Racy, 2000.

and Riyādh Al-Sunbaṭī, and explores its potential as a "model for pre-composition"(Rohana, 2021). He follows this with original compositions that utilise his systematisation of the performance techniques and formal procedures uncovered within them. Through his research and development on recent publications by Egyptian oud player Tarek Abdallah (2015, 2016), Rohana contributes significantly to scholarship on the subject and lays out the conventions of modern taqsīm performance as practiced in Egypt in the 20th century, highlighting its unquestionable influence upon oud players (including myself) and other instrumentalists across the Arab speaking regions to the present day.

Aside from the maqāmic phrasings and gestures that are innate to the practice, the structural idiomatic elements of a taqsīm as per Rohana's definitions and codification (2021: 48-54) are:

i) **فواصل *fawāṣil*** (sing. فصِل *faṣil*, lit. section or chapter)

Temporal periods (sections) of melodic phrasing and development.

ii) **وقفات *waqfāt*** (sing. وقفة *waqfa*, lit. stop or pause)

Short or long pauses that punctuate the fawāṣil.

iii) **إقامات *iqāmāt*** (sing. إقامة *iqāma*, lit. settlement)

Repetition and sustain of a single note.

iv) **ترجيعات *tarjīʿāt*** (sing. ترجيعة *tarjīʿa* lit. returns)

Use of a 'pedal' tone within a musical phrase.

v) **قفلات *qaflāt*** (sing. قفلة *qafla*, lit. closure)

Cadences

vi) **زير بم *zīr-bam*** (Persian lit. high-low)

Sustained tremolo of a note in an upper register (زيـــر *zīr*, high) punctuated by single notes in the low register (بـــم *bam*, low) in a phrased sequence.

To this list Rohana adds three more definitions of his own contribution, though without Arabic language parallels. These are; action: "a phrase that highlights one of the predominant tones", closure: "the process or the act of descending to and finishing on the tonic after an action", and resolution: "a gradual descending melody within the closure process where the performer decides to retrieve [*sic*] to the tonic after an action" (2021: 52).

I include this novel codification of the taqsīm's constituent elements and highlight its structural conventions i.e. conventional melodic and formal construction, precisely because a large part of my works in this portfolio engage with abstracting and deconstructing both the maqāmic phrasing associated with taqsīm and the form itself, in order to experiment with different perspectives and approaches. Rohana's work in this sense acts as a marker that helps define the positionality of my artistic process within the context of my Arab oud playing contemporaries who are also engaged in artistic research.

2.3 Maqām as a Sonic State

In addition to referring to the musical phenomenon (Touma, 1971), the word maqām in the Arabic language also means the place of one's footing (i.e. a place where one is settled). In Sufism, it is used as a singular noun for the shrines of Sufi saints, and in the plural (maqāmāt) also refers to states of being (حالات pl. f. *ḥālāt*, sing. حالة *ḥāla*) that a Sufi adept aspires to nurture in themselves as constants, such as patience, trust and contentment.[38]

The choice to use such a term helps in elucidating the concept of طرب *ṭarab*, defined by Racy as "musical ecstasy" (2003: 120). The associations to ṭarab often revolve around both the ecstasy and the excitement of the socio-cultural and musical experience led by a vocalist[39] and their live musical accompanists (i.e. Sabah Fakhri, Umm Kulthum etc.). Though Racy also points out that the taqsīm, as a genre employed within the structure of an ensemble performance, is invaluable to inducing the state of ṭarab amongst both the vocalist and the audience, just as it is equally possible to induce and maintain ṭarab through a complete solo instrumental performance (Racy, 2000:310).

It is precisely within this context that I am interested in exploring the idea of the maqāmāt as sonic states of being, or places of sonic settlement/ existence. This interest stems from my studies and practice of the oud in the manner of the Iraqi oud school, and more specifically the meditative

[38] See مقام (maqām), (2022)

[39] A singer or vocalist is also referred to as a مطرب *muṭrib*, meaning the person that induces the state of ṭarab.

taqāsīm of Irāqī oud players Salmān Shukur (1977), Jamīl Bashīr (Bachir, 1974) and his brother Munīr Bashīr (1998), all three of whom contributed significantly to the development of the taqsīm in a philosophical manner, in contrast with the more lively and energetic stylings heard in the Egyptian or Levantine oud schools represented by Al-Qasjabji or Farid El-Atrach respectively.[40]

2.4 Ḥurūfīya and Abstraction

Principle extra-musical influences on the compositions submitted in this portfolio come from the concepts of abstraction innate to Islamic Art and the *Ḥurūfīya* art movement which focuses on the Arabic letter or script.

In her critique and counter thesis to an Islamic Art article by Madden (1974) and a response to it by Richardson (1976), Arabic and Islamic music and art scholar Lois Ibsen al Faruqi highlights Madden's and Richardsons's inability to recognise the lack of distinct separation between the sacred and the secular in Islamic art, alongside their failure to "discern any relationship between abstraction and the principle of Islamic style commonly known as the "dissolution of matter", and continues by saying:

> "The artist affected by Islamic ideology further molded his artistic style to express the utter transcendence of the Divine by "dissolving" or, better, "disguising" the material world with which he worked. He evolved two techniques or stylistic

[40] See Racy (2000) for more detail.

> devices for expressing this non-naturalness of Allah. It is these which can be said to fall under the label, "dissolution of matter." The first of these stylistic tendencies involves a "camouflage of structure," the second, a "disguise of materials".” (al Faruqi, L. I. 1977: 355)

Within this concept of the “dissolution of matter”, and the profound relationship between the sacred and the secular heard in the maqāmic music of the Arab speaking regions, I have long been interested in developing musical compositions that are in themselves a “camouflage” of maqāmic structure and a “disguise” of maqāmic materials.

With relation to structure, form and representation, Islamic Art scholar Ismaʿīl Al-Faruqi notes that:

> “The death-blow to naturalism is repetition. By repeating the stalk, leaf and flower over and over again, and making them proceed one from another indefinitely in a manner impossible in nature, all idea of nature is banished. Repetition produces this effect so unmistakably that it even tolerates its own enemy-i.e., development-provided what has developed within a portion of the work of art is repeated in the work of art as a whole. Thus, nature is annihilated from consciousness, and un-nature is presented. If stalk, leaf and flower still leave a vestige of nature in the consciousness of the beholder, then the line, straight, broken, circular, jetting

> or trajecting, in free lance designs or geometrical figures, will do the job better, beyond all doubt." (Al-Faruqi, I. R. (1973: 100)

Again, this has inspired me to consider maqāmic practice and its form in a similar way to how these core elements in the representation of nature are abstracted and repeated in order to insinuate at something beyond.

Similar approaches to the above are also found in the secular 20th century Ḥurūfīya art movement that takes its name from the Arabic حـــروف *ḥurūf*, (lit. letters of the alphabet, sing. حـــرف *ḥarf*). In one of the few books dedicated to the subject, Dagher defines the movement as "art-works that engage with the Arabic language - letters or text - as a visual element or material for composing" (2016: 17).

Coincidentally, the words ḥarf/ḥurūf for letters is also used by Arabic musicians to delineate pitch classes or naghma/naghmāt. In direct influence, the majority of this research project focuses on engaging with Arabic maqāmic practice through its constituent elements, specifically tanghīm (tuning) and naghamāt (pitch classes), alongside the ḥurūf of the Arabic language, as sonic "elements or material for composing", a process that could be termed maqāmicism or even naghamīya.

In continuation, Dagher goes on to define the movement's artists as those "who aimed to create art with local reference and "civilisational" identity" (op. cit. 17). It is precisely in this context that the works of modern Iraqi artists such as Dia Al-Azzawi, Shakir Hassan Al Said and Jawad Selim

have had a major influence on my thinking, as will be elaborated in the next section.[41]

2.5 Native Historicity

As the quotation of Dagher highlights above, and is similarly expressed in the work of Shabout (2007: 61-144) regarding modern Arab art and Naji (2019) with specific reference to modern Iraqi art, historical and modern native visual symbols and forms played a distinctive role in the maturation and self-definition of Arab and Iraqi art practice.

With regards to music, the extant theoretical writings on Arabic music theory, a total of 339 manuscripts which span over a thousand years from 900 C.E (Shiloah, 1979), provide a similar wealth of inspiration. This is as much due to their individual creativity as it is to the distinct cross-pollination of ideas within them. The early influence of Greek theory is the most obvious, but so is that of Persian and Ottoman culture in later centuries. In addition to these influences I also consider the recent 20th century discoveries of cuneiform tablets that elucidate the role of music, and particularly tuning, in Babylonian cosmology, all of which will be discussed in detail in due course.

The 18th to 20th century studies of these aforementioned manuscripts have been mostly conducted by Anglo-Europeans scholars, as has been discussed by Ghrab (2005) and will be seen in citations throughout this

[41] For more on modern Arab art see Shabout (2007) and for modern Iraqi art see Naji (2019). For more on Dia Al-Azzawi see Al-Azzawi et al.,(2017).

research project. This is a direct result of the majority being held in British and European libraries and museums through colonial cultural extraction as Shiloah's catalogue attests (1979). In many of these translations and commentaries, Anglo-European framing and narrativation abound but are rarely critiqued elsewhere, an example of which is throughly interrogated in this portfolio with regards to al-Kindi. Furthermore, due to these Anglo-European works being treated as primary sources, there is often a need to see them in relation to the original sources, and to more recent works by native Arab scholars such as Abou Mrad (2006 and 2007), Beyhom (2010) and Maalouf (2011) amongst others, even if they are publishing in English and French rather than Arabic.

One principle element that is present across this portfolio of compositions is the tuning system of al-Farābī from the 9th century, a decision I took due to it being the earliest tuning system that features a mathematical definition of the infamous Zalzalian Middle Finger. Known more commonly today as the *segāh*, it is the archetypal and most characteristic interval in Arabic and maqāmic music, the finer details of which will be discussed further below.

In an article I recently published for the Beirut Art Centre,[42] I discuss the complex love/hate relationship Arab artists and audiences have with this interval through an anecdote regarding a film score that I worked on, followed by an overview of some historical, physical and cosmological associations, alongside modern 20th century contexts. I conclude the article

[42] See Allami (2021), also included in the appendices.

by highlighting my perspective on its role within the recent socio-political climate by saying:

> "I would lean towards arguing that the potency of the segāh —of this one single evasive interval—is so deeply associated with the culture of the region that it is refuted precisely because of that. So excessively representative and symbolic, it has become capable of triggering a reaction subconsciously associated with the political realities that have left many of us heartbroken to say the least, and dead to say the worst. I would also argue, however, that just as old associations were once made, so too can new ones." (Allami, 2021)

Seeing as many of these Arab musical histories are challenging, inspiring and under-explored experimentally in Arabic maqāmic music, many of the compositions in this portfolio rely on them, and a desire to re-narrativise certain aspects of them is also clearly expressed in the compositional commentaries. In relation to the segāh and the importance of tuning in my work, the upcoming Chapter 3 will address its role within the framework of modern sonic technologies, and the possibilities they have long repressed through the inheritance of 19th and 20th century Anglo-European perspectives about music history and music practice today.

Chapter 3:
Repressed Possibilities

3.1 Tuning and Supremacy

The practice of tuning and intonation is fundamental to music making worldwide, both in instrument making and performance. Once considered core to the study of music, today it is little taught and needlessly obscure. It is also one of the defining markers of cultural identity in music, as essential to it as accents or dialects are in speech, or ingredients and spices are in cuisine.

In his powerful study of "Tonality as a Colonizing Force in Africa", Ghanaian scholar Kofi Agawu profoundly articulates the role of Christian Anglo-Germanic hymnody within what he defines as the triangulation of "music, race and empire":

> "In domesticating hymns whose texts were originally in German or English for local consumption, melodies often disregarded the natural declamation of indigenous singing, imposed a regime of regular and symmetrical periodicity, and rode roughshod over the intonational contours prescribed by speech tones. All of this amounts to musical violence of a very high order, a violence whose psychic and psychological impacts remain to be properly explored" (2016b: 336).

Agawu's diagnosis of the under-explored impact of this same violence on the psyche and psychology of peoples across the African continent echos Fanon's views regarding the role of colonialism and pre-colonial history:

> "Colonialism is not simply content to impose its rule upon the present and the future of a dominated country. Colonialism is not satisfied merely with holding a people in its grip and emptying the native's brain of all form and content. By a kind of perverse logic, it turns to the past of the oppressed people, and distorts it, disfigures and destroys it" (Fannon 1963: 210).

On a subtler level, we could also read Agawu's words as a commentary on tuning, not merely on tonality as defined by melodies.[43] Although tonality and tuning are inextricably related, I see tuning as a subtler element in music making. From this perspective I would posit that the high order of "musical violence" triangulated by Agawu is equally applicable to twelve tone equal temperament (12EDO) and its related perspectives. Perspectives, and narratives, that have "distorted" and "disfigured" native musical logics, and have been disseminated since the late 19th century through supremacist Anglo-European musical and sonic theory, instruments, and more recently the modern technologies at the core of music making across the world.

[43] Agawu recognises the importance of tuning as "pitch resources" typically including "tone systems" and "networks of intervallic preference" but due to its "flexibility" and "margin of tolerance" in the varying practices of African musics he chooses to treat tonality as the guiding melodic principle. See Agawu (2016a: 206-207).

Unlike the modern Turkish system created in the 20th century by Yekta, Ezgi and Arel, which was based on 53 divisions of the octave and conceived as commas but now equal (Signell, 2008: 7 and 22-30), there is no modern agreement on what the tuning or intonation of the intervals used in Arabic maqām music are, or should be (Marcus, 1989: 161-188). Though this does not mean that such tuning systems didn't or don't exist. This lack of standardisation is likely a result of the infamous 1932 International Congress for Arabic Music held in Cairo, Egypt, during which Arabic scholars and practitioners, in tandem with Turkish and European counterparts, were unable to reach a consensus to unify the Arab tonality system into a specific series of intervals (Shawki 1969: 10), whilst also refusing the imposition of a 24-EDO system. Although lamented by the Europeans as detrimental to the "evolution and orchestration" of Arabic music (Shawki 1969: 13), in context it can also be seen as an act of Relational and opaque resistance to the colonial logics that were being implied.

Ultimately many of these logics were either imposed on, adopted or inherited by Arabic music throughout the 20th century, as is evident in Arabic music theory books from the second half of the 20th century. Brief examples of these include defining the maqāmāt as scales (Al-Hilu, 1961, Abbās, 1986), the adoption of barely modified naïve staff notation (Ghoṣn, 1984, Al-Rejab, 1985), the development of Eurocentric music education curricula (Farah, 2006), and most importantly its impact on the conceptualisation and practice of tuning, particularly through music technology, as will be elaborated below.

In opposition to the above, it is necessary to mention the existence of important and little known works of two Arab scholars. The Syrian Mikha'īl Allah Wīrdī's *The Philosophy of Oriental Music* (1949) is idiosyncratic at times, but provides one of the most extensive modern overview of tuning as a full subject in the Arabic language and includes a unique proposition for an alternative staff notation system. The Egyptian Youssef Shawki's *Measuring the Arabic Music Scale* (1969) on the other hand provides a review of Arabic tuning between 1894 and 1969 and is subdivided into three parts; before the 1932 Cairo Congress, the proceedings of the Congress, and after the congress up to 1969.

Here it is equally important to highlight the impact of Alexander Ellis's invention of the 'cent', as a unit of measurement for pitch, and the perpetuation of his perspectives on tuning and the musics of the world through the reliance upon both the 'cent' and his translation of Helmholtz's *Die Lehre von den Tonempfindungen* (1863)/On the Sensations of Tone (Helmholtz and Ellis, 1912).

> "When the 'interval numbers', that is the pitch numbers of two notes, have been found (or the 'interval ratio' [...]) it is necessary, in order to have a proper conception of the interval itself by comparison with a piano or other instrument tuned in intentionally equal temperament, to determine the number

of cents or hundredths of an equal Semitone, in that interval"

(Helmholtz and Ellis, 1912/1855: 446)[44].

We can read here very acutely that Ellis's reason for creating cents was specifically to be able to compare other tuning systems to 12EDO. What is little known or realised however, is that Helmholtz's original German book uses ratios exclusively, obviously because the cents system wasn't invented by Ellis yet. Although extremely valuable as a unit, a method and ultimately a tool, from a Glissantian perspective the cents system represents a filiative approach of laying things out on a line to see and compare them to something else, rather than the Relational method of ratios which requires a practical understanding of the subject for its details to be heard and observed. It is a markedly different worldview.

The impact of this filiation can be seen in almost all literature on the subject of tuning since Ellis's publication. With specific reference to Arabic music scholarship and research, it is also found almost exclusively in all the works by Arab and Anglo-European scholars, except Allah Wīrdī, all of whom convert the ratios from the original manuscripts into cents without including the original ratios in their publications. In addition, this same Anglo-European filiative worldview was imposed on the 1932 Cairo Congress during which all the measurements and experiments were conducted on a sonomètre, a monochord, by using centimetres as the

[44] I quote here the 1912 fourth edition of Ellis's English translation based on the fourth and last German edition of 1877, but the quote is also found in Ellis's first edition from 1855.

measuring unit for the length of the string, rather than ratios (n.a. *Kitāb* 1933: 331).

To go further back in time, many of the principle extant historical works on Middle Eastern music as a whole (see Shiloah, 1979) gave tuning and the division of the octave a central role, and it was always one of the first ideas to be discussed. Although the earliest Arabic theorists such as al-Kindī, al-Farabī and Ikhwān al-Safā' were all clearly influenced by Greek theories, through the translations that were being undertaken in Baghdad's *Beit al-Ḥikma,* House of Wisdom, in the early 9th century (Farmer, 1929: 96), this did not preclude them from developing and expanding upon such works to represent their own Relational worldview. Neither did this preclude creative ideas as will be discussed with regards to al-Kindī in the compositional commentary for *Ma-a a-ba ud me-na-gin Ma-a di-di-in* below.

Tuning, intervallic relationships and most importantly their Relational mathematical values (as relational interval numbers), have played an intrinsic role in the development of varying cultures' worldview for millennia, as is clearly evident in extant historical evidence from ancient Mesopotamia, Egypt, China and elsewhere (see Wellesz, 1957). Despite this fact and the historical scholarship that attests to it, almost all the Anglo-European literature on tuning theory from the second half of the 20th century onwards does nothing but minimise, if not outright exclude, these histories in favour for one in which the Greeks, and specifically Pythagoras, are to credit for everything (Barbour, 1951: 1-14, Levarie and Levy, 1980:

189-240, Mathieu, 1997: 246-249, Isacoff, 2001: 26-42). Not to mention the Anglo-European exceptionalism present in the 19th century (see Walden (2019) for an excellent discussion).

In his biography of Pythagoras, first translated into an abridged English by Taylor (1918) and later compiled and translated by Guthrie (1987), Iamblichus (c. 250 - c. 325 C.E.) distinctly states that Pythagoras was advised by his teacher Thales to go to Egypt and "get in touch with the priests of Memphis and Zeus", and that on his way he sailed to Sidon صـــيدا (Ṣaidā, modern Lebanon) "because it was his native country"[45], where he was "initiated into all the mysteries of Byblos and Tyre" (جـبيل Jbeil and صــور Ṣūr, modern Lebanon) (Guthrie, 1987:60-61).

Iamblichus continues that "after gaining all he [Pythagoras] could from the Phoenician mysteries, and found they had originated from the sacred rites of Egypt, forming as it were an Egyptian colony", he continued to follow the advice of his teacher Thales and left for Egypt where he "passed twenty-two years in the sanctuaries of temples, studying astronomy and geometry". After this he was "taken captive by the soldiers of Cambyses, and carried off to Babylon" where, "overjoyed", he "associated with the Magi who instructed him in their venerable knowledge and [...] through their assistance, likewise, he studied and completed arithmetic, music and all the other sciences. After twelve years, about the

[45] Taylor translates this as "birth-place" (1918: 9) and his translation corroborates all the other details in Guthrie's.

fifty-sixth year of his age, he returned to Samos" (op. cit.), which calculates as Pythagoras having originally left Samos aged 22.

Since the 1960s, twenty ancient Mesopotamian cuneiform tablets concerning music have been found and translated (Mirelman 2013: 43). The earliest of which, tablet CBS 10996 currently at the British Museum in London, features the exact tuning system credited to Pythagoras, and the seven principle modes credited to the Greeks (Kilmer 2019: 472 and 475). In the tablet these are presented as a practical method of how to tune the Babylonian nine-stringed harp into the various modalities by ear, through determining whether the relationship between a specific sequence of dichords is *zakû* or *lā zakû,* Akkadian for pure/clean/clear or its converse impure etc. (Mirelman, 2003: 48-49). It is referred to as "the tuning text (so named because it is the only clear example of instructions for tuning), [and] dates to the Old Babylonian period, conventionally ca. 2000-1500 BCE. Thus, they precede by approximately one millennium anything comparable from other pre-Christian civilizations, such as Greece and China, from which music theory and notation texts have survived" (Mirelman, 2013:1)[46]. Another tablet, CBS 1766, features numerical values relating to the strings of the harp and indicating the same proportions that are also credited to the Pythagoreans (Crickmore, 2009, McClain, 1984: 129-160).

Considering also, that in 1957 about three-hundred mathematical cuneiform tablet text had been discovered out of approximately 500,000 that were extracted from Iraq and taken to American, British and European

[46] For more see Gurney (1968), Wulstan (1968), Kilmer (1971), Mirelman and Krispijn (2009), and Mirelman (2010).

museums (Neugebauer, 1957: 30), and more specifically that within them is "sufficient proof that the "Pythagorean" theorem was known more than a thousand years before Pythagoras" (op. cit. 36). This makes for a far more convincing history than Pythagoras walking past a metal smith and hearing the hammers pounding on the anvils, producing the harmonious tones of the octave, the fifth and the fourth, as recounted by Nicomachus in the second century B.C.E. (Levin and Nicomachus, 1975: 83) and perpetuated to this day whilst either being acknowledged as myth or legend (Riedweg, 2005: 27-29), or not at all (Barker, 1989: 246).

All the above mirrors in many ways Bernal's arguments in *Black Athena* and what he terms the "fabrication of ancient Greece" by Anglo-European scholars and historians in the 18th-19th centuries (Bernal, 1987). From my reading, this leads subsequently to what Ewell has termed the "white racial frame" of 20th century music theory (2020)and helps in contextualising the filiative versus the Relational narratives that Anglo-European music scholars have perpetuated for so long. Maybe we should be referring to Pythagoras of Sidon and Babylonian tuning?

It would be easy to dismiss these arguments as a case of semantics, were it not for the literal and practical impact that such supremacist Anglo-European-centric narratives have had, and continue to have, on music theory and practice across the world, including on artists such as myself looking to develop a Relational imaginary within their cultural interests. With regard to my research, aside from the continuous European obsession with imposing a 24-EDO divisions on Arabic tuning based on one singular

work by Meshshāqa (see Maalouf, 2003), and the consequential perpetuation of the notion that Arabic music uses a 24-EDO tuning, this has led to the literal imposition of such misreadings through their distribution in both modern-day theory and technology.

The most recent book on Arabic music theory *Inside Arabic Music* (Shumays and Farraj, 2019) helps to fill the ailing scholarship gap. Unfortunately it is also replete with Anglo-European-centric framings. Despite a full chapter on tuning (op. cit., 161-178) it does not reflect upon the work of al-Kindī, al-Fārābī or any other historical figures from the medieval period onwards. Instead there is a distinct centring of European and "Pythagorean" theory, followed by an unconvincing "assertion" based on the regional and individual variations of the maqāmic tonalities that: "musical intervals and scales are fundamentally arbitrary (following Saussure's definition of the *arbitrariness of the sign*), by which we mean that they are the result of cultural choices and conventions—*even in cases when there are mathematical relationships expressed in some of them"* (Shumays and Farraj, 2019:164, italics in the original).

Although they recognise the inadequacy of the 24-EDO system and are both critical of 12-EDO and aware of its supremacist biases, 24-EDO conceptions are still perpetuated and somehow justified, particularly in the context of "Arabised" musical instruments (Shumays and Farraj, 2019: 32-46). Historically, Arabic tuning systems have been theoretically defined as mathematically derived intervals. Although this does not exclude that variations in practice exist, neither should it exclude the value of such

theorisation. Following Agawu's lead we could just as accurately define the theoretical variants whilst recognising their "flexibility", "margin of tolerance" and preferences that exists in practice (see Agawu 2016a: 206-207).

Due to the modern-day legacies of such narratives and perspectives, these inherited biases, musicians, researchers, artists, composers and many others like myself, have consistently faced an othering, a lack of representation and even exclusion from modern-day musical theorisation and practice, a frustration also clear in Shumays and Farraj (2019: xix). In my view, this supremacist positioning of Anglo-European music theory has led to a substantial impact on our abilities to realise our imaginary and often also to a disproportionate amount of labour in order to confront these problems, as this thesis and Shumays and Farraj's work demonstrates. Aside from scholarship, a principle arena in which this has all occurred is that of music technology, as will be elaborated in the next section.

3.2 Biases of Sonic Technologies

Discussions about the role of digital music making tools and their effect on Arabic music can be found in Rasmussen (1996) and to a limited extent in (Shumays and Farraj, 2019: 36-40). Both works focus on the 'Arabic Org' and the so-called "oriental keyboard" that gained much popularity in the 90s and brought with it the fixation of 24-EDO into the Arabic music landscape. Rather than comment directly on Arabic music, I am more

interested in expanding into a Relational consideration of this issue and what I will present as the problems that have led to it, with particular relevance to transcultural music making.

The impact of sonic technologies on music-making has been discussed widely (see Wittje, 2016, Strachan, 2017), as has the newfound reliance on such technologies for creating, therefore also conceptualising and imagining, music (see Théberge, 1997), and the issues of gendered "neo-colonial labour" that allow their existence (Vágnerová, 2017). What is often left out in these discussions, is the impact such technologies have had on musicians, artists and composers who desire to work within cultural or transcultural musical frameworks other than those of the UK, Europe, or the United States (see Strachan, 2017: 15 for such an example), and particularly without twelve-tone equal temperament.

One of the few scholars working from such perspectives, Jose Claudio S. Castanheira, has highlighted what he has termed "technocoloniality" by stating that:

> "the standardized technical environment, controlling both production mechanisms and creative flows, represents a serious obstacle to diversity of sonic/musical manifestations. The globalized structure of sound production processes favors a specific type of commodity, stimulating its circulation on large scale as a demand of late capitalism, within vertically defined parameters of transnational

> conglomerates. Peripheral or DIY practices are, by several means, put aside, attacked or absorbed by mainstream technical solutions" (Castanheira, 2021).[47]

To briefly reference my own research and practice, the subject of tuning in the context of sonic technologies has long been the cause of much frustration. As tuning and intonation are the fundamental, and most subtle, elements of maqāmic practice, my desire to explore Arabic music outside the confines of traditional instrumentation whilst maintaining its specific characteristics was always unsuccessful. This was due to the cumbersome and complex technical workarounds, the constant hurdles and compromises, the overly analytical software interfaces and most importantly, the Anglo-European, as opposed to transcultural, perspectives embedded within the tools that tried to tackle these problems, as I will expand on below. So much so that in the late 2000s I gave up completely and dedicated myself solely to the acoustic world of the oud, only to come back to sonic technologies in the few years preceding this doctoral research.

In this context, tuning and its position as a fundamental element for the conceiving and practicing of music in many cultures across the world, serves as a prism through which the problematics of modern sonic technologies can be interrogated. Not only because it highlights certain technical deficiencies within them, but also because it acutely highlights the

[47] This quote is from the abstract of Castanheira's conference paper "Technocoloniality: Social and cultural inequalities within musical technical discourse" presented as part of IAMCR, Nairobi 2021. Unfortunately the full paper is no longer available to cite at the time of writing. The above text comes from the abstract book published by the conference and is available at the link in the bibliography under Castanheira (2021).

inherited and unquestioned biases and non-neutrality of the perspectives that are embedded within them.

Much of current music making practice relies on sonic technologies inseparably from the creative process; to create, record, and manipulate sound, either separately or in combination. It is often presumed that this reliance only applies to electronic music-making, but I would argue that it also extends to acoustic music making through digital devices such as hardware or software tuners and digital notation softwares for the creation and engraving of notated compositions, the playback capabilities of which continue to become more important. Although more prominent in digital tools and environments, the issue also exists in those that are analogue/ electric which are based on similar fundamental conceptions. Many of these technologies are based on a 12-EDO default which often cannot be changed.

Rath and Castanheira both accurately point out that MIDI (Musical Instrument Digital Interface), the communication protocol backbone of most sonic technologies since its inception in 1983, is at its core, a "Eurocentric language, the 'nouns' of which are equal-temperament notes that must be bent and shaped by the 'adjectives'"(Rath 2018: 38), the development of which did "foreshadow an increasing autonomy of digital devices from their human operators" (Castanheira 2020: 114). This is consistent with a general discourse I have encountered in conversations with colleagues that MIDI itself is the problem.

As I have previously published,[48] the pertinent detail of the matter is that MIDI Tuning Standard (MTS), an ultra-high-resolution specification for tuning, was ratified by the MIDI Manufacturers Association (MMA) and included as an integral part of the MIDI spec itself in January 1992 and later updated in 1999[49]. Developed together with composers Robert Rich and Carter Scholz following Rich's personal lobbying of Dave Smith[50], MTS allows the use of both octave-repeating and non-octave-repeating tunings to a resolution of 0.0061 of a cent, which essentially divides the octave into 196,608 equal parts. It also allows changing the tuning of one or more notes in real-time, and gives the user the choice of changing all currently sounding notes, or only the new notes that follow the tuning change message. This is a level of detail that covers all the melodic needs of all-musics from across the world (as long as they only need a maximum of 128 notes), but not without a caveat. Due to the MIDI protocol not being compulsory in its entirety, any elements of it can be used, or ignored, in any way a manufacturer or programmer desires. As MTS was included as part of the rarely used SysEx messages, it only ever found its way into a limited set of hardware synthesisers, and some that use SysEx also dropped MTS entirely.

[48] See Allami (2019) *Microtonality and the Struggle for Fretlessness in the Digital Age*, also included in the appendices.

[49] See MIDI Association: https://www.midi.org/specifications/midi1-specifications/midi-1-addenda/midi-tuning-updated (Accessed: 6 April 2022)

[50] Rich, R. (2019) Personal Communication. Smith was one of the original developers of MIDI.

On the cusp of this development in 1987, and just after the release of her complex tuning-focused album *Beauty in the Beast* (1986)[51], revered electronic musician and composer Wendy Carlos published an article in Computer Music Journal titled *Tuning: At the Crossroad*. In reference to the digital music technologies being developed at the time, she states:

> "This is the first time instrumentation exists that is both powerful enough and convenient enough to make practical the notion: any possible timbre, in any possible tuning, with any possible timing, sort of a "three T's of music." That places us at a crossroads, to figure out just how to use all of this newly available control. And we'll discover that the three "T's" are really tied together" (1987: 31).

Carlos's perspective in this short statement and everything else she writes in the article, alongside her compositions on *Beauty in the Beast*—which must have been incredibly labour intensive at the time—and the comments she makes on her pedagogical album *Secrets of Synthesis* (1987), clearly highlight what seemed possible through the emerging technologies at the time, not only for herself, but for music makers worldwide.

To date, I have been unable to find a single reason as to why MTS was not more widely adopted. Leading me to a conclusion that developers and manufacturers did not think it was important enough to include, and that due to the capitalist supply and demand nature of the still emerging and

[51] See also https://www.wendycarlos.com/+bitb.html for detailed information (Accessed: 6 April 2022)

developing music technology market at the time, it is likely that MTS did not have a large consumer demand and therefore no market they could exploit. Though, I do not consider this enough to satisfy the conclusion, especially seeing how the imagination of developers like John Chowning was leading to technically complex timbral possibilities such as FM synthesis, and therefore products such as the Yamaha DX7 (first released in 1983) which had a major influence on artists at the time, leading to large quantities of production and sales to serve a market that the technologies themselves created.[52]

A similar scenario, with regards to time, occurred with Roger Linn's LM-1 drum machine, followed by the now classic hip-hop staple the MPC60 sampler, sequencer and instrument in its own right. In his recently published *Dilla Time* about highly respected and influential hip-hop producer J. Dilla, Dan Charnas explicitly relates Linn's development of both the LM-1 and the MPC60, to Dilla's masterful approach to rhythm and groove. He highlights how it was Linn's forward thinking design, in comparison to the rigid grids of previous drum machines, that created the possibilities for Dilla to find his artistic voice and in turn influence many genres of current African-American music and much more worldwide, not only hip-hop. In first discussing the LM-1 which was released in 1980, Charnas tells us that: "Linn realized that recording a user's real-time playing, and having it better reflect their timing, required the creation of a

[52] A parallel of this has occurred recently with Korg teaming up with British electronic musician Aphex Twin to develop and market synthesisers based on their collaboration which primarily focused on tuning capabilities and James' own presets more than sound design. See James and Takahashi (2017).

finer grid: instead of sixteen divisions per measure, his new number was 192 per measure" (Charnas 2022: 80)[53]. Having already illustrated his point Charnas omits that when Linn went on to design the AKAI MPC60, released in 1989, he took this even further and introduced a grid of 96 divisions per 1/4 note, equalling 384 divisions per measure, as stated in the MPC60 Manual (Linn 1989: 56). However what is more relevant to this research, is that it wasn't just the finer grid that allowed J Dilla to transform hip-hop, it was *how the use of the grid was implemented* i.e. the inclusion of playable pads on the main surface of the instrument, allowing the user to play and record their beats with far less quantisation rather than programme them, the pads being an update to the original LM-1 concept and design.

Since the 1990s, the tools to most influence the practice of music making have been DAWs (Digital Audio Workstations) such as Apple's Logic Pro, Steinberg's Cubase and Nuendo, Avid's Pro Tools, Ableton's Live, FL Studio, Bitwig, Reaper and others. These are recording, composing and producing environments that have, today, taken on the form of a central recorder, sequencer, sampler and instrument hub for virtual instruments and sample libraries, from which all aspects of a music-making session can take place on a laptop computer. It was only until recently that DAWs allowed for any kind of tuning capability, but even in their allowing tuning it is often mis-implemented or enabled in a tokenistic way, as I will elaborate

[53] This is in reference to a measure of 4/4 equating to 48 division per quarter/crotchet beat. Charnas doesn't provide a direct citation and the manual of the LM-1 does not define the exact number of divisions, it just says "Hi Resolution" (Linn, 1980: 5). Though Charnas confirmed to me that this precise figure was recounted to him by Roger Linn in an interview conducted on October 25, 2019 as is listed in the back of his book under 'Reporter's Notes and Sources' (2022:405). Personal Communication.

on below. The same also applies to the many software plugins, sample libraries and synthesisers that offer such capabilities.

As I have published previously,[54] many software and hardware manufacturers have made provisions to include tuning capabilities in their products. Many are shipped with pre-loaded tuning files both historical and modern, including those from varied musical cultures, but often presented as scales. Unfortunately when any such tuning is loaded, it is impossible to know how it is supposed to be used. There is often no documentation on what these tunings/scales are, what their values are, or which note on the keyboard they are supposed to be played from.[55] The maximum we often find is a short blurb about each tuning in the manuals, but even this is usually trivial, and in many cases their naming is also problematic[56].

In addition, the tunings are loaded up and spread across the 12-tone piano keyboard/piano roll starting from Middle C/MIDI note 60, regardless of the number of divisions or the logic of their intended usage. The result is that any tuning loaded immediately feels unusable outside the scope of exoticism or othering, therefore rendering the inclusion of such capabilities as tokenistic and lacking a meaningful method for interaction, unlike Linn's MPC60 pads.

---

[54] See Allami (2019), *Microtonality and the struggle for Fretlessness in the Digital Age*, also included in the appendices.

[55] For example see Omnisphere 2 2.8 Manual (2020:883), Logic Pro 10.73 User Guide (2022:1022-1026)

[56] Such as "Arabic, empirical", "Bali/Java Slender, Siam 7, empirical" and "Tibetan Ceremonial, empirical" in Apple's Logic Pro (not mentioned in the software manual but available in the software).

The comparison to the MPC60 here serves to highlight the importance of design and interface. There are many tools and solutions that have been designed and/or implemented to deal with the issue of tuning[57], though they are almost always done so from an Anglo-European-centric perspective. The main problem being the equation of the concept of a tuning system to the concept of a scale. Technically this can be represented as the difference between using only a set, or a set and subset(s)[58]. We can also use the Glissantian terms of filiation and Relation to elucidate the problem in more detail. Treating tunings as scales and rendering them arbitrarily, is a filiative approach that serves a purely technical, as opposed to a musically meaningful solution. Whereas dealing with tuning systems according to their individual cultural logics, specifically with regards to the tonalities of non-Anglo-European musics, is a Relational approach that allows the user and the individual pitches to both rely on and relate to each other.

A major influence on this issue has been the Scala software[59] and the Scala file format[60], which today are considered the "de facto standard"[61], and are the most widely used for the dissemination and utilisation of tuning across both hardware and software devices, instruments and plugins. Due to

[57] An extensive list of softwares is listed on the Xenharmonic wiki: https://en.xen.wiki/w/Useful_Tools (Accessed: 6 April 2022)

[58] Even the lauded "microtonal" composer Harry Partch never utilised all the intervals of his 43-tone system on all his instruments. See Partch (1979: 195-319).

[59] Scala was one of the earliest stand-alone applications to deal with creating tunings which could then be exported as Scala files.

[60] See https://www.huygens-fokker.org/scala/scl_format.html (Accessed: 6 April 2022)

[61] See https://en.xen.wiki/w/Useful_Tools (Accessed: 6 April 2022)

the open access nature of the Scala scale archive[62], which includes over 5000 Scala files submitted by users and collated over time, many designers and developers implement tuning by allowing the import of Scala files without providing their own, therefore avoiding any inappropriate labelling but without dealing with the main problem.

Scala files, although human readable and easily editable without having to use the Scala software itself, rarely provide contextual information on how the tunings should be used, many of which are without sources or poorly cited. By contextual information, I refer to the basic musicological details needed to enable a meaningful interaction with the content. Although an argument can be made that it is not the role of a digital file to teach complex musicology, I would pose a counter argument that it is possible to deal with a fundamental musical element such as tuning according to its own logics, and to render it in a way that is meaningful and provides a path to entry, as opposed to a barrier.

One solution to this set and subset issue is partially resolved by the '.kbm' Keyboard Mapping file format, which allows for the definition of which pitch classes of the tuning system, are related to which keys on the keyboard or piano roll.[63] Another potential solution is available through the AnaMark tuning file format '.tun' and its '.msf' variant that can contain multiple subsets, but usage of .kbm and .msf is not widely implemented nor widely available, and none are included in the Scala scale archive.

---

[62] See https://www.huygens-fokker.org/scala/downloads.html#scales (Accessed: 6 April 2022)

[63] See Sevish (2017) for an overview of how these work

I have often been asked whether the piano keyboard, so prevalent in these technologies both as a physical MIDI controller device and as a symbol in the piano roll, is the problem. The majority of musical cultures around the world rarely use more than a heptatonic (seven note) scale plus a few accidentals at any given time.[64] This means that aside from experimental Anglo-European tunings, the twelve notes of a piano keyboard are perfectly useable for a meaningful interaction. A piano keyboard is a mechanical device that lifts a hammer and drops it back onto a string, a string that can be tuned to anything. There is no need to equate the piano with 12-EDO.

Lastly, software environments such as Max/MSP, Pure Data and Supercollider, which allow the user to programme their own environments and interfaces, do also provide tuning capabilities, but again none in a meaningful way that is comparable to the ease of programming a 12-EDO application. This represents the binary inherited from the reactionary and biased 20th century European art music models of either 12-EDO tonality (including serialism), or free form sonic exploration, whereas it should really be a continuum. There is no reason, or need, for culture to be seen as mutually exclusive to experimentalism, as this research project attests.

What we can see from this limited overview is that musical issues of timbre and time have been of great importance to manufacturers and developers, whereas tuning fell by the way side. One could think of tens of possibilities as to why this might be the case. In light of all of the above I would argue that whether by ignorance or innocence, it was, and still is, the

[64] For more on this see Danielou (1995: 147).

inherited biases of Anglo-European musical and cultural supremacy, which are ingrained in music history, theory, literature, education and conception, that have led to the current status-quo. The technological solutions to these problems have existed for thirty years, and were it not for such biases and perspectives, they would have been long resolved.

Here then, I would add to Castanheira's reflections on "technocolonialsim" (2020, 2021) that it is not necessarily the technology itself that is the problem, but instead the remnants of colonial logics that perpetuate such problems. Ultimately what this highlights are the repressed possibilities that exist within myriad musical cultures precisely because of the perpetuation of such asymmetries, and how these technologies continue to impose compromise while supposedly democratising access to them (Strachan, 2017: 21) and to the individual expression that is afforded through them. This directly relates to what Robin James has termed the "Sonic Episteme" (2019) in her examination of 21st century conceptions of sound and the ways they support white supremacist and capitalist patriarchy. In her concluding arguments, James notes her skepticism towards the idea that:

> "sound or sounds can be a model for revolutionary ontologies and epistemologies that completely eradicate ongoing relations of domination. First, these relations are systemic, and completely revolutionising those relations means revolutionising the systems that rest on them—and this

> involves more than just changing the object or mode of our theorising" (2019: 182)

It is precisely the complexity of these concerns that I am trying to raise, articulate, share and respond to in this research. This is articulated creatively through my usage of tuning as a fundamental building block of almost all the compositions in this portfolio, particularly with regards to the creation of Leimma and Apotome, and their effort to demystify this topic, and make it accessible.

3.3 Comma

In 2017, prior to my beginning my doctoral research, I designed a software plugin named Comma. It was coded in Max/MSP as a Max for Live device in different stages by programmers Charles Matthews in London, UK and John "jhno" Eichenseer in California, US. The concept of this device was to allow for accurate, intuitive and immediate tuning of any software or hardware synthesiser or sample library, based on the ability to have one-click access to tuning presets and mappings, and one-click access for the tuning adjustment of any pitch class.

Having access to such a device within the framework of a versatile DAW such as Ableton Live was a rubicon moment in my artistic and academic research, bringing with it swathes of questions and problematics. When I first received a working prototype of Comma, my experiments were generally focused on searching for novel ways to *sound* the maqāmāt using

various synthesisers and sample libraries. Very quickly I realised that I was being led astray by the sonic possibilities and the excitement following many years of limited options, whilst losing sight of the real novelty—that I could explore new ways to approach the maqāmāt themselves and how they are composed/performed, not just how they sounded.

The process of developing this device and its related technological, musical and historical context, was published as an in-depth seven page article titled *Microtonality and the Struggle for Fretlessness in the Digital Age* which I wrote for Berlin's CTM Festival magazine (Allami, 2019)[65]. It was published in accompaniment to the live premiere of a work titled *Kawālīs: Part II* (not included in this portfolio), which was developed using Comma and a hybrid acoustic/virtual tuned piano.

More pertinently, it was in this period that I understood the depth of the aforementioned inherited biases and how they manifested, even in my own work. I also realised that the issue of tuning, and even this simple proposed solution, were not what was really needed. With Comma, I was working in a filiative sense, in that I was unintentionally creating a means to an end, whilst what I really needed to develop was a more Relational and holistic approach that would provide context, malleability, and most importantly, a creative freedom to intuitively explore ideas, to imagine possibilities.

[65] I would like to recognise here that my usage of "microtonality" at the time was in the earlier stages of this research and the first opportunity I had to articulate my ideas to the public. In that the article was aimed at general readership, even though it was long, I used the term microtonality throughout the article to allow for a sense of familiarity for those who might come across it. This is pertinent also because the term is heavily used in almost all literature and therefore functions as a keyword for any internet searches. That said, I wish I had known better at the time and not used it.

The compound effect of this sonic, intellectual and compositional searching was the spark for much of the research presented here, and is elaborated on further below in the commentary for Leimma and Apotome.

PART TWO:
Compositional Research.
Commentary.

Throughout part one, I have highlighted the various problems that this research project has had to unpack in order to find its grounding. Chapter 1 included a critique of recent literature about the musical context this research is situated in and a review of its current situation. Chapter 2 outlined the musical and conceptual frameworks that influence and inspire this research. Whilst Chapter 3 detailed the role and impact of sonic technologies on the subject of tuning with which this research is actively engaged.

In the upcoming part two, I address the aforementioned problems with a body of work that can be categorised as solo improvised, duo/chamber composed and composed-improvisational, sound art installation, and electronic, alongside the development of musical softwares to enable their conceptualisation and development.

The multiple upcoming connections to Berlin that will be mentioned were the results of a year-long M4C placement through the Erasmus+ programme 2019/2020. During this time I studied with Marc Sabat as part of his now disbanded Studio for Intonation Research and Microtonal Composition at the Universität der Kunste (University of the Arts), whilst building and expanding my professional and artistic networks.

1. Requiem for the 21st Century

Multichannel installation.
Variable length.

Commissioned by Opera North, Leeds (UK) for the PRS Foundation's New Music Biennial (UK). Nominated for an Ivors Composer Award, Sound Art, 2020 (UK).

NOTE REGARDING SUPPORTING ASSETS:

The audio extract representing this work is a 9 min binaural recording made by the BBC using a binaural head during the premier at London's Southbank Centre. It is best listened to on headphones.

Should a more in-depth listening be desired, stereo mix downs of 1-2 mins extracts from 31 presets rendered from the custom software "as live" are included in the appendices.

Requiem for the 21st Century is a long-form generative composition in installation format that takes its inspiration from a 10th century myth about the origin of the oud. Using acoustically recorded naghamāt (pitch classes) fed into a custom-coded software, the installation moves through a series of musical states over time, generating sonic material in varied combinations of maqāmāt, sounds and silence.

According to Abi Taleb Al-Mufaḍḍal Bin Salāmah (d. 971 CE)—who anecdotally cites Hishām ibn al-Kullā—the oud was created by Lamech, a descendent of Cane, the son of Adam. He says that:

> “Lamech was of old age and never had a son, leading him to marry 50 wives and have 200 affairs until finally a son was born to him only 10 years before he died. When his son reached five years of age, he died, and Lamech became incredibly distressed. So much so, that he hung the corpse of his dead son on a tree and said: I will not let this body out of my sight unless it falls to pieces or I die. As the body began to decompose, it began to fall from the tree until all that was left was the thigh, the leg, the foot and the toes. And so Lamech took some wood which he cut and made thin, and began to assemble it together. He made its body in the shape of the thigh, its neck in the shape of the leg and its headstock as shape of the foot and the keys in the shape of the toes. He then stretched strings across it as the veins, and began to play it and cry and lamented until he went blind. It is said he was the first who ever lamented, and after him the instrument was called oud (Arabic for wood) because it was made from wood”. (Bin Salamah 1984:13-14)[66]

This myth, in which the oud is born of death and used to commemorate death, is the basis for this work. Conceived as an ever-changing requiem for the troubled 21st century, it aimed to offer a time-space for each visitor to contemplate the past, present, and possible futures of our millennium,

[66] My translation.

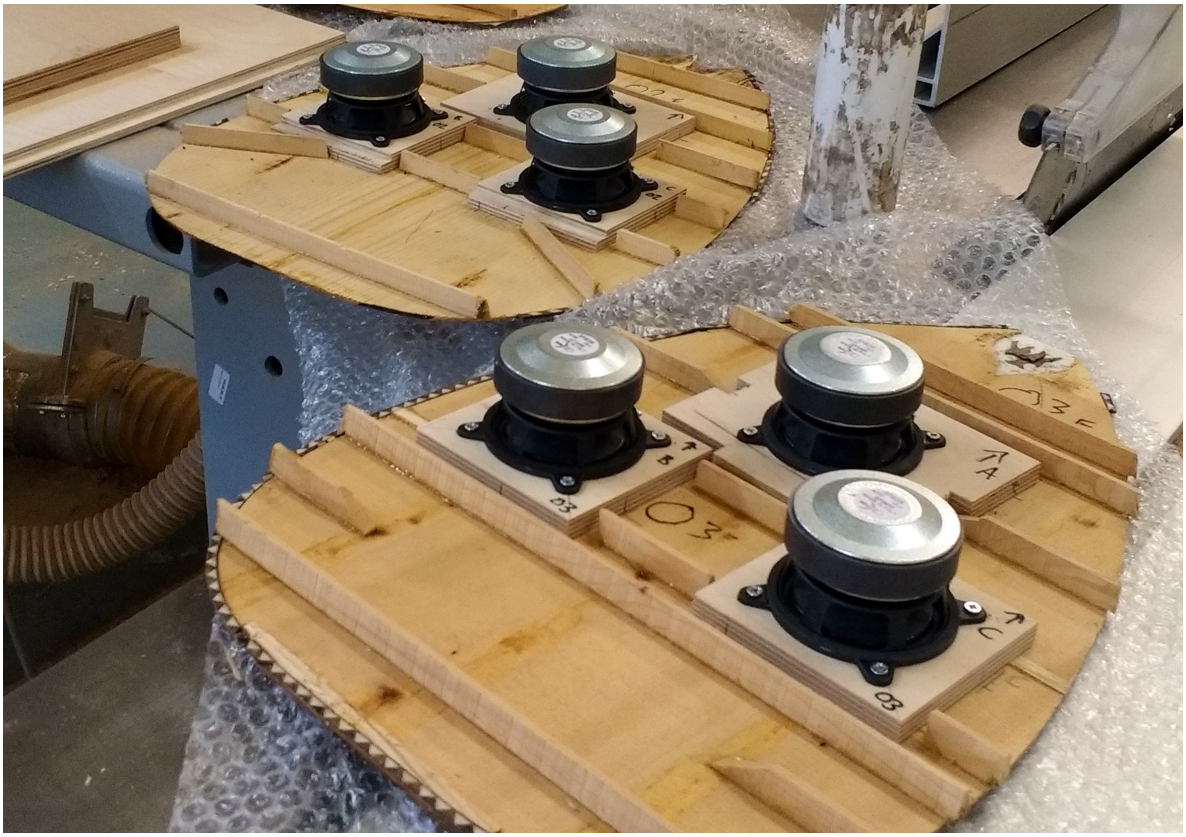
while also commemorating those we have lost. In particular, those killed during the incessant wars across the Arab speaking regions.

Adjusting placement of ouds during test build in Leeds (UK), May 2019

To create the installation, I searched for old ouds in various states of decay and disrepair in Beirut, Lebanon. Some were donated by friends, others were found in markets or second-hand shops. One particular "faceless" oud was kindly donated by the Lebanese luthier Albert Mansour, it was an unfinished oud that he had hanging in his workshop.

Once the eight ouds were collected, they were shipped to Leeds, UK and fitted with speakers by carpenter Chris Tribe, with assistance and supervision from the production manager Jane Earnshaw. One speaker was placed behind each sound hole by carefully taking the instrument' face off

and installing the speaker onto its back, then placing a layer of foam inside the instrument to prevent extraneous noise, before putting them back together again. The mounting of the ouds on over-head stands in a circular formation facilitated an immersive sonic experience, whilst also referencing the hung, decaying body of Lamech's son. The stands were built by metalworker Ralph Tricker also in Leeds.



Chris Tribe and Jane Earnshaw mounting speakers on the faces of the ouds in Leeds (UK)

The generative composition is based on the maqāmāt and is tuned using 22-unequal-divisions of the octave from the tuning system devised by the 10th century polymath al-Fārābī (d. ca. 950). As a development of the 9th century 12-tone chromatic system of al-Kindī (d. ca. 874), al-Fārābī's

was the first to include a specific measurement for the archetypal segāh interval for which he gave the ratio of 27:22.

Note N‘	English Note Name	Ratio	Cents
1	G	1/1	0
2	G-#	256/243	90
3	Ab	18/17	99
4	A-b	12/11	151
5	A	9/8	204
6	A-#	81/70	253
7	Bb	32/27	294
8	B-b	27/22	355
9	B	81/64	408
10	C	4/3	498
11	C-#	1024/729	588
12	C#	24/17	597
13	D-b	16/11	649
14	D	3/2	702
15	D-#	54/35	751
16	Eb	128/81	792
17	E-b	18/11	853
18	E	27/16	906
19	F	16/9	996
20	F-#	4096/2187	1086
21	F#	32/17	1095
22	G-b	64/33	1147
Octave	G	2/1	1200

Al-Fārābī’s 22-tone oud tuning according to Forster (2016:643)

Working with members of the Opera North orchestra and chorus in sections over a couple of days, I asked the musicians to play each of the 22 pitch-classes separately in the octaves most suitable to their range. I also recorded the same on the oud in one octave, playing single and sustained tremolo notes. These individual notes were recorded and edited into separate samples, which was achieved by providing the musicians and singers with a headphones playback of accurately rendered pitches using

Comma and a triangle wave sound from a digital synthesiser. They were then given a chance to pitch (i.e. find) the notes before recording them.

Recording with members of Opera North string section in Leeds (UK), April 2019

Rather than have the chorus members sing vowels or other sounds, I decided to have them sing syllables from the names of Iraqi victims of the 2003 Iraq war[67]. The names of the victims were taken from the Iraq Body Count database[68], a project led by Birmingham City University's Dr Lily Hamourtziadou who had synchronously published an article dealing with the issue of remembrance and commemoration only months before[69]. This

[67] The list of names and syllables that I selected are provided in the appendices.

[68] The only publicly available database documenting the lives lost in Iraq since 2003 available at: http://www.iraqbodycount.org (Accessed: 6 April 2022)

[69] See Hamourtziadou (2018)

choice gave the chorus members a more suitable intention in their delivery and provided a poignant yet subtle layer of meaning to the requiem as a whole.

In addition, I also asked the string players to record a series of abstract extended techniques (plucks, scratches, knocks, scrapes etc.) which would go on to be used, alongside "silence", as potential "instruments" for playback within the software. Each extended technique sound was edited as an individual audio sample, allowing for maximum texture and randomisation from the software.

Finally, I created a series of low drones using software synthesisers pitched to Al-Farābī's tuning system which would playback as the istiqrār of each generatively selected maqām, helping to "ground" the intervalic relationships and provide a reference pitch to make each maqām slightly more obvious to the ear.

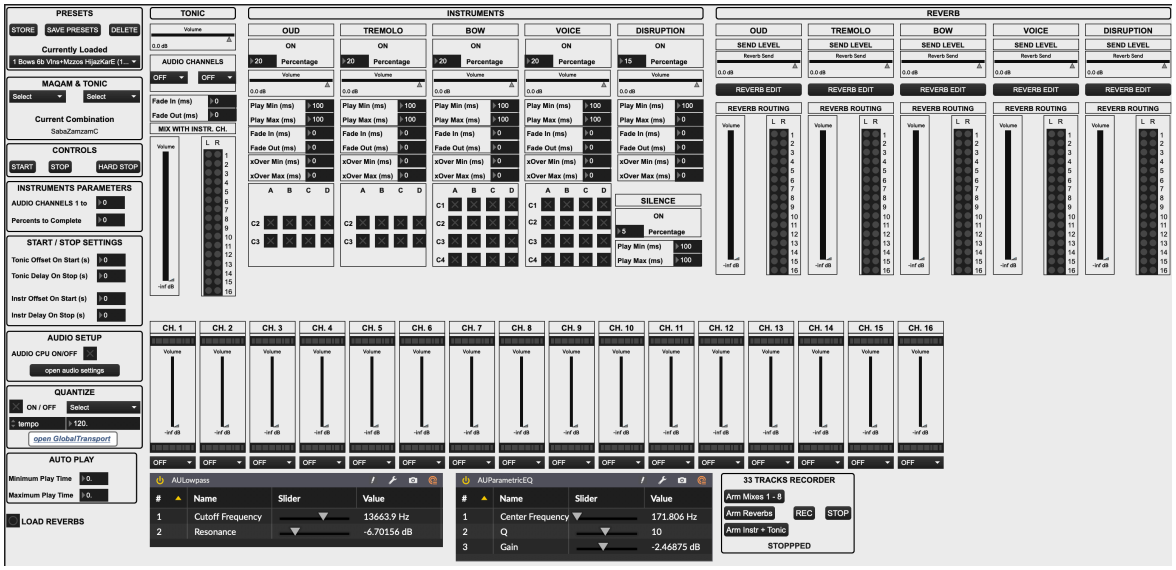
To generate the music playback, I created a design for a custom software which was coded in Max/MSP by the project's technical and system designer Arnaud Mercier. The software was designed to randomly choose which pitch-classes to play, based on a collection of variablesI would set and save into a preset. These variables included: which maqām? which istiqrār? which instruments (Oud single notes, Oud tremolo, Strings, Voice, Disruptions, Silence)? which performers? what percentage of likelihood of instruments being triggered? minimum and maximum length of triggered notes, minimum and maximum fade in and fade out values, minimum and maximum crossover values, reverb send and return volume levels,

individual instruments and tonic volume levels and minimum and maximum preset playback length. One reverb plugin was used (Eventide's Blackhole) and its settings could be saved differently for each preset.

Arnaud Mercier and I working on the software during the test build in Leeds (UK), May 2019

The choice of maqām and istiqrār was based on a table of mapped maqāmāt and their transpositions I had prepared in advance. Once a preset was created, the software would be run and it would randomly choose which sample to trigger and which of the eight physical channels to output it to, whereby each physical channel was routed to one of the hanging ouds. Alongside the oud-speakers I also used a pair of mid-range monitors and a pair of subwoofers to help boost certain frequency bands in certain presets, for more dynamics and colour.

Lastly, the software also randomly chose the order in which the presets would play, after I had determined the minimum and maximum length values for each individual preset. By the time of the premier in London, I had composed 31 different presets which would run for approximately 4.5 hours before starting again.



Screenshot of the Max/MSP interface for *Requiem for a 21st Century*

This elaborate process allowed me to use acoustically recorded and accurately pitched naghamāt within a generative system, creating a music that would be impossible for musicians to perform, because of the difficulty of accurately rendering these specific pitches as an ensemble. This was primarily due to the use of indeterminacy in which notes to use and when, leading to an unconventional polyphonic and heterophonic maqāmic soundscape. Furthermore, the acoustic sound and warm visual execution allowed for what is essentially a sample-based computer generated music, to be conveyed as an organic, embodied experience.

The installation in place at the Spirit Level Gallery, Royal Festival Hall, Southbank Centre, London (UK)

As a result of these concepts and processes, the *Requiem* presented manifold possibilities for an exploration of maqāmic practice through technology, in line with the musicological concepts outlined previously in Chapter 2. It was due to this specific sounding that my aural imaginary was able to start conceiving the other works included in this portfolio, in particular the development of Leimma and Apotome as will be discussed below.

The full credits and acknowledgements for *Requiem for the 21st Century* are included in the appendices.

2. Constellations I: Huzām

Text score: For concert harp or piano and tape loop.
ca. 12-20'

Commissioned by Deutschlandfunk Kultur in partnership with CTM Festival and SAVVY Contemporary, Berlin (DE).

NOTE REGARDING SUPPORTING ASSETS:

The score for this work is included in the supporting assets. The audio recording submitted is performed by Joseph Kai on Abdullah Chahine's "quarter-tone" piano at the Chahine music store, Hadath, Beirut, Lebanon 28 December 2018. Recorded by Julia Tieke and myself. Duration: 10'54"

Due to the previously discussed lack of consensus with regards to tuning in modern Arabic maqām practice, what is rarely given consideration in written theory or in orally-transmitted teaching, are the sonic qualities of the intervals and intervallic relationships as distinct entities in their own right.[70] More so, due to maqām theory being confined to two middle octaves (generally in the range of G3-G5), and to the limited sonic ranges of the instruments associated with these musics (oud, qanūn, nāy etc.), the

[70] Independent scholar Sami Abu-Shumays provides some insight (Abu Shumays, 2009) albeit within the realms of cognitive and linguistic studies more than in terms of composition.

exploration of these intervals in or across octaves that are lower or higher than the usual (G3-g5) is almost non-existent.[71]

During research for a previous composition, *Kawālīs* (not included in this portfolio), which was focused on interrogating the conventions of maqāmic practice with regards to the taqsīm and improvisation, questions emerged in a similar vein when considering composition: is it possible to render a maqām as a sonic state purely by relying on its intervallic relationships and without recourse to its sayr, conventional micro-melodic phrasing, or consistent re-affirmations of its istiqrār or degrees of melodic focus? And how would that be impacted if a range wider than the usual two middle octaves was used, i.e beyond considering intervals as 9ths or 12ths etc.?

Returning again to the concept of the maqāmāt as sonic states that can be inhabited, my interests led to a conceptual research based on the historical associations of the naghamāt and maqāmāt with the cosmological worldview well documented in various sources of Arabic and Islamic literature, such as the works of al-Kindī (9th c. CE), al-Fārābī and Ikhwān Al-Safā' (10th c. CE)[72] and the role of music in medieval Arabic and Islamic healthcare practices[73].

---

[71] The upright/double bass entered Egyptian music ensembles in the mid-20th century and has since become adopted across the Arab speaking regions, including its replacement by an electric bass guitar, but it has always been used as a backing instrument that help defined the rhythm and the tonal centres, and its range or register was never used as a compositional feature. The same is evident in more contemporary and experimental works such as Kamilya Jubran and Sarah Murcia's *Nhaoul* and *Habka*. On these landmark works, where the double bass played by Murcia is a central instrument alongside Jubran's oud and Murcia's accompanying arrangement for cello, viola and violin, the low register of the instruments, including the cello, are wonderfully balanced but rarely utilised as a compositional feature. See Murcia, S. (2013) and Jubran, Kamilya (2017) in discography.

[72] See Pacholczyk (1996)

[73] See Isgandarova (2015)

In combination with the recent developments in scholarship regarding the Babylonian cuneiform tablets on tuning and modal cycles (Mirelman and Krispijn, 2009, and Mirelman, 2010 and 2013) and the work of Ernest G. McClain regarding the links between numbers, melodic intervals, and the deities and cosmology of Babylonian culture (Macclain, 1984: 129-60 and 1994), I was able to formulate a chain of influences that equally informed a re-imagining of the philosophical and meditative nature of the Iraqi oud school.

With this in mind, I began developing sketches towards an indeterminate composition for a modern concert harp, not only as a reference to the ancient Babylonian harp, but also out of desire to work with a plucked string acoustic instrument that had a wide pitch range and a long decay time. I decided to utilise a text based score in order to avoid imposing specific melodic patterns or motifs, and instead to create my own convention based purely on the intervals of a chosen maqām. This was to highlight these naghamāt and the chain of cosmological, metaphysical, and practical knowledge they had inspired in Iraq throughout history. This connection to cosmology also prompted the idea of using a tape loop to 'capture' and then 'freeze' the musical process in time, allowing one to inhabit and contemplate it, before it ultimately fades away. But shortly after things took an unexpected turn.

In this same period, Jan Rohlf, co-founder and co-artistic director of CTM Festival, Berlin, reached out to me about a chance discussion he had with Marcus Gammel, head of the radio art department at German national

broadcaster Deutschlandfunk Kultur (DFK). One of Gammel's colleagues, Berlin based researcher and radio producer Julia Tieke, was undertaking preliminary research into a radio programme about the role of the piano in Arabic music. Having already heard demos of my experiments for *Kawālīs: Part II* (not included in this portfolio) which focused on a re-interrogation of the role of the piano in Arabic music, and my work in developing Comma, Rohlf suggested an opportunity for collaborative research towards a radio programme for DFK alongside a discursive presentation as part of CTM Festival's 2019 programme, during which I would also be invited to premier *Kawālīs: Part II* and write an article for the festival magazine.

Tieke and I had met briefly many years before in Cairo and she was already aware of my work in the region, but not my recent research. Her interest in the Arabic piano was recently ignited following her coming across the German translation of the French graphic novel *Piano Oriental* by Zeina Abirached (2016)[74], the granddaughter of the Lebanese entrepreneur, piano tuner and musician Abdallah Chahine whose story had not been documented in detail prior to that graphic novel's publication.

After an excited discussion with Tieke about the subject of tuning, the various Arabic pianos that were made in the early-mid 20th century and the events of the 1932 Cairo Congress of Arabic Music, it was agreed that we would work together to develop the concept. The parallels between my frustration with modern music making technologies that led to the development of Comma, and Chahine's desire for the same through his

[74] The graphic novel was originally published in French in 2015 by Casterman, followed by this German edition, but at the time of writing this dissertation it is still not available in Arabic or English.

piano over half a century prior, would be the heart of the radio programme. To complement this I was commissioned by DFK to compose two new works for Chahine's infamous piano, which we would record on site in Beirut on the piano itself, and my upcoming CTM premier of *Kawālīs: Part II* would also be recorded for inclusion in the broadcast.

During the 1932 Cairo Congress for Arabic music, which is discussed in more detail in the commentary to the composition *'32*, one of the main contestations revolved around the use of the piano, whose tuning of equal temperament was not considered suitable for rendering the complexity of the Arab maqām system. During the General Assembly a vote was held in favour of the piano and passed by a majority of one, providing the piano could reproduce "quarter tones" and that they would be tuned to pitches on which the Congress would agree (n.a., *kitāb* 1933: 396-397). In the end they were unable to agree on a tuning system and the issue of the piano has remained a source of conflict since.

In 1955, after 20 years of research and home-made prototyping, Chahine convinced the Viennese piano manufacturer Hoffman to create a professionally manufactured "Oriental Piano" prototype that allowed him to perform the Arabic maqāmāt. His design consisted of adding extra strings to each piano note on a single manual, which were tuned an equal tempered quarter-tone lower than their equal tempered counterparts, and introduced a new mechanical device which, by depressing a modified pedal on the piano, moved the hammers sideways allowing them to strike the additional strings. With this mechanism, Chahine was able to access the "quarter-

tones" of Arabic music, whilst maintaining the look of a normal piano i.e without needing to add extra keys or an extra manual.

Abdallah Chahine's 24 tone piano. Detail of mechanical device for moving hammers, Beirut (LB)

Unfortunately Chahine was unable to secure the required number of pre-orders for the instrument to be put into commercial manufacturing by Hoffman, but the prototype has been preserved by his family and is accessible at their musical instruments store in the Chiyah/Hadath neighbourhood of Beirut. Although Chahine's piano design was based on the contested 24-tone equal divisions of the octave tuning system as discussed previously, I was hopeful we would be able to tune it differently and experiment with some variations. Having already heard Chahine's *Oriental Bouquet* album (1965) and been struck by the fluid, albeit conventional, phrasing, I was curious what the mechanics of the piano would have to

offer, though I needed to see it in person to understand how it worked before composing anything.

Although a commendable idea, it turned out that Chahine's design for this piano was a little idiosyncratic. Due to the use of the pedal to shift the hammers and access the quarter-tone strings, it does not allow for the quarter-tones to be played at the same time as the equal temperament notes. The mechanics are also quite slow, impeding quick phrases or the use of subtle accidentals. This confirmed my suspicion that the performances documented on *Oriental Bouquet* (op. cit.) were achieved by tuning the piano and playing it normally, not with the pedal function that he had designed.

Despite these consequences, Chahine's mechanical solution opened up theoretical possibilities for intiqālāt and transpositions that are not easily accessible by other means, and these novel confines for how maqāmic melodies can be performed also encouraged an imagining of a different kind of Arabic maqāmic music. Sadly he did not work with any composers in his time to develop compositions specifically for this piano and many of these possibilities remained unchartered.

In this context I completed the work on *Constellations I: Huzām* following the conceptual intentions mentioned previously. Seeing as my initial ideas fitted the pacing and the confines of the mechanical instrument, I adjusted the instrumentation and some details so that it could suit either a harp or a piano, and returned to Chahine's piano with Tieke and Lebanese pianist Joseph Kai to record it. We were unfortunately not allowed to touch or change the tuning of the piano, so I had to concede my desire for

accurate intonation according to Al-Farabi's tuning system, or even the 24-EDO system Chahine had intended, and work with the piano in its present state of tuning. Another issue was the incessant sound of car horns and traffic from the main road just outside the music store, which was being captured by the microphones and the tape loop due to the piano's placement in the main showroom. Therefore we embraced the city's soundscape and a reference to such interference was added to the score.

Joseph Kai rehearsing and Julia Tieke recording in Beirut (LB), Dec 2018

To perform the piece, Joseph used some sticky page markers to mark each note he played, a simple solution that wouldn't vandalise the historic piano and added an additional texture to the recording. The tape loop was

created digitally using Ableton Live, allowing him to listen to it on headphones whilst recording.

Joseph Kai recording Constellations I: Huzam using sticky markers, Beirut (LB), Dec 2018

Following this detour and its final performance on Chahine's piano, not on a harp as intended, the compositional content of *Constellations I: Huzām*, remained faithful to its original intention of unconventionally exploring the intervallic relationships of a given maqām, whilst also taking inspiration from the aforementioned historical and cosmological associations. As our eyes take time to adjust to the night sky and see the individual stars that make up a given constellation amongst others, here, our ears are given time to piece together the melodic intervals that lead us

towards the composition's final form. Once this process is complete, a fragmented maqām is laid bare, frozen, creating an inhabitable sonic state from the arrhythmical melodic interactions within it, allowing us a moment of contemplation, mirroring the spiritual introversion of the taqsīm and even the metaphysical associations of the maqām system itself.

The resulting German language radio programme featuring all the performances and interviews was broadcast on DFK in April 2019 (see Eine Frage der Stimmung - Arabische Musik auf europäischen Instrumenten, 2019). In addition to the compositional results of this collaboration, the research conducted by Tieke and I led to many paths that would significantly impact and inspire the entirety of this research project, as would the collaboration with CTM festival, Berlin. The most relevant finding was Tieke's discovery of Mme Mady Humbert-Lavergne's comment about the Ondes Musicales, buried in the annals of the 1932 Cairo Congress of Arab Music documentation, the details of which are explored in detail through the project '32 further below.

3. Aṭadata

Notated score: Any multiple of three voices.
ca. 6’

NOTE REGARDING SUPPORTING ASSETS:

The score for this work is included in the Scores folder. The audio recording of this work is performed, recorded and mixed by myself, out of necessity due to Covid-19 regulations hampering opportunities to rehearse and record the composition with experienced voice artists. All three parts are recorded as multitrack takes with some sections rendered as loops due to my amateur vocal experience and lack of stamina in this type of performance practice.

I have long been interested in exploring the sonic qualities of the Arabic tongue outside the conventions of verbal language, much in the same way that the Ḥurūfīya artists often took the letter shapes out of their written context as discussed in Chapter 2.

In the systemisation of the letters of the Arabic language, one frequently comes across two sequences: either the traditional *abjadīya*, or the modern form which is based on the script and the shapes of the letters:

Abjadīya	أ ب ج د ه و ز ح ط ي ك ل م ن س ع ف ص ق ر ش ت ث خ ذ ض ظ غ
Modern	أ ب ت ث ج ح خ د ذ ر ز س ش ص ض ط ظ ع غ ف ق ك ل م ن ه و ي

During a research trip to Paris for the ’32 project (presented below), I visited the Institut du Monde Arabe and found a book titled *A course in the science of reciting the Qur'ān* (Surti 1988). Written in English with Arabic text

examples from the Qur'ān, and accompanied by 6 CDs of audio recordings, the book explains the 75 rules of prosody in Qur'anic recitation and begins with introductory chapters and exercises regarding the phonetic systemisation of the Arabic language.

Alphabets and their places of origin (Surti 1988: 52-55)

Al-Ḥurūf al-Hawa'īya The Arial letters	ا ـي ـو	ā ī ū
Al-Ḥurūf al-Shafawīya The Labial letters	ب م و ف	b m w f
Al-Ḥurūf al-Ḥalqīya The Guttural letters	ه ح خ ء ع غ	h ḥ kh ʻ ʻ gh
Al-Harafān al-Lahawīyān The Uvular letters	ق ك	q k
Al-Ḥurūf al-Shajarīya The Orificial letters	ي ش ج	y sh j
Al-Ḥurūf al-Dhaulaqīya The Liquids	ر ن ل	r n l
Al-Ḥurūf al-Niṭ'īya The Dental letters	ط د ت	ṭ d t
Al-Ḥurūf al-Lithawīya The Gingeal letters	ظ ذ ث	ẓ dh th
Al-Ḥurūf al-Asalīya The Apical letters	ص ز س	ṣ z s
Al-Ḥarf Ḍād	ض	ḍ

Inspired by the exercises in the book and the systemisation of the Arabic letters according to their phonetic qualities, I took a few private classes with german voice artist Ute Wasserman[75], so as to explore these sounds from a performer's perspective. The resulting composition was developed following those classes, encapsulating some of the conceptual

[75] https://utewassermann.com. Wassermann's artistry and experience in exploring the voice has been of great inspiration to me since I first heard her in Berlin many years ago. Like myself, she also has a longstanding professional and personal relationship with the improvised music scene in Beirut through the Lebanese capital's Irtijal Festival and its founders Sharif Sehnaoui, Raed Yassine and Mazen Kerbaj who are all established musicians and artists in their own right.

elements regarding repetition and dissolution from the Arabic and Islamic arts referenced in Chapter 2.

Aṭadata is composed for three voices or any multiple of that number. Based on the exploration of Arabic letters according to their phonetic, and therefore sonic characteristics, the composition moves in an energetic tempo through groups of interlocking phonemes whilst exploring exhale and inhale pronunciations. These allow for incessant repetition without the need for breaks to breathe-in, echoing Isma'īl Al-Farūqi's previously cited notion that "the death-blow to naturalism is repetition" (1973: 100). By using the voice placement of certain phonemes, their varying yet subtle sonic qualities are brought to light, such as in the repetition of the compound letters إع (i') starting from rehearsal mark G.

The composition is presented in a modified staff notation that follows engraving standards, and includes both Arabic and transliterated Arabic letters as 'lyrics', as a practical means to communicate it.[76] Unlike all the other compositions in this portfolio, pitch is not dealt with as a precise musical element. Instead, there is a focus on heightened speech and the vocalists are instructed to use either head, throat/mouth or chest placement, represented by a three line stave marked as high, middle, low. The same three line stave is also used to represent clearly-voiced though

[76] I would like to highlight a self-critical note in that my original intention was to produce a written score according to Arabic language logics, entirely in Arabic and reading from right to left. Its purpose would have served an exploration through and against the concepts of staff notation, much like what has been explored by experimental Anglo-European artists throughout the 20th century (see Sauer, 2009)

arbitrarily-pitched descending or ascending pitch movement, such as in the phrase at rehearsal mark H.

The principle theme focuses on a timbral exploration of the Dental letters that give the composition its title, each starting in combination with the Arial letter أ *alif*, inspired by the exercises provided in Surti (1988: 57-61). The trajectory then shifts its focus onto the Guttural letters and the Liquids, followed by the Apical, the Gingieal and the letter Ḍād, before cycling back to a recapitulation of the Dental.

The composition ends with variations on the relative pronouns مـــاذا (*māthā*, what) and لمـــاذا (*limāthā*, why), creating a moment of hovering stillness. This surprise introduction of meaning concludes the composition through a repetitive insistence on the root verb حَ صَ لَ (*ḥaṣala*, to happen or to occur), preceded by a series of relative pronouns and adverbs in 5/8 and 6/8 groupings, written without question marks or indications to their relative linguistic intonation. Consequently this highlights the rhythmic impact of the *qamarīya* letters that only occur in verbal pronunciation, as in lines 3 and 4, and how a change of one vowel can change the tense whilst also subtly affecting the rhythmic groove.

1	2+3	ماذا حَصَلَ	*māthā ḥaṣala* (what happened) *present*
2	3+3	لماذا حَصَلَ	*limāthā ḥaṣala* (why did it happen) *present*
3	2+3	متى حَصَلَ	*matā ḥaṣala* (when did it happen) *present*
4	2+3	الذي حَصَلَ	*‘l-lathī ḥaṣala* (that which happened) *present*

5	2+3	كيفَ حَصَلَ	*kayfa ḥaṣala* (how did it happen) *present*
6	2+3	أينَ حَصَلَ	*ayna ḥaṣala* (where did it happen) *present*
7	2+3	الذي حُصِلَ	*‘l-lathī ḥuṣila* (that which happened) *present*
8	2+3	ماذا حُصِلَ	*māthā ḥuṣila* (what happened) *past*
9	3+3	لماذا حُصِلَ	*limātha ḥuṣila* (why did it happen) *past*
10	2+3	متى حُصِلَ	*matā ḥuṣila* (when did it happen) *past*
11	2+3	الذي حُصِلَ	*‘l-lathī ḥuṣila* (that which happened) *past*
12	2+3	كيفَ حُصِلَ	*kayfa ḥuṣila* (how did it happen) *past*
13	2+3	أينَ حُصِلَ	*ayna ḥuṣila* (where did it happen) *past*
14	2+(7)+2	لِمَن ..... حَصَلْ	*liman..... ḥaṣal* (to who..... did it happen) *present*

Aṭadata represents a sonification, or a sounding, of the principles of abstraction within Islamic Art and particularly the Ḥurūfīya art movement discussed in Chapter 2. Through a brisk tempo, it explores the phonetic relationships of the ḥurūf and specific words with a sense of energy and humour. Its final lines, all delivered in a single breath, hint at a state of delirium in the work’s restrained climax, a dark-humoured reflection on the seemingly never-ending onslaught of socio-political crisis requiring our attention.

4. Leimma & Apotome

Collaboration with Counterpoint Studio

Transcultural browser-based music applications and live performance.

ca. 30'

Supported by an M4C SDF grant and CTM Festival 2021, Berlin (DE) with additional support from DAAD, Berlin (DE). Awarded the inaugural Isao Tomita Special Prize at Art Electronica 2021, Linz (AT).

NOTE REGARDING SUPPORTING ASSETS:

The main submission to support this project are the tools themselves (via their URLs noted below) and a video extract from the premier live performance featuring myself with Enyang Ha, Nene H, Tot Onyx and Tyler Friedman on synthesisers, and Lucy Railton on Cello.

In the appendices, I have also included a capture of the autonomous Apotome audio-visual stream of a generative session I created, and a video demonstrating Apotome's use within a music-making work flow with Ableton Live.

Both Leimma and Apotome are accessible from the primary URL: https://isartum.net or via direct links: Leimma and Apotome.

In considering the problems of tuning and technology discussed in Chapter 3 and the limitations I felt on my own work and imaginary, I was compelled to find a solution that would support and inspire the exploration of the maqāmic concepts behind this research project.

Seeing that the ancient Babylonians could explore complex notions and associations of tuning with a nine-stringed harp and explain them on a small clay tablet in Cuneiform (Mirelman, 2013), or that the ancient Chinese could explore such ideas with the simple method of adding and removing thirds from bamboo pipes (Nakaseko, 1957), or that the Greeks could do the same with a monochord (Barker, 1989: 190) and Arab theorists with the oud (Forster, 2010: 610), it baffled me that such simple pragmatic tools were not available using modern 21st century technologies.

I was excited by the potential of browser-based platforms, particularly after having seen Tero Praviainen's presentation *How Generative Music Works* (2017), explored Sevish's Scale Workshop (Sevish, n.d.)[77], and read about the developments in creating browser-based music technologies through Google's open source research project Magenta[78].

In the spirit of Glissantian giving-on-and-with, I did not want to centre, or only cater for, the maqām tradition that my work revolves around. Instead I was interested in the challenge of creating transcultural tools that would address musical cultures equally, and provide intuitive access to tuning exploration for musicians, composers, researchers and educators.

I reached out to Parviainen and Diggins from Counterpoint Studio[79] and after an initial in-person meeting in London, they agreed excitedly to embark on such a project together. I was successful in obtaining an M4C

[77] Although Scale Workshop is a very powerful tool, I was dissatisfied with its interface and its lack of a culturally inclusive workflow.

[78] https://magenta.tensorflow.org/demos/web/ (Accessed: 6 April 2022)

[79] https://ctpt.co/ (Accessed: 6 April 2022)

SDF grant through my doctoral research program, and work on the project began in late 2019. The principle aims were to create platform-independent, non-commercial, accessible tools that would not only function as a means to an end, as was the case with my previous project Comma, but also allow for learning and an experimentalism that could invigorate imaginaries and inspire possibilities.

As mentioned in Chapter 3, the interface and design of such tools would also need detailed consideration in order to achieve the aims of approachability, accessibility and intuitive interaction. The full details of the capabilities and functionalities of both Leimma and Apotome are presented in detail in their extensive published user guide, which is also included in the appendices.[80] Therefore I will only briefly present their main design principles and features here.

Leimma is a tool that allows for the creation and exploration of octave-repeating cyclical tuning systems.[81] Its design is based on sequential stages to inspire agency in the user with 'choice' being the default proposition, as opposed to presenting a flat default state that the user would then customise. I had the idea of presenting the tunings and subsets as a wheel as the final stage, but to achieve a narrative flow and the aforementioned

[80] Available at: https://docs.google.com/document/d/1vxLZaL8jeXQcj3m7q6qF42ZWAaG-2HlRkQZiGacRUXI/ (Accessed: 6 April 2022)

[81] The decision to limit the initial version only to such tuning systems was pragmatic. The majority of musical cultures around the world use octave repeating cyclic tuning system, though of course there are exceptions such as non-octave repeating cyclical systems in Indonesian Gamelan and non cyclical systems such as those in many cultures on the African continent. Seeing how complex the concepts of tuning are, and how inaccessible and veiled the subject's presentation is in modern literature, I decided on the octave repeating cyclical formation to keep things simpler in the first instance. There are plans to further develop Leimma and include non-cyclical and non-octave repeating tuning in the future.

agency, Diggins suggested following the simple design principle of dimensionality by going from zero dimensions, a point, to one, a line, to two, a circle. This is explored on three separate pages, and the metaphor is reinforced by morphing animations between them.

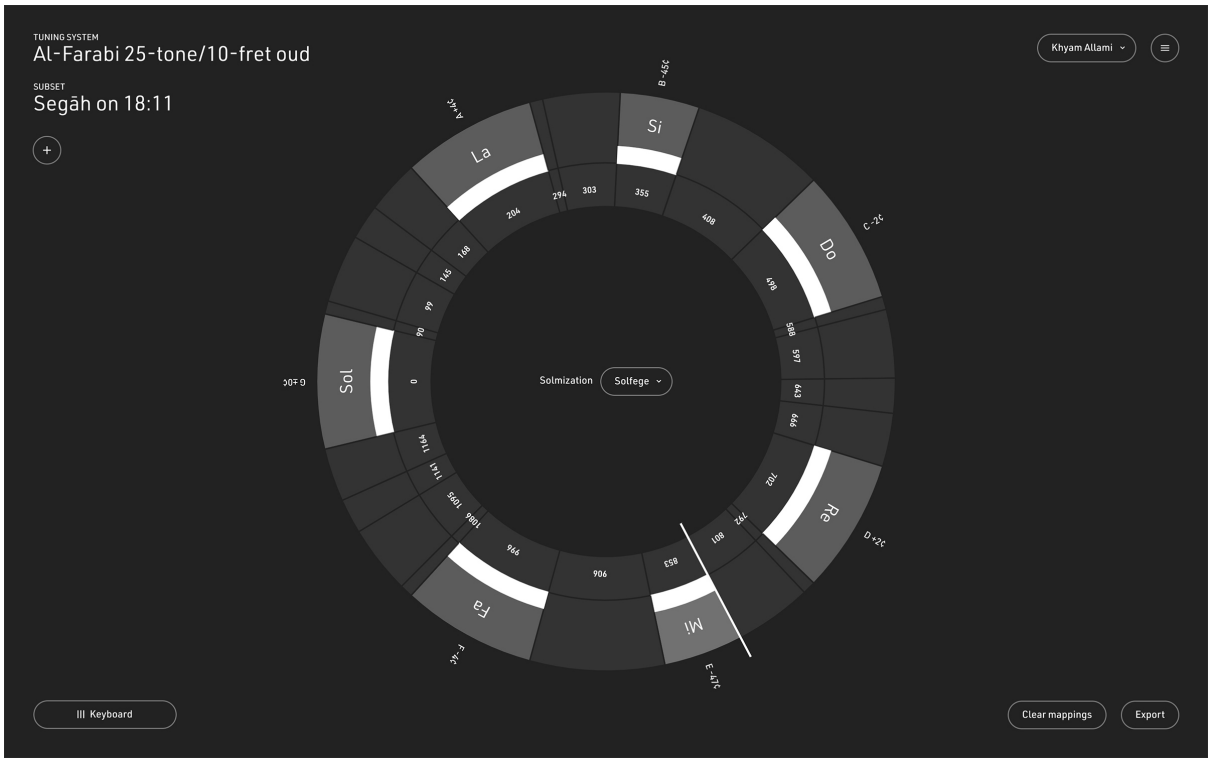
The first page (point) allows the user to decide their reference pitch by choosing any MIDI note and assigning it any Hz value. This is inspired by maqāmic ensemble practice wherein a singer would decide which maqām is to be performed and on which istiqrār (grounding pitch), and would then decide what that pitch should be in order for the remaining instruments to tune to it as a reference.

The second page (line) presents the user with a ruler, the length of which represents an octave. Divisions of the octave can be inputted in ratios, cents or experimentally by clicking with a mouse, and each division can then be adjusted by dragging to enable working by ear. These divisions represent the tuning system as a set.

The third and last page (circle), presents the tuning system as a wheel with segments visually representing the distance between each division relatively. Each segment can then be mapped to one of the twelve chromatic MIDI notes by using only a computer keyboard or connecting a MIDI keyboard controller[82]. This mapping represents the subset, where the root or tonic is highlighted by a clear line division, and each mapped degree can be defined as Primary or Secondary, for added visual distinction. This

[82] Currently Web MIDI only works with Chrome and Firefox browsers.

delineation in Leimma is only visual, but it has practical usage in Apotome as will be discussed below.



Leimma user interface: Page 3/Wheel view

The same page also allows for visualising this information using various solmization systems from different cultures (North and South Indian Sargam, Javanese: Ji Ro Lu Pat Ma Nem Pi, Solfege etc.). With this intuitive and practical workflow, a tuning system can be created, mapped and become playable within much less than one minute. Once this is done, it is possible to play it polyphonically using the internal triangle wave synth or by outputting the tuning data to any MIDI software or hardware using either monophonic or polyphonic pitch bend, or the more desirable Midi Polyphonic Expression (MPE). MPE allows for each midi note to have its

own midi channel and avoids the artefacts often incurred with sending single or multiple monophonic pitch bend messages.[83]

Another creative option is the ability to explore modal transposition by clicking and dragging the wheel. This maintains the same mapping distances between interval relationships, but starts the subset and its mapping on a different degree. When used with non-equal divisions of the octave, this can produce interesting experimental results.

All of the above can be done without having to sign up or login to Leimma, reducing the amount of steps between a musical idea and its realisation. The tunings and mappings can be saved simply by bookmarking the human readable URL, and shared with others in the same way. Tunings in Scala file format can be imported and exported to allow their use in other tools, though with the caveat of no mapping as mentioned in Chapter 3. What is not possible without a personal account is creating a list of favourite subsets, an important feature that allows the user to jump between different tunings and subsets with one click. An account also allows a user to save their own tunings and subsets for use in Apotome as is explained below.

Aside from this ability to create tuning systems and subsets, Leimma also provides a database of tunings that I personally researched and inputted. These are currently limited due to time and resources, but they will be continuously updated. Their sources and some contextual

[83] Due to sending MIDI notes being possible only on a per channel bases, each pitch bend message affects all notes played. This means you can only have one pitch bend message at a time, which affects currently triggered, i.e. held or sustaining, notes relative to 12-EDO. As solution is to send pitch bend messages in a. Round robin method across multiple MIDI channels, but this is only possible with polyphonic synthesisers and is dependent on the number of “voices” or MIDI channels the device can work with. MPE avoids this by using the round robin method natively.

information are also included, allowing users to continue their exploration in more depth. There are of course key features still missing, particularly the ability to change the tuning division by ear in the wheel view/whilst playing the mapped subsets, and a flexibility feature that will allow for subtle pitch modulations of the tuning whilst it's being played. These and many others are noted and will hopefully be undertaken soon.

Apotome, on the other hand is a generative music-making environment that is fundamentally based on the tunings and subsets in the Leimma database, or those that a user creates and saves to their personal account. The reason behind choosing to create a generative environment, as opposed to a sequencer, was to provide a means for making music outside of cultural conventions and personal melodic preferences. It is a tool to inspire experimental ideas and stimulate the imaginary, as much as it is a standalone creative platform.

It is designed based on a familiar track and modules layout, whereby each track represents a melodic "voice". In a similar fashion to Leimma, choice is the default philosophy and nothing will work without the user choosing which tuning system and subset they want to work in. Each track features a fixed set of modules with probabilistic parameters that are adjusted using sliders or buttons.

Multiple tracks can be created and used individually, or specific modules can be controlled from the main 'track one', allowing for changes across tracks with one click. It is possible to adjust which degrees of a subset are used, either by manipulating their individual sliders, or by using the

sliders marked root, primary, secondary or none, following the delineation defined in Leimma. One principle feature is “force polyphony”. When activated on multiple tracks, none of them will trigger the same note in the same octave at the same time, allowing for unconventional polyphonic explorations.

Apotome interface

The settings created on all tracks can then be saved into a ‘session’ as individual ‘snapshots’. These snapshots allow for creating generative works with evolving compositional forms that can be triggered manually, or set to change automatically following a specified or a randomly selected length of time or bars/measures. When these sessions utilise only the internal sounds, they can be saved and submitted into a pool of ‘community sessions’ that anyone can access and play with. As with Leimma, each track

can output MIDI via pitch bend or MPE[84], but it can also be used in a standalone mode with the built in Web Audio Modules[85] synthesisers, including web versions of the famed Oberheim OBX and the Yamaha DX7.

As with Leimma, there are still features that need refining and possibilities that need to be added, particularly with regards to Apotome's rhythmic rigidity and lack of groove, plus more options for logics of melodic generation and control during live performance. These will hopefully be undertaken soon.

For the launch of the project under the catch all title 'Apotome' at CTM Festival, Berlin, in January 2021, its multi-dimensional aspects were presented in myriad forms. This was prompted specifically by the restrictions of the Covid-19 pandemic and a desire to make the most of the opportunities considering the browser-based nature of the tools and the online edition of the festival.

To introduce the project, I created a 30 minute video presentation titled "Repressed Possibilities - An Introduction to Apotome"[86] highlighting the problematics that the project responds to, alongside two separate tutorial videos for Leimma[87] and Apotome[88].

Throughout the festival, Apotome autonomously generated audio-visual material based on compositions by myself and those submitted by

[84] A video demonstrating Apotome in use with Ableton Live is available in the appendices.

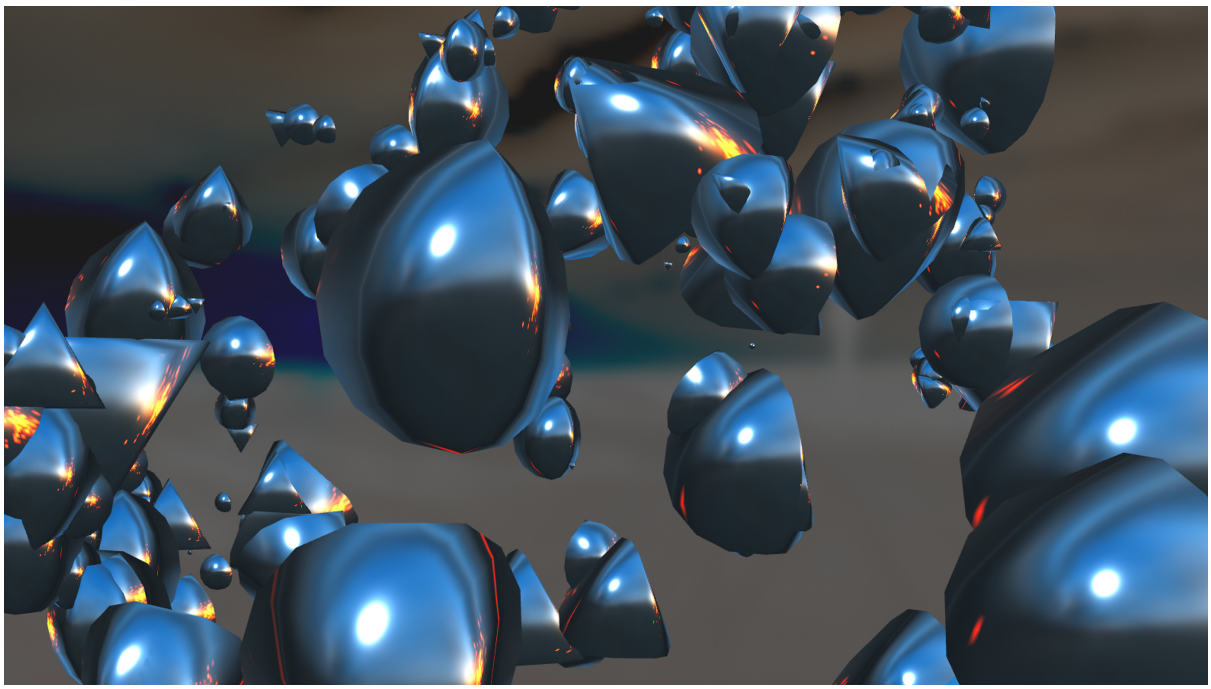
[85] https://www.webaudiomodules.org/ (Accessed: 6 April 2022)

[86] [86] Available at: https://www.youtube.com/watch?v=GzcWzblOiSs (Accessed: 6 April 2022)

[87] Available at: https://vimeo.com/503475532 (Accessed: 6 April 2022)

[88] Available at: https://vimeo.com/503451447 (Accessed: 6 April 2022)

users worldwide to the ‘community sessions’ pool mentioned above, through a dedicated website. During this time, anyone, worldwide, was also able to sign up for a predetermined time slot and have the chance to “perform” Apotome by manipulating its parameters, whilst the result was broadcasted live via both CTM’s virtual festival environment Cyberia and the afore mentioned website.[89]



Still from Apotome’s autonomous audio-visual stream at CTM Festival 2021

Artist takeovers by Deena Abdelwahed[90], Slikback[91] and Wahono[92] were streamed as part of the CTM 2021 programme featuring new works created and performed using Apotome from their home studios in Toulouse, Kampala, and Jakarta respectively.

[89] An example of this audio-visual stream featuring a generative work programmed by myself is available in the submitted materials.

[90] Available at: https://www.youtube.com/watch?v=PHHDprf2q2o (Accessed: 9 April 2022)

[91] Available at: https://www.youtube.com/watch?v=vy966kFAQmE (Accessed: 9 April 2022)

[92] Available at: https://youtu.be/1cWBLs7qZDo (Accessed: 9 April 2022)

Just before the live streamed performances, we held an online panel discussion via Zoom titled “Dismantling Western Bias in Music Software and Music Education” with myself, Tero Parviainen, Matana Roberts and Deena Abdelwahed, moderated by Dahlia Borsch from Berlin’s DAAD.[93]

Apotome Live at CTM Festival 2021 featuring (L-R): Nene H, Tot Onyx, Enyang Ha, Khyam Allami, Tyler Friedman and Lucy Railton

Live-streamed performances of Apotome also took place during the festival, featuring Enyang Ha, Nene H, Tot Onyx and Tyler Friedman on synthesisers, and Lucy Railton on acoustic cello. This quintet of musicians controlled the sonic rendering of Apotome's generative MIDI output and reacted to it, whilst the generative composition was crafted in real time by

[93] Available at: https://youtu.be/lwvVj2mPY0Q (Accessed: 6 April 2022)

myself on-site in Berlin[94], and Faten Kanaan connecting remotely from her home studio in New York city[95].

This was technically easy to achieve by Kanaan preparing her work on Apotome in advance, and then me granting her remote access to my laptop so she could control Apotome in real-time, and hear the results through a live audio-visual stream sent via Zoom. Elements of my composition were also prepared in advance, built around a series of intiqālāt between various maqāmāt and developed with the musicians on site. During the performance I improvised with the musicians changing parameters and conducting according to the pre-defined structure we had agreed upon.

In conclusion, it is difficult to understate the importance of both tools to my creative practice and to the compositional works submitted in this portfolio. Leimma is now a tool I use every day, whether for academic research, artistic exploration, or teaching and workshops. As will be seen below, every composition submitted that was created after this launch has relied on Leimma extensively.

After many months of preparations, the project was a great success. The energy in the chatrooms during the streaming of the artist takeovers was humbling, not to mention the thought-provoking discussions that the premise of the project raised. The extensive impact of the project as a whole is briefly recapped in the Impact section towards the end of this portfolio.

---

[94] Available at: https://www.youtube.com/watch?v=Zn8XHijHUm8 (Accessed: 6 April 2022)

[95] Available at: https://www.youtube.com/watch?v=HLBKKs_iwB0 (Accessed: 6 April 2022)

Unfortunately I am unable to provide any statistics on the usage or access of Leimma or Apotome because Counterpoint and I decided early on not to collect any data other than what was necessary for functionality. This was part of a respectful privacy policy outlined in the user guide, which is included in the appendices. Full credits and acknowledgments for the project can also be found in the user guide.

5. Naghamīya I: Istiftāḥ Al-Rāst

Fixed Media: Electronics.
5’23”

Commissioned by and for the inaugural Listening Biennale 2021, Berlin (DE).

NOTE REGARDING SUPPORTING ASSETS:

The beginning of this audio recording includes very low sub-bass frequencies and not silence. Ideally please listen via studio monitors or speakers in order to experience the harmonic interactions inherent to the composition. If this is not possible, please use high quality headphones.

In following the lines of imaginary possibilities opened through Leimma, Apotome and my ongoing research, I began to consider the use of the harmonic series in synthesis. I started by imagining a hypothetical continuum where one could plot the ways in which the harmonic series is used or relied upon, with additive and subtractive synthesis on one end, and FM, Wavetable and Vector synthesis inhabiting the other. By staring at the proverbial hole in the middle, a simple thought came to mind: what would a synthesiser that didn’t use the harmonic series sound like?

In the Anglo-European tuning and compositional framework now known as Just or Rational Intonation, there is a distinct focus on the harmonic series as the arbiter of the physical and psycho-acoustical properties of sound (Sabat and Nicholson, 2018), and therefore allowing for

a somehow objective musical practice based purely on the physics of sound, as articulated here by American composer James Tenney:

> "I think our ears interpret intervals of any kind as though they were the nearest simple interval in this kind of harmonic series relationship. That is, we even hear intervals that are out of tune as more or less distorted versions of simple intervals. By simple, I should say also "natural", as they occur in the harmonic series. By the way, if we have any part of nature that we can pick to use in our music, that's it. Everything else is culture, style and psychology. The harmonic series is physics." (2018: 17)

In contrast, I am interested in tuning more as an arbiter of cultural and personal identity, and as a means for philosophical and metaphysical considerations[96], not only because of its scientific properties.

Thinking back to the concept of a maqām as a sonic state, I began to imagine one that would be synthesised, based on the resonances and interdependent relationships of a self-referential series of partials stemming out from the naghamāt of a given maqām, not only from the fundamental harmonic of a naghma and its natural series of partials as per the harmonic series. An imaginary equally inspired by the abstract ḥurūfīya movement, ancient Babylonian cosmologies and Sci-Fi.

[96] As represented in the works of a multitude of historical Arab writers and the works of Kayser (1970) and McClain (1984 and 1994)

To put it in more poetic and Glissantian terms, by positing a futurism-inspired notion that the maqāmāt (and consequently all tunings and subsets) are part of a Relational pluriverse (*total-monde*), how can we experience their individual universes (*écho-monde*)? Just as science-fiction imagines universes where certain laws of physics, such as gravity, linear time, etc. do not exist, how can we imagine such unbounded universes sonically?

Without adequate skill in audio programming environments such as Max/MSP or Supercollider etc. I turned to Leimma, Comma, and Ableton Live to explore creating a *Rast Series*, i.e. a series of unnatural harmonics based on the subset of maqām rāst, starting from the 4:3 interval of Al-Farabi's oud tuning: 4:3, 3:2, 18:11, 16:9, 2:1 (1:1), 18:8 (9:8), 54:22 (27:22). To do this, I recorded over 30 different sine waves of these fundamental ratios/naghamāt of maqām rāst but mapped across consecutive octaves in a manner similar to how the harmonic series spreads out the primes and the powers of each partial.

Once this mapping was done and the sine waves recorded, I added a subtly modulating sine wave LFO to the gain of each audio file, and rendered this slightly modulating additive and curious synthesis as a sound file. I then loaded this recording into a sampler device in order to play it with a MIDI controller keyboard. Initially, I tried to play this with the sampler at its default 12-EDO setting, bad idea. I then used Leimma as a bridge to allow for playing the sample using the rāst subset that had birthed it, and the result was fascinating.

Across the 5’ 23” of this work, a series of ascending thirds[97] in maqām rāst play through this prototype of custom synthesis, where the ratios of the maqām itself are used to create a self-referential series of sine wave partials spiralling outwards into the higher octaves. In this imagined *istiftāḥ* (opening) of maqām rāst’s sonic universe, its pantheon of ratios is represented both by its fundamental pitch classes and their partials, interweaving and folding in on each other in an archetypal manner of hermaphrodite deific procreation (McClain, 1984: 19-32).

In hindsight, I see this electronic creation as an aural invigoration unlocked by Leimma and Apotome's functions as Relational tools of inspiration, rather than only filiative tools of execution. This is not to say I couldn’t have imagined this idea without them, but rather that they had a significant role to play in providing agency and allowing space for that imaginary, alongside its realisation.

[97] Literally the sequence of a naghma followed by the third naghma above it, limited to the subset of the tuning and the primary naghamāt of the maqām.

6. ’32

Collaboration with Julie Normal and Julia Tieke

Composed-improvisations: Ondes martenot, acoustic and electro-acoustic oud, virtual ondes martenot, custom ondes martenot style CV controller with analogue synthesisers
c. 67’

Supported by MusickFonds, Berlin (DE).

NOTE REGARDING SUPPORTING ASSETS:

The audio files submitted are only Part 1 and Part 4 of the project for the sake of overall length of submission. Part 2 and Part 3 are included in the appendices. These recordings were mixed by Tyler Friedman.

”توجد الآن آلة موسيقية اخترعت حديثا [في فرنسا]، وهذه الآلة تستطيع أن تؤدي جميع الأنغام والألحان العربية وتسمى ”الموجات الموسيقية“ (Les ondes musicales) وإني أوجه النظر إلى استعمال هدة الآلة في الموسيقى العربية الآن.“

“A musical instrument which can play all Arab melodies was recently invented in France. It is known as “The Musical Waves” (Les ondes musicales) and I take the opportunity now to recommend the use of this instrument in Arabic music.”[98]

- Mady Humbert-Lavergne (n.a., *Kitāb,* 1933: 431)[99]

[98] My translation as the congress documentation is only available in Arabic and French. The original French: “On vient d’inventer récemment en France un instrument de musique qui peut exprimer tous les airs et mélodies arabes et qui est connu sous le nom d’”Ondes musicales” je profite maintenant de l’occasion pour préconiser l’usage de cet instrument dans la musique arabe.”

[99] Comment made during plenary session for the Commission of Musical Instruments, Congress of Arab Music, Cairo, 02 April 1932.

For almost 90 years, these four simple lines have lain dormant within almost 800 pages of documentation from the First International Congress of Arab Music, which took place in Cairo in 1932.[100] This simple, pragmatic and truly avant-garde suggestion for the time, came immediately after heated and intense discussions between the European and Arab delegates on the possibilities for the development of Arabic music through the introduction of "Western" instruments.[101]

The congress and its reverberations have been well documented elsewhere[102] but I provide a brief overview for contextualisation. Under the patronage of King Fu'ad I and implementation by the Egyptian Ministry of Education, this congress was mandated to develop binding guidelines for tuning, instruments and curricula for music education. Its ambitious, and nationalistic, agenda was to distinguish *al-mūsīqā al-ʿarabiyya,* Arabic music, from what was up until then referred to as *al-mūsīqā al-sharqiyya,* "Eastern" or "Oriental" music.

About half of the congress delegates were from Egypt, about twenty from Europe, mostly France and Germany, four from the Maghreb, one each from what is today Lebanon and Syria, and two from Turkey. German musicologist Curt Sachs headed the commission of musical instruments and had traveled to Egypt with several colleagues from the "Berlin School of

---

[100] A large part of this research was conducted in collaboration with researcher and radio producer Julia Tieke for a second radio programme commissioned by Deutschlandfunk Kultur. See Mawjāt Martenot - Arabische Klänge und frühe elektronische Musik, (2020).

[101] As can be read in the documentation (n.a., *Kitāb* 1933: 431)

[102] See the official documentation in Arabic (n.a., *Kitāb,*1934) and French (n.a., *Recuiles*, 1934) also Saḥḥāb (1997), Katz et al. (2015), Maalouf (2011), Marcus (1989) and Racy (1993).

Comparative Musicology" who were also participating: Ernst Moritz von Hornbostel, Robert Lachmann and Johannes Wolf, and with them came Paul Hindemith. Other leading European composers at the congress were Béla Bartók and Alois Hába. Rauf Yekta Bey (Turkey) and Wadia Sabra (Lebanon) were also among the more than 60 congress members. Only two female delegates were present, the French Mady Humbert-Lavergne and her colleague Jeanne Herscher-Clément, both from the Phonetic Institute of the Sorbonne in Paris.

The Congress of Arab Music lasted for three weeks and included seven working groups alongside numerous concerts, performances and recording sessions. The central lines of conflict during congress ran between the Berlin school centred around Curt Sachs, and the Egyptian modernisers centred around el-Hefni, with whom the musicologist and historian Henry George Farmer aligned himself. These conflicts were most prominent in the 'Commission for Musical Instruments', which was charged with determining what instruments could be used in Arabic music, and the 'Commission for the Musical Scale, its Establishment and its Notation'. As previously mentioned, the intonation of Arabic music and the maqāmāt varies from region to region, therefore one main premise of the congress was that if Arabic music was to be notated uniformly, it needed to be fixed or standardised, and only with such a standardisation could maqāmic intervals be played on musical instruments such as the piano.

During the 1920s and early 1930s, various attempts were made to build pianos that could render the maqāmāt. Some of these prototypes were

brought to Cairo in 1932[103] and experimented with at the congress, though none of them were agreed upon during the work of the Musical Instruments Commission, leading the Commission to state the following in its General Report:

> "It is indisputable that musical instruments are nothing but a tool for expressing the style of composition. Therefore it is the offspring of that style as long as it remains and will change with its change and will perish when it dies out. This means that the introduction of Western instruments to Arab instruments is only justified by a change in [compositional] style. The development of a new style of composition thus requires new instruments to perform such composition, and it is this opinion, supported by five thousand years of music history, is what led the Western members of the committee, and a group of its Eastern members, to oppose the introduction of most European musical instruments, whose melodies were distinguished by a special colour and a special character, to avoid distorting the beauty of Arabic music." (n.a , *Kitāb* 1933: 393)[104]

---

[103] The Library of the Cairo Opera House features a quarter tone grand piano developed by Czech composer Alois Hába with the piano maker August Förster. The Musical Instrument Museum in the Cairo Institute of Arabic Music features a quarter tone piano made by Schmitt.

[104] My translation. Original Arabic:
"ومما لا جدال فيه أن الآلات لم تكن إلا أداة التعبير عن مناحي أسلوب التلحين أو التأليف. فهي إذاً وليدة ذلك الأسلوب السمه مادام باقياً وتتغير بتغيره وتفنى بنفاته. وذلك معناه أن إدخال الآلات الغربية على الآلات العربية لا يسوغه إلا تغيير في نوع الأسلوب. فوضع طراز جديد من التأليف يتطلب أداة جديدة يتأدى بها ذلك التأليف، وحذا الرأي الدى يؤيده التاريخ الموسيقى منذ خمسة آلاف عام هو ما حداً بالغربيين من أعضاء اللجنة وطائفة من أعضائها الشرقيين إلى المعارضة في إدخال معظم الآلات الموسيقية الأوروبية، التي امتازت الحانها بلون خاص وطباع خاص، تفاديا من تشويه ما في الموسيقى العربية من جمال."

During the heated plenary session that followed, the judge and later director of the Cairo Music Institute, Muḥammad Fatḥī remarked irately in his opening statement that "you should not judge our music with your ears, or your emotions and feelings in it. Rather, you should judge it with our ears, and our feelings, because every nation has its own sentiments and feelings"(n.a. 1933: 429).[105] The result of these discussions and their subsequent deferral was previously mentioned in *Constellations I: Huzām*.

Mady Humbert-Lavergne's proposal for the use of the Ondes Musicales, made shortly after Fatḥī's speech on the same day, drew no documented reaction in the congress report nor anywhere else. We can strongly presume this was because she was one of the only two women present, but possibly also because no one had any idea what she was talking about and in the midst of all the tension, did not want to know either. Regardless, it was patently a suggestion ahead of its time, not because it proposed an alternative to the piano, but precisely because it proposed a newly created technology for musical practice—an electric instrument—that would allow the music its cultural opacity.

In a short article for *La revue musicale* published in May 1932 immediately after the congress, Humbert-Lavergne says:

> "Far from wanting to limit the sound material of oriental orchestras to ancient instruments, we were keen to point out that modern instruments whose unrestricted sounds can be

[105] My translation. The original Arabic:
"يجب الا تحكموا على موسيقانا بآذانكم، أو تحكموا فيها عواطفكم وشعوركم، بل الواجب أن تحكموا عليها بآذاننا نحن، وأن تكون فيها شعورنا فأن لكل أمة مشاعرها وإحساساتها الخاصة بها"

> enriched with harmonics at will, such as the ondes musicales Martenot and even the musical saw, could be used perfectly well without interfering in any way with the Arab modal subtleties." (Humbert-Lavergne, 1932: 384)[106]

The ondes musicales, today known as the ondes martenot, was a pioneering instrument invented by the French Maurice Martenot in 1928. As one of the earliest electronic instruments, patented the same year as the Theremin, it has maintained the interest of musicians and composers for almost a century, not only for the expressive sound of its vacuum tube oscillators and its unique touch-sensitive glass "touche d'expression", but also for its equally unique and innovative use of the "ribbon", a ring originally attached to a ribbon that controls an electric potentiometer allowing for a continuous glissando from its lowest frequency to its highest.

Although today associated with both its original ribbon and piano style keyboard, early models of the ondes martenot used only the ribbon, while later models used a painted piano keyboard merely as a visual guide for intonation.[107] It is for this reason that Humbert-Lavergne recommended its use. The ribbon allowed for precise intonation that was not limited to 12EDO or any other tonality system. Although Martenot did add a "guide" under

---

[106] My translation. The original French: "Loin de vouloir limiter le matériel sonore des orchestres orientaux aux instruments anciens, nous avons tenu à indiquer que des instruments modernes dont les sons libres peuvent à volonté se charger d'harmoniques comme les ondes musicales Martenot et même la scie musicale, pouvaient parfaitement être utilisés sans gêner en rien les subtilités modales arabes."

[107] One of these early ondes is publicly displayed at the Musée de la musique, Philharmonie de Paris, France as shown in the photos below. For more information see: https://collectionsdumusee.philharmoniedeparis.fr/0162041-ondes-martenot.aspx

the ribbon at a later stage, a metal strip with a series of peaks and troughs that demarcated the positions of the twelve chromatic equal temperament notes, to help the performer “feel” the correctly pitched notes, this did not limit the fluidity of the ribbon’s intonation.

Ondes Martenot from 1930 at the Musée de la musique, Paris

Close up of the ribbon and painted keyboard on the Ondes Martenot from 1930 at the Musée de la musique, Paris

Following our collaboration for the radio programme discussed previously in *Constellations I: Huzām*, and our preliminary research into Humbert-Lavergne and the ondes, my collaboration with Julia Tieke continued in 2020 with a second radio programme for Deutschlandfunk Kultur[108] for which Rome-based French ondist Julie Normal was invited to Berlin to work together with us on finding ways to help the instrument "speak" Arabic, just as Humbert-Lavergne had suggested.

Working on a prototype "guide" with Julie Normal, Berlin (DE), August 2020

The first challenge was making tuning accessible. Seeing as we could not change the 12-EDO intonation of the ondes' keyboard, I came up with the deceivingly simple idea of designing removable custom made "guides" for the ribbon, to allow a performer to feel the accurate maqāmic

[108] See Mawjāt Martenot - Arabische Klänge und frühe elektronische Musik, 2020

intonation, or any other for that matter. Due to the original ondes guide being impossible to remove without damaging the instrument, we had to find a stiff enough material that would remain stable, have adequate thickness not to protrude too much, whilst allowing us to place embossed nail-heads and debossed troughs as markers, in a similar fashion to the original ondes guide design.

Working on a prototype “guide" with Arabic tuning.

To create this new guide for our project I used a subset of 17 notes from al-Fārābī’s 10 fret/25-tone tuning system with G3 =195.998 Hz as the 1:1, due to the ondes keyboard starting on a C. These allowed Normal to access the principle maqāmāt according to modern conventions of theory/practice,

without having too many awkward and confusing markers to feel through. By using al-Fārābī's ratios with the *log (numerator/denominator,2)*150* function to divide Normal's ondes' physical octave length of 150mm, it was easy to plot the markers in millimetres on the new ruler.

Custom Ruler for Julie Normal's Ondes Martenot
17 pitch classes from Al-Fārābī's 25-tone system (c. 950)
REF PITCH/1:1 = G3 195.998 Hz

Nº	Ratio	Position in mm	AR Note Name	EN Note Name
1	1:1	0.0	Yegāh	G
2	256:243	11.3	Qabā Ḥiṣār	Ab
3	162:149	18.1	Ḥisār	A-b
4	9:8	25.5	Ushayrān	A
5	32:27	36.8	Ajam Usahayrān	Bb
6	27:22	44.3	Irāq	B-b
7	81:64	51.0	Kawasht	B
8	4:3	62.3	Rāst	C
9	24:17	74.6	Zirguleh	C#
10	216:149	80.4	Tīk Zirguleh	C+#
11	3:2	87.7	Dugāh	D
12	128:81	99.0	Kurd	Eb
13	18:11	106.6	Segāh	E-b
14	27:16	113.2	Buselīk	E
15	16:9	124.5	Chahargāh	F
16	32:17	136.9	Hijāz	F#
17	288:149	142.6	Tik Hijāz	F+#

The resulting radio programme documented this research, with a focus on the 1932 Cairo Congress and the role of the Berlin school, our practical solutions, and me teaching Normal simple maqāmic phrases to acquaint her with the maqām system and Arabic music in general. Due to the amount of information brought to the surface, we wanted to expand upon the project further. Following a successful funding application to Berlin's MusikFonds, Normal, Tieke and I met again in March 2021 for a two-week residency in Berlin to develop original musical works centred around a maqāmic exploration of the ondes. During this period, we came across more information regarding Humbert-Lavergne and Martenot much of which would affect the musical path of the project.

As we gradually discovered, Mady (as she was affectionately known) was a composer, soprano, archivist and ethnomusicologist, who knew very well what she was proposing in Cairo in 1932. She had a special interest in the ondes musicales and had been involved in its development and performance. Through her interest in the musics of many cultures,[109] Mady clearly saw the potential of the ondes martenot beyond the frame of the European classical "avant-garde" of her time. Although her own musical work could be seen as orientalist and fetishistic, even an early example of the exotica genre[110], her skill in working with the ondes' variety of timbres and performance styles is unquestionable.

---

[109] Mady had access to the ethnomusicological recordings collections of the Phonetic Institute of the Sorbonne in Paris where she worked and which she catalogued and evaluated.

[110] This can be heard in "Danse Araucane" on the compilation album *Musique Rituelle, A Travers Temps Et Pays*. This arrangement for ondes martenot and piano premiered at the 1937 Paris World's Fair and was released on an LP in 1958 labelled an arrangement of an Inca ritual. She is credited as on the LP as Mady Sauvageot. See Humbert-Lavergne/Sauvageot (1958) in Discography.

To push our experiments further and explore performing in duo with a second ondes for a fraction of the cost, we commissioned Jean-Loup Dierstein[111], the world's only maker of the ondes musicales, to create an electric controller based on the ribbon and guide system of the ondes, i.e. without the oscillators, but with the addition of un-fixed interchangeable rulers.

Testing the Ondes-style controller with Jean-Loop Dierstien at his atelier in Paris, May 2021.

This would allow for the sonic and intonational flexibility of using hardware synthesisers with accurate custom intonation guides, similar to that which we created for Normal's ondes previously, through the use of electric CV signals. Most importantly we also decided to remove the classic

[111] https://jeanloupdierstein.fr/

“touche” and replace it with a foot pedal for VCA control, in order to facilitate performing with one hand and one foot, whilst the other hand remains free to change and modulate the hardware synthesiser’s parameters.[112]

During our research we also discovered that in the late 1930s, apparently following a suggestion by famed Tamil poet Rabindranath Tagore, French musicologist and oncologist Alain Daniélou[113] commissioned Martenot to build a custom ondes for him which would allow precise and adjustable tuning of the keyboard itself. A draft contract and patent application from 1937 alongside the approved patent from 1938 signed and assigned to both Martenot and Danielou attests to the seriousness of their endeavour, whilst also providing the technical and musicological details[114].

These documents are now archived at the Cité de la Musique in Paris, where it is also possible to see the prototype that Martenot produced for Daniélou which is also dated from 1937. This historic instrument features most of the hallmark characters of the ondes i.e. the ribbon with a metal guide[115], the touche, a keyboard with metal keys, and the vacuum tube oscillators, but there is one major addition.

---

[112] Although such an instrument already exists, it utilises the touche and does not have interchangeable rulers: https://www.synthtopia.com/content/2012/04/09/french-connection-mov/

[113] The website https://www.alaindanielou.org is a useful resource for a wide range of information about all of Danielou’s work.

[114] Both the draft patent and the contract are available online here: https://www.semantic-danielou.com/historical-background/ [Accessed 16 March 2022]

[115] Presumably 12-EDO based on the alignment of the markers with the keyboard keys (see detail photograph below).

On the front of the tightly packed instrument are twelve dials, each of which effects one of the twelve chromatic keys of the octave. Each dial has five or six positions that allow for changing the divisions of the relevant note according to Danielou's unique tuning system of fifty-three unequal divisions of the octave.[116]

Martenot's ondes for Danielou with detail of tuning dials on front

What we can discern from this prototype instrument, and all the detail, it seems Danielou was looking for a transcultural technological solution to serve his forward thinking analytical and musicological ideas rather than an artistic endeavour. Alongside the published evidence of his preservationist and traditionalist attitude, this can also be construed from this instrument's

[116] See Daniélou (1943: 246) for more details. Daniélou would go on to publish his *Tableau Comparatif des Intervalles Musicaux* in 1958 documenting his in-depth research into historic tuning systems and making the results accessible. See Daniélou (1958).

lack of timbral controls and more specifically, the lack of interchangeable guides.

During our first residency while waiting for Dierstein's controller prototype, we explored various duet combinations always with Normal performing her ondes, but with me shifting between acoustic oud, electroacoustic oud, and the use of a virtual ondes sample library made by Soniccouture[117]. For the exploration of the electric and virtual ondes duet, we made extensive use of the immediacy and fluidity that Leimma allows, in order to explore various maqāmāt and intiqālāt unlocking an audible imaginary that had been, until then, either purely hypothetical or full of technical hurdles and disruptions. By using the virtual ondes tuned through Leimma, we had the additional flexibility of tuning an ondes keyboard, albeit virtually, giving us the same freedom of intonation as the one created with our custom ondes guide.

Inspired by the overwhelming amount of information uncovered by our collaborative artistic research, Tieke, Normal and myself met again in Berlin in August 2021 to complete the project. Building on our previous experiments, we decided to craft a four part composed-improvisational structure that would allow ample time and space to explore each duet, as opposed to trying to fit multiple combinations into separate shorter pieces. With the help of Leimma, each part was designed to have its own maqāmic focus and trajectory, utilising unconventional intiqālāt and a mix of

[117] See https://www.soniccouture.com/en/products/24-vintage/g27-ondes/ (Accessed: 6 April 2022)

common and less-widely used maqāmāt. The four parts were constructed as follows:

- Part I: *Acoustic Oud and Electric Ondes Musicales* - Exploration of the maqāmāt bayāt, ʻirāq and bayātayn.

- Part II: *Virtual Ondes Musicales and Electric Ondes Musicales* - Exploration of the maqām bestenegār.

- Part III: *Electro-acoustic Oud and Electric Ondes Musicales* - Exploration of the maqāmāt bayāt al-nawā, ḥijāz al-kurdān and rāst al-chahargāh.

- Part IV: *Custom Ondes Martenot style CV controller with Moog Mother 32 and Make Noise 0-Coast synthesisers, Ciat-Lonbard Plumbutter and Electric Ondes Musicales* - Exploration of maqām ṣabā.

To aid us in navigating each part, a simple text based score was created to indicate the structure and included basic instructions regarding when to activate or deactivate certain effects and URL links to the tuning system and subset mappings in Leimma. A list of the maqāmāt used with links to Leimma is provided in the appendices.

Part I is led by the acoustic oud with the ondes accompanying and interjecting timbral characteristics including its noise generator. It begins in maqām bayāt on dugāh, then makes an unconventional intiqāl down to maqām ʻirāq, before another unconventional intiqāl to conclude the remainder of the piece in maqām bayātayn on ʻushayrān, signified by an

audible de-tuning of the oud's lowest string, down from qabā rāst to qabā ʻushayrān.

Part II focuses on the distinctive harmonic colour of the rarely used maqām bestenegār on segāh. This is enabled by the use of the virtual ondes martenot tuned through Leimma. A series of ascending chords set the background for the ondes' abstract phrasings and sonorities, all utilising the principal naghamāt of the maqām. After a moment of respite, harder sounding cluster chords interject with unusual beating amongst the intervals, leading to a clearly maqāmic descending arpeggio that highlights, after 12 minutes, the core intervals of the maqām. This leads back into a sequence of sustained chords accompanying the ondes in a higher register, before ending with a chord featuring the istiqrār of the maqām on the segāh.

Parts III is an abstract duet between the electro-acoustic oud and the ondes in maqām bayāt al-nawā. Beginning with a tremolo drone set by the oud, a simple two-note ondes theme establishes the distinctive character of the maqām and the sound world. This is followed by an interchange of maqāmic improvisations between the ondes and the electro-acoustic oud, the last of which leads us through an intiqāl to maqām ḥijāz on kurdān before settling and ending on maqām rāst on chahargāh .

Part IV is the only one to feature a clear rhythmic element. It begins with an awkward groove created by the Ciat Lonbard Plumbutter synthesiser. Though marketed as a "drum and drama machine", played in this subtle way the Plumbutter's idiosyncratic rhythmic grooves and ornaments resemble very closely the rhythmic cycles of the ottoman faṣil

and their rendering on the *kudum* (small kettle drums), or those of the Arab Andalucian *muwashshaḥāt* and their performance on the Arabic *riq* (fish skin tambourine).

A clear and stable drone on dugāh sets the groundwork for the abstract rendering of maqām ṣabā by the electric ondes and the prototype ondes-style controller made for us by Dierstein, which is used to perform the Moog Mother-32 and the make Noise 0-coast simultaneously. As the noisy abstract phrasings develop from their long fade-ins, the harmonics of the drone is explored through the additive synthesis of the 0-coast leading to a unison maqāmic melody that takes a slow descent back to the emptiness of the Plumbutter's *aqsāq*-like groove[118].

To conclude, this composition and its underlying research revisits a unique moment in Arabic music history that has been overlooked, by Arab and Anglo-European scholars alike, for almost a hundred years. By highlighting the importance of Mady Humbert-Lavergne's four-line suggestion within its context at the 1932 Cairo Congress, it allows us to see the Relational potential and effect that a transcultural approach can have on sonic technology and the practice it can inspire.

[118] From the Turkish Ottoman Asak rhythmic family, meaning limping or stumbling.

7. NKHṬ

Collaboration with Nakul Krishnamurthy

Fixed Media: Voice and Electronics.
24’30”

Commissioned by Centrala, Birmingham (UK).

NOTE REGARDING SUPPORTING ASSETS:

The audio file submitted is a rough mix.

To illustrate my Relational approach as it refined itself throughout this research, and more specifically through Glissant’s definition of a Relation identity as one that “does not think of a land as a territory from which to project toward other territories but as a place where one gives-on-and-with rather than grasps” (1997:144), I have decided to include in this portfolio a collaboration between myself and Carnatic experimental vocalist Nakul Krishnamurthy[119]. This work acutely represents the evolution of both my practice and my perspectives as they relate to transcultural music making through collaboration, composition, musicological research, the use of sonic technologies, and the creative interrogation of musical conventions.

Prior to our collaboration, I interviewed Krishnamurthy for Counterflows Festival during which we discussed many issues related to our

[119] Krishnamurthy’s debut solo album Tesserae had a major impact on me. See Krishnamurthy (2021) in the discography.

artistic experiences[120]. It was poignant for both of us and revealed much common ground in our thinking. In light of those discussions this composition was driven by a shared desire to take an experimental polyphonic and electronic approach to Indian art music, through mixing forms, concepts, *rāgs* and *tāls*, from the vocal and instrumental traditions of both North and South India. The pitch material is based on the 22-*śrūtī* tuning system as defined by Sambamoorthy (1951:5), and the method of using the grama murchana system as posited by Jairazbhoy (1975) and Powers (1962), in that that the Sā, the tonic of a rāg, should start on the 4th (9:8) śrūtī as opposed to the first (1:1).

The reference pitch, the Hz value of 1:1, was decided upon by asking Nakul to sing long notes whilst holding his hand to his chest and searching for the frequency that resonated the most. It was approximately 268.3Hz. Leimma was then used extensively to research experimental possibilities of various rāgs and their modal transpositions i.e. maintaining the number of śrūtīs in each interval, but starting on a different śrūtī, an extension of the idea behind the alternative grama murchana system mentioned above.

Once we decided on the rāgs and their starting śrūtīs,[121] we developed the compositional form by crafting out a musical template:

1. Begin with a free rhythm synthesis mimicking a hybrid of tanpura and harmonium to set the mood and the rāg.

[120] See Krishnamurthy (2021).

[121] See list in the appendices.

2. Introduce the vocals, in the style of an alap, using vocalised sargam.

3. Introduce a pulse in the North Indian tīntāl (16 beats cycle) in mādhya lāya (medium tempo) and lead into a double-length lehra, traditionally a repeated musical phrase used to define the rhythmic cycle and its length. In this case, it is the double of 16 beats making it 32 beats.

4. Morph the tuning of the lehra from the starting rāg to the next, a technological feat impossible with traditional instruments.

5. Once the tuning of the rāg is fully morphed, introduce the rhythmic jātīs on a pulse but without a clear tāla.

6. Fade out the lehra and introduce sung jātīs in the current rāg. Jātīs are usually recited to represent rhythmic compositions and not sung melodically.

7. Return to a free rhythm and re-introduce sargam in the current rāg.

8. Blur the vocals from the current rāg into the next.

9. Introduce a new tālā, the South Indian tāl khanda chāpu (5 beats cycle).

10. Develop an instrumental section with electronic percussion programmed with gestures from Indian percussion playing.

11. Morph through the final modulations of the current rāg down through the remaining śrūtīs to the 1:1 to end.

With the compositional form decided together, I proceeded to generate musical ideas which I sent to Krishnamurthy. He then proceeded to record vocal improvisations based on the rāgs, both in free rhythm and in the agreed upon tāls and tempos. In the end he sent almost 100 audio files. The tuning of the recorded vocals in each file was adjusted slightly but precisely using Celemony's Melodyne software according to the 22-śrūtīs tuning, the subsets of the rāgs for each section, and their new modal transpositions that we had defined using Leimma. I then proceeded to complete the musical composition by crafting, editing and arranging the vocals into the compositional framework, using various synthesis and production techniques.

The opening instrumental introduction was created by rendering tuned generative MIDI data from Apotome and recording the MIDI into Ableton live, whilst manipulating the software synthesiser in real time. The tuning and morphing of the remaining synthesisers was accomplished using OddSound's MTS-ESP plugin which was released after Leimma and Apotome in March 2021.[122] This was done by mapping the śrūtīs of each rāg to the white keys of the piano roll / piano keyboard, which allowed for the same midi notes to be played/triggered whilst their tuning would change through the MTS-ESP plugin.[123] Due to the polyphonic nature of the

[122] See https://oddsound.com/mtsespsuite.php (Accessed: 6 April 2022). At the time MTS-ESP was the only plugin that allowed for the morphing between different tunings via MPE, a feature that Leimma is not currently programmed to do, but which is possible using Comma via multi-monophonic pitch bend messages. I decided to use MTS-ESP in order to test it out and make use of the MPE capability which is not programmed into Comma as yet.

[123] It is worth mentioning that each subset had to be mapped and saved as if it was a separate tuning system, and not a subset, as it is possible in Leimma.

composition it was easier to use MPE (MIDI Polyphonic Expression) enabled synthesisers. These were Ableton's Wavetable software synth and Madrona Labs' Aalto software synth.

The composition starts in the Carnatic rāg charūkeshi on the 4th śrūtī (9:8), before morphing down to the Carnatic rāg gowri manohari on the 3rd śrūtī (10:9). This morph is clearly audible in the lehra melody set in a mādhya lāya North Indian tīntāl.

The jātīs (spoken percussive syllables) are based on a pulse, without a particular tāl. The sung jātis continue the Carnatic rāg gowri manohari on the 3rd śrūtī (10:9) as do the vocals that come in after the pitched percussion interlude. The vocal sections then blur into each other and modulate down to the Hindustani rāg bhūpal tōdī (pentatonic rāg) on the 2nd śrūtī (16:15). This is followed by the instrumental section which morphs and modulates the same rāg down to the 1st śrūtī (256:243) and finally down to the 1:1. Movements that are clearly audible in the main pulsing synth chords.

The instrumental section and its melodic/polyphonic modulations are all based on the pentatonic rāg bhūpal tōdī, with a synth playing 5 note chords (all the rāg's pitch classes) that are changed every 4 bars of the rhythmic cycle, by shifting the root to create a different inversion of the chord with the start of every new round. The rhythm of this section is based on the South Indian tāl khanda chāpu (5 beats cycle) and utilises generative triggering of pre-programmed percussive gestures (short phrases) of different lengths. This was a new feature in Ableton Live's 'follow actions'

which wasn't possible until the latest release of Live 11 in Feb 2021. The percussion sounds were modulated in real-time by me.

Once this was completed, the audio file was sent to our third collaborator Tarik Barri[124], who created a generative improvised visual accompaniment for the fixed media audio-visual premier in July 2021.

As has been described above, this project involved both artistic-research and immersion in the details of Indian music theory, alongside a creative collaborative approach to the interrogation of these theories in practice. The role of sonic technologies, particularly Leimma and Apotome, but also the recently released MTS-ESP alongside Melodyne and Live, was crucial for allowing the imagined possibilities to flow. This is not to say there were no technical hurdles along the way, but they were far less intrusive to the creative process than I had ever encountered since first trying to use music technology to make non-12EDO music almost twenty years ago.

[124] Tarik's initial in Arabic is ط for طارق and is transliterated as Ṭ making up the third initial in the sequence that gives the work its title.

8. Ma-a a-ba ud me-na-gin Ma-a di-di-in

Notated Score: String Quartet (2 vl., vla., vc.)
c. 20'

Commissioned by JACK Quartet as part of JACK Studio 2019.

NOTE REGARDING SUPPORTING ASSETS:

The score for this work is included in the Scores folder. The audio recording submitted is from the premier at Kaufmann Center, New York, NY (US) which took place on 20 April 2022.

This composition for string quartet is an exploration of the infamous maqāmic interval known as the segāh, in tandem with my own reinterpretation of al-Kindī's "Interwoven Braid". Inspired by the oud , both symbolically and practically through the use of its characteristic رش *rash* tremolo technique, it is also a reflection on the problems of Arabic tuning in the modern period[125].

The research I conducted on al-Kindī's interwoven braid and the new interpretation used in this work was dense, and brought to light many salient points regarding the Anglo-European-centric logics imposed upon al-Kindī's principle historic work and their perpetuation over time. Due to the details being too long and complex to justify their inclusion here, I have included them in the appendices. It is hoped that these details will be

[125] Since the mid-18th century. See Marcus (1989: 13).

published as a separate article in the near future and I will be more than happy to discuss them during the viva voce examination.

The infamous Arabic and Middle Eastern interval originally known as وسطى زلزل *wusṭā Zalzal* (lit. Zalzal's middle finger), or the less provocative ratio of 27:22, was first defined by al-Fārābī (d. ca. 950) based on the fret added to the oud by renowned Iraqi Abbasid oud player and singer Mansur Zalzal in the 9th century (Shiloah, 1981: 30). Almost a thousand years later, in his translation and commentary on al-Fārābī's tuning system, Dutch orientalist and musicologist J.P. Land referred to it as a "neutral third" (1880)[126], in that it was neither a major nor a minor third but in-between, a term perpetuated through its re-use and reference by Ellis in his English translation of Helmholtz's *On the Sensations of Tone* (Helmholtz and Ellis, 1912:281, 521, 525, 556). Despite the interval's unique sonic character, this Eurocentric term is frequently used to this day, though it is slowly starting to change amongst some native scholars and international artists who are referring to it as a *Zalzalian* interval instead.[127]

Across the Arabic speaking region today, it is referred to as the سيگاه *segāh* (or سيكه *sīkah)*[128] by many musicians and maqām aficionados, or more colloquially as الربع تون *al-rub' tōn* (lit. the quarter tone), an equally

[126] See Land (1880) in the original Dutch and Land (1885) for a later French version by Land himself.

[127] See Abou Mrad, (2007: 119) who cites its premier usage being by Wright in (1978: 82). Very often it is also referred to as a Zalzalian third but this is only accurate in the case of maqām rāst, and not bayāt or segāh or even the sequence of intervals in the tuning system itself.

[128] More commonly pronounced in the Egyptian Arabised version سيكاه pronounced سيكه *sīkah* (with the گ *g* replaced as a ك *k* and a short voweled كَه *ka* instead of the long كاه *kāh*). It is also often used as a verb سيّك/ تسييك meaning to make into a سيكه *sīkah* i.e. to tune a 12EDO note to a segāh value.

inaccurate nomenclature inherited from similar Anglo-European narratives.

As I have mentioned in a recently published article for Beirut Art Centre's *The Derivative* magazine titled *The Third Place: In the Shadows of Anxiety and Recovery*[129] (Allami, 2021b), the segāh takes its name from the Persian linguistic portmanteau of سه *seh*, meaning three or third, and گاه *gāh*, meaning position, location or place, and is considered the quintessential interval of music from across North Africa, the Middle East and some of Central Asia. In nuanced variations, its intonation defines the musical identity of the vast geography, both regionally and locally, and sometimes even that of an individual musician.

By no means neutral, its shape-shifting character has been the bane of music scholars since the 10th century of al-Fārābī. This is evidenced by the longstanding debates regarding the 24 intervals of modern Arabic maqām theory and whether they are 24-EDO or not. Ultimately all those debates are concerned with the precise definition and fixation, a proverbial straightjacketing, of this evasive interval specifically because of it is manifold subtle variations. More so, the segāh is an interval deeply entwined with the concept of ṭarab due to its profound relationship to the maqāmāt, therefore also to my conceptualisation of maqām as a sonic state.

My re-reading and re-interpreting of Al-Kindi's 1100+ year old methods for creating musical phrases is also a central structural element of this composition, in particular الضفير المشتبك al-*ḍafīr al-mushtabik,* the cryptic

[129] This article is listed in the bibliography and also included in the appendices.

"interwoven braid". In the 9th century, revered Iraqi polymath al-Kindī wrote a musical treaties titled رسالة في خبر تأليف الألحان *Risālah fī khubr ta'līf al-alḥān (*Treaties concerning the knowledge on the composition of melodies),[130] in which he described and defined a tuning system based on the fretting of the oud, and discussed the maqāmāt and guidelines for how melodies should be composed.

In the same treaties, which is one of the earliest known works on Arabic music[131], he also describes, in written words, six methods for crafting musical phrases: the ascending, the descending, and four others which are based on visual shapes: اللولبي الداخل واللولبي الخارج *al-lawlabī al-dākhil and al-lawlabī al-khārij* (the inward and outward spirals), الضفير المنفصل *al-ḍafīr al-munfaṣil* (the separate braid), and الضفير المشتبك *al-ḍafīr al-mushtabik* (the interwoven braid). These are accompanied by two grids that al-Kindī states are "prefaced as a comprehension aid for the learner" (Wright, 2006: 4).

As Wright points out in his article *The Sight of Sound*, there does "exist a literature on the relationship between music and the visual arts in the Islamic world", but up to his time of writing at the turn of the millennium, "the use of visual representation and visual metaphors as explanatory devices in relation to music" had been neglected (Wright, 2004: 1). What is intriguing about Wright's article is not only the abundance of such

[130] Translation of title by Shiloah (1979: 256).

[131] The only surviving manuscript is at the British Library, London, UK (Oriental Manuscripts, Or 2361, ff 165r-168r). It is a copy was completed on 29 November 1662 from a manuscript written in Damascus and dated late November 1224, which was itself copied from another manuscript described as defective and unreliable. A digitised copy, alongside fourteen other Arabic and Persian music theory manuscripts in the Codex ff. I+269+iv. (created in 1073-1075), is available online through the Qatar Digital Library at https://www.qdl.qa/en/archive/81055/vdc_100035587376.0x000001 (accessed 29 March 2022).

representation and metaphor in historical Arabic and Persian music manuscripts, but also the fact that in the case of al-Kindī's fascinating treaties, they represents a method for the composition of melodies, based on the oud as a conceptual framework for the tuning and the pitch classes used.

Soon after the aforementioned article, Wright published a critical review of all the aforementioned studies of al-Kindī's treaties, and noted that all the interpretations are justified except for those of the interwoven braid because in one way or another, each previous study had failed to reconcile their visual representations with the text (Wright, 2006: 14). Following his spuriously detailed interrogation of all the previous interpretations and the issues that exist in them, and apparently also in the original treaties, Wright proposes his own interpretation for the interwoven braid, but states:

> "There is, no doubt, a strong element of conjecture in Figure 20 [Wright's proposition]. But it does no violence to al-Kindī's text; it respects and consistently applies the sequence of moves laid down in the description; it preserves all the pitches cited in the example; and it concludes with a consonant return to the initial note." (op. cit., 24)

Whilst studying Wright's densely worded article in depth, the discrepancies of the interwoven braid in the previous studies, and the complexity of the challenge became obvious. Although Wright recognises a

"strong element of conjecture" in his proposition, specifically because it implies "going 'beyond the end' of the third rank of the grid" (op. cit., 22), I settled for his solution being at the very least coherent with all the details of al-Kindī's texts, and began to develop compositional ideas for the string quartet based on the melodic figure his interwoven braid proposed.

As I developed ideas and made mistakes, leading me to return frequently to Wright's article alongside those by Cowl (1966), Yūsuf (1962), Shawki (1969) and Lachmann and el-Ḥefnī (1931), my dissatisfaction with Wright's proposal kept gnawing at the back of my mind. Luckily I was able to access a digitisation of the original manuscript[132], and often found myself hypnotised, my eyes braiding as they tried to follow al-Kindī's thousand-year-plus-old sequential descriptions across the grid. In this dissatisfaction, I decided to attempt understanding the problems by taking a pencil and paper, and drawing the options out myself.

To briefly summarise, all the interpretations of al-Kindi's interwoven braid essentially follow a precedent set by Lachmann and el-Hefni, which is to correlate the two methods that al-Kindī uses to describe the visual shapes and the melody they should form, and to draw the result on a plane, leading to figures of various interweaving loops. Alternatively, I decided to try and follow al-Kindī's logic exclusively by reading through the entire manuscript to get a clear insight into the narrative flow of the information within it, just as Wright (2006) does, but with the main difference of exclusively using al-

[132] [Risālah fī khubr taʾlīf al-alḥān] [رسالة في خبر تأليف الألحان] Kindī, Yaʿqūb ibn Isḥāq يعقوب بن كندي، إسحق, British Library: Oriental Manuscripts, Or 2361, ff 165r-168r, in Qatar Digital Library https://www.qdl.qa/archive/81055/vdc_100131607039.0x00000a [Accessed: 29 March 2022]

Kindī's grid to render the visual forms, rather than a plane. For the full discussion on my process, its results and my findings, please check the appendices.

After weeks of frustration I finally arrived at my own interpretation for the interwoven braid, which led subsequently to new interpretations for all four principle methods presented by al-Kindī (both spirals and both braids) . As a result, my desire to utilise the interwoven braid and Zalzal's Middle Finger as a core part of the experimental composition grew all the more strong

The composition of this work began by first following the logic of the oud's open string tuning in perfect fourths with the fret of Zalzal's middle finger, and creating a vertical stack of four intervals (1:1, 27:22, 4:3, 18:11) at the starting point of the braid. From its earliest inception, there was a decision not to use the maqāmāt as pitch resources, but rather to develop a unique tuning system to facilitate using the segāh and the braid at the same time.

My interpretation of the braid gives a sequence of fourteen notes, and by following them I constructed a sequence of fourteen such stacks that would go on to serve as the melodic contour of each part of the composition. I then constructed various inversions of these stacks, and utilised them where necessary to add colour and movement to the parts, which also served as a means to braid/weave the instruments' individual lines together.

To do this, I constructed my own tuning system based on both al-Kindī and al-Fārābī, by adopting al-Kindī's chromatic tuning for the oud and its

frets, and applying al-Farābī's 27:22 ratio for Zalzal's middle finger/the segāh to each of the twelve chromatic notes. This gave each of the twelve notes its own segāh and allowed for the procedure outlined above. This resulted in culturally relevant values for all 24 pitch classes of the modern theoretical maqām system without needing to utilise EDO, a practical and usable response to the problems that have hung over modern maqām theory since the 18th century. The reference pitch (1:1) used for the tuning system is the first of the ancient oud's four open strings named *bam* or *'ushayrān* in the modern Arabic system. Ironically, this is today tuned to the A of 220 Hz/ 440 Hz fame, but due to JACK Quartet preferring to tune to A = 442, the 'ushayran was set to 221 Hz. An important point here is that the modern Arabic maqām system usually starts a tone lower on yegāh (G3), but by starting the tuning system on 'ushayran (A3) we enable a more historically accurate rendition of it, which answers many other questions. A copy of the tuning system is included in the appendices and the score.

To notate the intervals of the tuning system, I utilised the Helmholtz-Ellis Just Intonation pitch notation (HEJI) devised by Sabat and Schweinitz (Sabat et al., 2020), as per JACK Quartet's familiarity with it and their request. These accidentals and intervals were then set-up in Steinberg's Dorico notation software (due to its limited but functional tuning playback capabilities) to facilitate a smoother workflow and engraving of the score.

As Shawki notes in his commentary, it is unlikely that al-Kindī meant for the spirals and braids to be used as literal melodic lines, but rather as

tonal focus points (1969: 180-189), much like maqāmic practice as outlined in Chapter 2.

Thanks to the JACK Quartet and their JACK Studio programme, I had multiple opportunities to workshop ideas with the group in New York, Berlin, and online. Seeing as I had an unconventional harmonic framework and melodic contour already defined, I decided to avoid using melodic development to go from one pitch in the braid to another, but rather to utilise the dynamics and performance techniques afforded by the string quartet, with a specific focus on their right hands i.e. use of the bow. With the results of those workshops in mind, I developed the composition in line with my desire to use the inspiration of the oud. The semiquavers/sixteenth notes, and subtle use of tremolos used across the composition, reference the characteristic رش *rash* tremolo technique of its practice.

In addition to the melodic sequence, I also chose to use the number of moves from each of the braid's utilised notes to the next, as a means to delineate the time signatures and reference the length of each move needed to draw the braid through time. This sequence is:

11, 5, 2, 4, 3, 8, 7; 10, 5, 3, 5, 2, 8, 11.[133]

The composition is divided into three unequal parts. The first part uses one page for each of the fourteen stacks to highlight the principle Zalzalian interval, whilst also exploring the relationships of the combined intervals to each other in a dynamic way. Each page utilises one specific time signature following the aforementioned sequence. Part two treats the sequence and

[133] Please see the additional text about this composition in the appendices for exact details.

intervals as a compound melodic line, and gives each note in the sequence its relative time signature, creating an abstract groove to the unconventional melodic/harmonic progression. The final part three takes the same sequence as part two, but intersperses it with blocks of rests/ silences, in order to create space for the appreciation of the intervals' echoing. A conceptual *échos-monde* of vertical and horizontal relationships that gives the composition its unique character.

The title of the work, *Ma-a a-ba ud me-na-gin Ma-a di-di-in*[134], translates as 'Where is the future like the past? Where will I go?' (Maul, 2005: 64-72). It is a poignant, and very fitting, line from an Akkadian "lament accompanied by the Balag-instrument"[135] inscribed onto a ritual/ liturgical clay tablet found in Bābili (mod. Babylon), written 131 or 130 B.C.E (op. cit. 63). Today, the tablets and their fragments are in the collections of the Metropolitan Museum of Art, New York (US), and the Vorderasiatisches Museum in Berlin (DE)[136].

[134] See CTMMA 2, 008 (MMA 86.11.346+) (n.d.).

[135] There is some conjecture to whether the Balag was a plucked string or a percussion instrument (Volk, 2005: 3).

[136] According to Maul: "The NYC fragments were purchased by the Reverend William Hayes Ward on the London antiquities market in 1885 and were acquired by The Metropolitan Museum of Art in 1886. […] The Berlin fragments had been acquired by the Konigliche Museen zu Berlin (the present Vorderasiatisches Museum), in the same year as the tablets in New York, namely 1886. […] In order for the full translation to be completed The simplest way to deal with the matter was to bring the two groups of tablets together, so that suspected joins could be confirmed on the spot. So in summer 1990 the New York tablets, courtesy of The Metropolitan Museum of Art, were shipped on loan to the Vorderasiatisches Museum, Berlin. [...] The loan took place when Berlin and Germany were still divided, and the tablets had to cross the border between West Berlin and East Berlin" (2005: 64-72).

9. Mkhālef

Improvisation: Solo acoustic oud.
ca. 24’

NOTE REGARDING SUPPORTING ASSETS:

The audio recording of this work is taken from a live solo performance at KM28, Berlin in February 2022.

This portfolio of compositions and their commentaries concludes with a solo acoustic oud improvisation. It marks a Relational return in my practice to the instrument that helped pave and enlighten the path of my academic and artistic interests since 2004, alongside a Relational return to the personal conflicts of identity and uprootedness. Having gotten through the majority of my doctoral research at this point and felt both empowered and inspired by much of what I had studied and created, I also took the opportunity to give myself permission to just be.

Listening to this recording in hindsight makes me notice how much the elements of my research have embedded themselves in my practice. In specific relation to this performance, these are unconventional maqāmic taqsīm using consciously tuned and untuned, voiced and unvoiced, fragmented and deconstructed maqāmic phrases, inline with the concepts influenced by the underlying philosophies of the Hurūfīyya movement and the concept of the maqām as a sonic state, as set out in Chapter 2.

The oud as an acoustic instrument, beautiful and expressive as it is, is very limited by its design and conventional performance techniques. It is a fretless plucked melodic instrument with a medium string length (58.5 cm), nylon and steel-wound nylon strings, a comfortable playing range of two and a half octaves, short decay, a limited timbre and dynamic range, and is played with a *risha* (lit. feather), a long plectrum that was originally an eagle's quill but today is made from plastic or tortoise shell, that is held in the palm of the hand.

Its characteristic performance techniques include *rash* (tremolo), *çarpma* (a Turkish term meaning hammer-ons), and various types of *zakhrafa* (lit. ornamentation) including pull-offs, mordents, turns, appogiatura, accaciatura, subtle glissando and vibrato. Extended techniques are very rarely employed, and simple preparations (such as using paper or paperclips etc.) yield results of limited interest. Yet within these limitations it is possible to find sonic characteristics and performance techniques that are intriguing.

Over the years, and after many experiments, I landed upon a deceivingly simple set of directions based on idiomatic and deconstructed approaches that could be utilised in pairs (one from either column) during an improvisation. See accompanying table below.

Choosing A1 + B1 would lead to the most conventional approach, whilst A2 + B2 would be the least. Combinations such as A1+B2 would be melodically maqāmic but structurally fragmented, and A2+B1 would be melodically deconstructed with an idiomatic adherence to the form. The

simplicity of such instructions, especially when taken as Glissantian active "relays" (1997: 177-178) to improvise through a moment rather than literal and immediate "actions" as defined by Rohana[137], allow for a simple navigational method to move through the deconstruction and reconstruction of the formal or maqāmic choices.

	A (maqām/jins)	B (taqāsīm)
1	Idiomatic	Idiomatic
2	Deconstructed	Deconstructed

This improvisation starts with a focus on the infamous segāh's upper sibling ʿawj and its nearby intervals, lingering longer than would be expected in a conventional maqāmic performance. The opening gives the impression of a very slow unfolding of the maqām, more in the style of a Hindustanti *alap*. Slowly the use of silence and resonance, reminiscent of Iraqi oud players Salman Shukur and Munir Bashir, begins to give way to abstract chromaqāmic phrases, a technique I have been developing that entails using a maqām's principle naghamāt, alongside relative chromatic intervals that add colour whilst also maintaining some of the maqām's principle character. These in turn lead to a series of unconventional intiqālāt, before settling into an abstract exploration of maqām kurd on ʿushayran with a heavy reliance on the open low string, tuned to qabā dugāh (the lower octave istiqrār) as a pedal.

[137] See Chapter 2

This soon takes a detour into an incessant series of arpeggiated sweeps of indeterminate pitches, in tandem with a literally cyclical scraping of the rīsha across the face and the rosettes of the oud, exploring the oud's potential acoustic sonorities outside of its conventions. These physical movements lead to a literal unvoicing of the oud, making it sound without clarity of pitch. A buzzing chromatic phrase slowly emerges, expanding and contracting until an ultimate unconventional resolve to a very conventional, but short, presentation of the uniquely Iraqi and rarely heard maqām mkhālef on tīk ḥiṣār.

Seen from this vantage point, at the end of this doctoral research it somewhat poetically points to a deeply Relational approach to the Iraqi imaginary throughout history. Something I have only been able to perceive or experience vicariously, through an exiled family and an exiled, fractured community. In the past, and even throughout this research, I have longed to be in proximity to this history in Glissantian terms as a Root identity, in my case one that was also mediated. Today I realise that my perspective has shifted and find myself in resonance with it in errantry, echoing within it as a Relation identity, one that "is linked not to a creation of the world, but to the conscious and contradictory experience of contacts among cultures, [...] produced in the chaotic network of Relation, [...] as a place where one gives-on-and-with rather than grasps" (Glissant 1997b: 144).

Impact

Throughout this research project I have made a conscious and concerted effort to connect and share my work with professional and public circles as much as possible, not only in closed academic bubbles. In that this research project was started before the Covid 19 pandemic and continued throughout it, in-person public performance or engagement opportunities were limited. As a result, I made an effort to continue my engagement online wherever possible.

Aside from varied public performances before the lockdowns, the *Requiem* was presented in London and Hull (UK) as part of the PRS Foundation New Music Biennial in July 2019 and nominated for an Ivors Composer Award. *NKHṬ* was premiered as an audio-visual screening at Centrala in Birmingham (UK) in June 2021 to a limited audience, and presented again alongside *Naghamīya* as part of the inaugural Listening Biennial in Berlin (DE) in July 2021.

The projects *Constellations I: Huzām* and *'32* were the focus of two separate German language radio programmes for Deustchlandfunk Kultur in 2020 and both were accompanied by discursive events. During *Constellations I,* Julia Tieke and I gave an in-person presentation on "The Piano in Arabic Music" at CTM Festival 2019, Berlin (DE). Whilst for *'32* we gave an in-person presentation with Julie Normal at SAVVY Contemporary and a performance at KM28, both in Berlin (DE) in August 2021. *Ma-a a-ba*

ud me-na-gin Ma-a di-di-in will be premiered by JACK Quartet at Kaufamn Music Center in New York (US) on 21 April 2022.

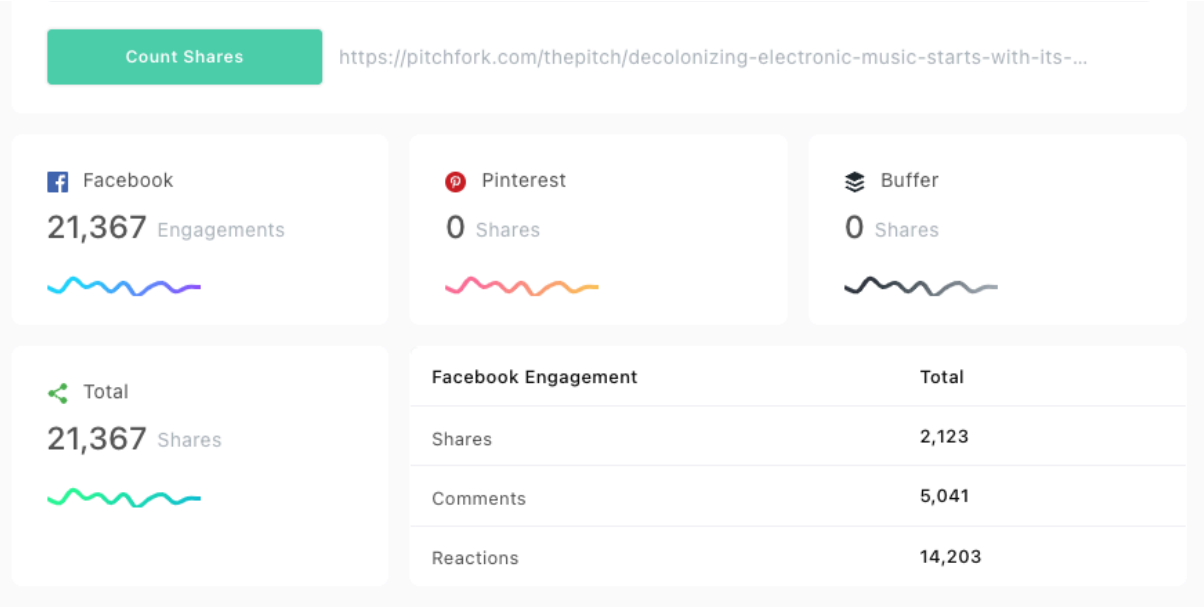
The most significant impact of my work however came in response to the launch of Apotome. As mentioned previously, the project was awarded the inaugural Isao Tomita Special Prize at Art Electronica, Linz (AT) 2021. Following the success of the project's holistic launch at CTM Festival 2021, including the video presentation, artist takeovers, live performances and the tools themselves, there was an exciting buzz around the project and good amount of publicity.

In response, I received many supportive messages from international artists such as Sam Shalabi, Maurice Louca, Aya Metwalli, Ata Ebtekar aka Sote, Daniel Lopatin aka OPN, Gaika, Barker, Mark Fell, Matt Dryhurst and Holly Herndon, Telefon Telaviv and others, alongside many emails and social media messages from supportive people I did not know. This was followed by in-depth interviews with CDM (Kirn, 2021), Ma3azef (Zeidan, 2021) and others.

Following the publication of a Pitchfork article titled *Decolonizing Electronic Music Starts with Its Software* (Faber, 2021) in February, the project provoked many discussions and criticism, mostly but not exclusively, as comments on Pitchfork's Facebook page. It became obvious very quickly that the headline—which I had no involvement with—was triggering for many people. As were my comments regarding the imposition of 12-EDO being a "remnant of a colonial, supremacist paradigm. The music is colonized in some way" and also Deena Abdelwahed's comment:

> "I had always felt oppressed by my melodic phrases in Ableton. I don't want to say my brain is wired to Arabic scales because I'm an Arab, but I found it much more logical to go from one note to another in Leimma and Apotome. They brought me close to something familiar, closer to what I truly want to express"(op.cit.).

Though some of the response was in critique of the article itself[138], and its provocative headline rather than the project, the two issues spilled over. As of 8 April 2022 the article was shared on Facebook over 2000 times generating over 5000 comments and over 14,000 reactions.[139]



Engagements with the Pitchfork article as of 6 April 2022

[138] This often focused on the way the article framed the project and its vague references to time signatures and rhythm, alongside the lack of recognition of previous solutions, regardless of their cultural exclusivity.

[139] Count generated via: https://sharescount.com/ the screen capture of which is used here.

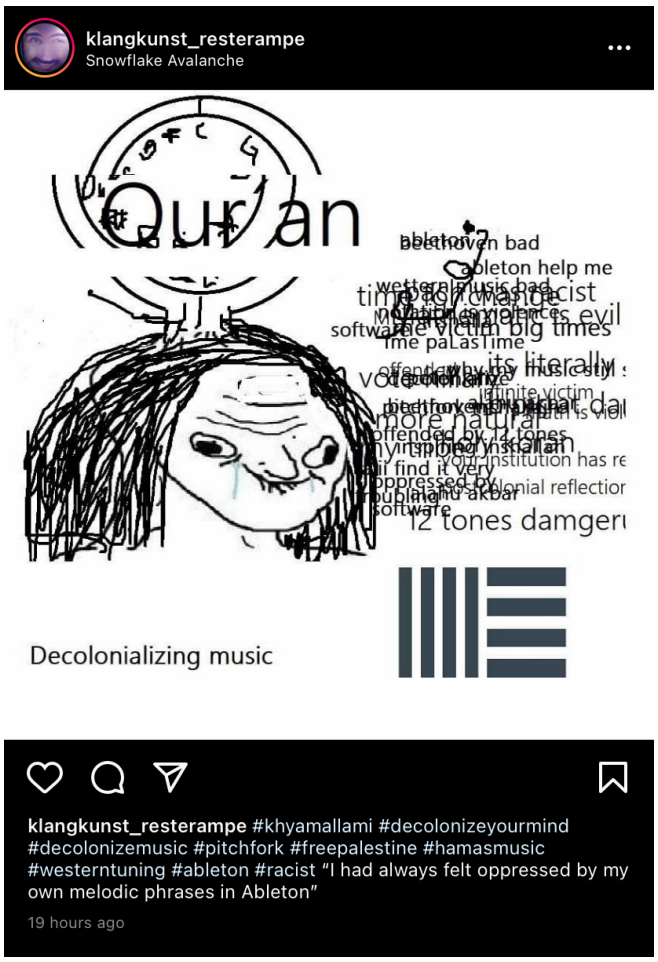
For the sake of documentation, I have attached screen captures of the many comments on Pitchfork's Facebook page from its initial publication and share date of 25 Feb 2021 until October 2021 in the appendices.

After the 30 March 2021 release of OddSound's MTS-ESP plugin in collaboration with Aphex Twin, the following meme, now deleted, featuring the Pitchfork article and Aphex Twin was posted onto the Facebook Group Xenharmonic Memes for Perceptually Aware Teens[140].

Meme from Xenharmonic Memes for Perceptually Aware Teens Facebook Group April 2021

A few months later a strange troll account, which has since been deleted, posted the following meme depicting me on Instagram:

[140] Available at: https://www.facebook.com/groups/841532689389565 (Accessed: 8 April 2022)



Meme posted to Instagram July 2021

This seemed to be in reaction to a simple comment I made on Instagram in support of a statement of solidarity with Palestinians by a Berlin club during the settler colonial aggressions in Sheikh Jarrah. What is peculiar is the strange computer generated nature of the meme, its clear use of the Pitchfork article, Deena Abdelwahed's quote and the Ableton logo, and how manipulative, stigmatising and politicised it is: Qur'an, Decolonizing music, 12 tones dangerous, #HamasMusic, #Ableton, #racist etc. Fortunately these memes were singular incidents.

As a result of the visibility of the project, facilitated in part by the Pitchfork article, I was subsequently invited to give talks, lectures and pedagogical workshops at varying universities and organisations across the

world. These included: HFG Karlsruhe and Hochschule Düsseldorf (DE), University of the Arts London/CRiSSAP, Trinity Laban and University of Edinburgh (UK), CUNY (US), Cultural Resource and Etijahat (LB), ADEF (EG), Goethe Institute Iraq (IQ), PGVIS (TH), CTM Festival and Amplify Berlin (DE), Gaudeamus Festival (NL), Gong Tomorrow Festival (DN), and teaching a module about tuning and intonation to second year BMus composition students at RBC/BCU, amongst others.

One of the most significant events was a long-form workshop project over a period of six weeks titled Common Tonalities for Nusasonic (IN)[141]. Twenty applicants from across South East Asia were selected to participate in three, three-hour workshops on the subject of tuning and transcultural music making, after which they were each commissioned to create a new recorded work. The resulting recordings are being complied onto a compilation album and will be released digitally in April/May 2022.

Lastly, I was also contacted by Evan Balster, the founder of Imitone and current Chair of the MIDI Association's MIDI 2.0 Pitch Profiles Sub-Committee. Through my discussions with Evan I was able to have direct contact with the MIDI Association and participate in meetings regarding the development of MIDI 2.0. We are currently discussing the possibility for the creation of a Cultural Diversity Special Interest Group as part of the MIDI Association itself, to try and encourage more direct interaction with musical cultures and BIPOC technologists, researchers and practitioners who have been historically marginalised within the outreach of the MIDI Association.

[141] See https://www.goethe.de/prj/nus/en/art/cmt.html (Accessed on : 06 April 2022)

Conclusion

It is hoped that this artistic research was able to demonstrate both an individuated, and in Glissantian terms, a Relational *échos-monde,* within its maqāmic and transcultural musical creolisations. In its hybrid approach and *tawshīḥ*—meaning its interweaving navigation, interrogation and conceptualisation of historical and modern-day artistic, technological and scholarly works and ideas—it identified and responded to some of the complexities of Arabic and transcultural musical practice, both academically and sonically.

As a whole this research can be seen as a response to the schism between a culturally situated creative practice, and a creative practice which is relevant to present-day lived experiences. A schism imposed by, and inherited from, the remnants of 19th and 20th century colonial logics, and a response manifested through an opaque resistance to binaries and filiative trajectories, expanding upon rhizomatic networks of Relation to give-on-and-with.

The *Requiem* articulated the potential for subtlety to resonate through myth and technology, whilst recognising and allowing space for grief and reflection. *Ma-a a-ba ud me-na-gin Ma-a di-di-in* interrogated and renarrativised specific historicities through rearticulations of native logics, utilising seemingly disparate points of inspiration to invigorate an imaginary that both looks forward and acknowledges the richness of the past, without nostalgia. Whilst *Aṭadata* articulated the sounding of the

Arabic script with the same reverence that calligraphy has to its written form, albeit with humour and energy.

Constellations and *'32* looked back at the pivotal 1932 Cairo Arabic Music Congress with fresh eyes and curious ears, by following up on a remark lost in the circles of time as a point of departure in the now. Meanwhile *Naghamīya* drew inspiration from ancient cosmological philosophies and unlocked an imaginary sonic wormhole that now awaits exploration.

By treating the rich musical culture of India with the same reverence and respect I have for Arabic music and history, *NKHṬ* manifested a creolisation between cultures and technologies, and blended sonorities of both past and present.

Leimma and *Apotome* catalysed overdue conversations on how the latent power of inherited perspectives infiltrates our musical imaginaries through sonic technologies, and how this can lead to the obfuscation of a natural maturation of musical ideas and identities. More importantly, it was these tools that allowed this research project to actively practice its collective and inclusive aspirations, giving-on-and-with all who resonated, and may still come to resonate, with it.

Finally through *Mkhalef*, this project allowed me the opportunity to claim my own space, to reflect, to consider and to insinuate a way of being, through the oud, that is as free of its associations and histories as it is Relationally connected to them.

Bibliography

Aase, A. (2018) *Three concepts in Zaid Jabri's music: Microtones, Heterophony and Expanded Series*. [online] NTNU Institutt for Musikk. Available at: https://musikk.hf.ntnu.no/2018/10/23/zaidjabri/ [Accessed 28 Mar. 2022].

Abbās, Ḥ.D. (1986) *Nadharīyāt al-Mūsīqá al-ʻArabīyah*. Baghdad: Maʻhad Al-Dirāsāt Al-Naghamīyah Al-ʻIrāqī.

Abdallah, T. (2015) L'art égyptien du taqsīm mursal au ʻūd de Sayyid a-s-Suwaysī à Muḥammad al- Qaṣabgī. *Revue de Traditions Musicales de Monde Arabe et Méditerranéen*, 9, pp.71–98.

Abdallah, T. (2016) *Muḥammad al-Qaṣabjī Mujadid Fann al-ʻŪd wa Ustādh al-Asātidha*. [online] AMAR Foundation. Available at: https://www.amar-foundation.org/qasabgi-article/?lang=ar [Accessed 7 Apr. 2022].

Abirached, Z. (2016) *Piano Oriental*. Berlin: Avant-Verlag.

Abou Mrad, N. (2006) Le legs musical noté par Ṣafiy a-d-Dīn al-Urmawī : approche systémique critique et transcription. *Musurgia*, 13(1), pp.41–61.

Abou Mrad, N. (2007) Clés musicologiques pour l'approche du legs de Mīhā'īl Maššāqa (1800-1888) *RTMMAM*, 1, pp.1–68.

Abu Shumays, S. (2009) The Fuzzy Boundaries of Intonation in Maqam: Cognitive and Linguistic Approaches. [online] Annual Conference of the Society for Ethnomusicology. Available at: https://maqamlessons.com/analysis/media/FuzzyBoundaries_MaqamIntonation2009.pdf [Accessed 9 Apr. 2022].

Agawu, K. (2003) Representing African Music : Postcolonial Notes, Queries, Positions. New York: Routledge.

Agawu, K. (2016a) *The African Imagination in Music*. New York: Oxford University Press.

Agawu, K. (2016b) Tonality as a Colonizing Force in Africa. In: T. Olaniyan and R. Radano, eds., *Audible Empire: Music, Global Politics, Critique*. Durham: Duke University Press.

Al-Azzawi, D., David, C., Traboulsi, K. and Youssef, N. (2017) *Dia Al-Azzawi: A Retrospective, from 1963 until Tomorrow*. Doha: Mathaf: Arab Museum of Modern Art.

Al-Faruqi, I.R. (1973) Islam and Art. *Studia Islamica*, (37), pp.81–109.

al Faruqi, L. (1977) The Aesthetics of Islamic Art. *The Journal of Aesthetics and Art Criticism*, 35(3), pp.353–355.

Al-Hilu, S. (1961) *Al-Mūṣīqa Al-Nadharīya*. Beyrouth: Maṭba'at Al-Hayat.

Allāh Wīrdī, M.K. (1949) *Falsafat Al-Mūsīqa Al-Sharqīya fī Asrār Al-fann Al-ʿArabī*. [online] Damascus: Maṭba'at Ibn Zaidūn. Available at: http://dlib.nyu.edu/aco/book/aub_aco003675/1 [Accessed 9 Apr. 2022].

Allami, K. (2011) *Resonance/Dissonance*. [CD] Nawa Recordings. NAWA001.

Allami, K. (2019) Microtonality and the Struggle for Fretlessness in the Digital Age. *Persistence: CTM Festival 2019 Magazine*, [online] pp.52–59. Available at: https://www.ctm-festival.de/magazine/microtonality-and-the-struggle-for-fretlessness-in-the-digital-age. [Accessed 9 Apr. 2022].

Allami, K. (2021a) *Apotome & Leimma User Guide*. [online] Google Docs. Available at: https://docs.google.com/document/d/1vxLZaL8jeXQcj3m7q6qF42ZWAaG-2HlRkQZiGacRUXI/ [Accessed 9 Apr. 2022].

Allami, K. (2021b) The Third Place: In the Shadows of Anxiety and Recovery. *The Derivative*. [online] 30 Dec. Available at: https://thederivative.org/for-disquiet/ [Accessed 9 Apr. 2022].

Al-Rejab, B.H. (1985) *Usūl Ghinā' Al-Maqām Al-Baghdādī*. Baghdad: Maṭba'at Ufset Al-Wisām.

Baggech, M. (1998) *An English Translation of Oliver Messiaen's Traité de Rythme, de Couleur, et D'ornithologie Volume I*. Doctoral Thesis.

Barbour, J.M. (1951) *Tuning and Temperament: A Historical Survey*. East Lansing, MI: Michigan State College Press.

Barker, A. (1989) *Greek Musical Writings Vol. 2, Harmonic and Acoustic Theory*. Cambridge: Cambridge University Press.

Barlow, C. (1980) Bus Journey to Parametron (all about ÇOGLUOTOBÜSISLETMESI). *Feedback Papers*, (21-23).

Bernal, M. (1987) *Black Athena*. London: Free Association Books.

Beyhom, A. (2010) *Théories de l'échelle et pratiques mélodiques chez les Arabes : une approche systématique et diachronique. 1,1, I. L'échelle générale et les genres ; 1. Théories gréco-arabes de kindī à Ṭūsī (XIIIe siècle)*. Paris: Geuthner.

Bin Salāmah Al-Naḥawī Al-Lughawī, A.Ṭ.A.-M. (1984) *Kitāb Al-Malāhī wa-Asmā'ihā min Qibal Al-Mūsīqa*. Cairo: Al-Hay'ah Al-Miṣrīyah Al-'Āmmah lil-Kitāb.

Burkhalter, T. (2013) Multisited Avant-Gardes or World Music 2.0? Musicians from Beirut and Beyond between Local Production and Euro-American Reception. In: T. Burkhalter, K. Dickinson and B.J. Harbert, eds., *The Arab Avant-Garde: Music, Politics, Modernity*. Middletown, Conn.: Wesleyan University Press, pp.185–208.

Burkhalter, T., Dickinson, K. and Harbert, B.J. (2013) *The Arab Avant-Garde: Music, Politics, Modernity*. Middletown, Conn.: Wesleyan University Press.

Carlos, W. (1987) Tuning: At the Crossroads. *Computer Music Journal*, 11(1), p.29.

Castanheira, J.C.S. (2020) Studio sounds: Digital Tools and Technocolonialism. In: A.L. Cárdenas, ed., *Border-Listening/ Escucha-Liminal, Volume 1*. [online] Radical Sounds of Latin America. Available at: https://radicalsoundslatinamerica.com/2020/11/24/studio-sounds-digital-tools-and-technocolonialism/ [Accessed 9 Apr. 2022].

Castanheira, J.C.S. (2021) Technocoloniality: Social and Cultural Inequalities within Musical Technical Discourse. In: *Rethinking Borders and Boundaries beyond the global/local Dichotomy in Communication Studies*. [online] Nairobi: International Association for Media and Communication Research - IAMCR. Available at: https://iamcr.box.com/shared/static/bckox3argew5sbypb06c7py4u39h2w06.pdf [Accessed 9 Apr. 2022].

Charnas, D. (2022) Personal Communication.

Cloarec, J. (2007) *Newsletter #13*. [online] Alain Daniélou official site. Available at: https://www.alaindanielou.org/newsletters-archives/newsletter-13-april-2007/[Accessed 9 Apr. 2022].

Cowl, C. (1966) The Risāla fī Ḫubr Tā'līf Al-Alḥān of Ja'qūb Ibn Ishāq Al-Kindī (790-874) *The Consort*, (23), pp.129–159.

Crickmore, L. (2009) The Tonal Systems of Mesopotamia and Ancient Greece: Some Similarities and Differences. *The Archaeomusicological Review of the Ancient Near East*, 1, pp.1–16.

Cyrille, D. (2002) Popular Music and Martinican-Creole Identity. *Black Music Research Journal*, 22(1), p.65.

Dagher, C. (2016) *Arabic Hurufiyya: Art and Identity*. Translated by S. Mahmoud. Milano: Skira.

Daniélou, A. (1943) Introduction to the Study of Musical Scales. London: The India Society.

Daniélou, A. (1958) *Tableau Comparatif des Intervalles Musicaux*. Pondichéry: Institute Français D'Indologie.

Daniélou, A. (1987) The Way to the Labyrinth: Memories of East and West. New York: New Directions.

Daniélou, A. (1995) Music and the Power of Sound: The Influence of Tuning and Interval on Consciousness. Rochester, VT: Inner Traditions.

Daniélou, A. and Brunet, J. (1971) The situation of music and musicians in countries of the Orient. Translated by J. Evarts. Florence: Olschki.

Darwish, S. (1920) *Wallāhī Tistāhil*. Cairo: SonoCairo. Available at: https://www.youtube.com/watch?v=gHNpi9EqQsc [Accessed 9 Apr. 2022].

Dash, J.M. (1998) The Other America: Caribbean Literature in a New World Context. Charlottesville, VA: University of Virginia Press.

Davis, B.P. (2019) The Politics of Édouard Glissant's Right to Opacity. *The CLR James Journal*, 25(1), pp.59–70.

D'Erlanger, R. (1930) La Musique Arabe, Tome 1: Al-Fārābī, Grand traité de la musique/Kitābu l-Musīqī al-Kabīr, livres I et II. Paris: Geuthner.

D'Erlanger, R. (1935) La Musique Arabe, Tome 2: Al-Fārābī (suite: livre III) et Avicenne Mathématiques (Kitābu' š-šifā') Paris: Geuthner.

Dudon, J. and Cloarec, J. (n.d.) *Historical background: From the S52 to the Semantic*. [online] Semantic Daniélou. Available at: https://www.semantic-danielou.com/historical-background/ [Accessed 9 Apr. 2022].

Duplan, A. (2020) Blackspace : on the poetics of an afrofuture. Boston: Black Ocean.

Eine Frage der Stimmung - Arabische Musik auf europäischen Instrumenten, (2019) Deutschlandfunk Kultur. 26 Apr. Available at: https://www.hoerspielundfeature.de/arabische-musik-auf-europaeischen-instrumenten-eine-frage-102.html [Accessed 9 Apr. 2022].

Ewell, P.A. (2020) Music Theory and the White Racial Frame. *Music Theory Online*, 26(2).

Faber, T. (2021) Decolonizing Electronic Music Starts with Its Software. *Pitchfork*. [online] 25 Feb. Available at: https://pitchfork.com/thepitch/decolonizing-electronic-music-starts-with-its-software/ [Accessed 9 Apr. 2022].

Fanon, F. (1963) *The Wretched of the Earth*. New York, NY: Grove Press.

Farah, A. (2006) *Solfège en musique orientale arabe*. Beirut: Lebanese National Higher Conservatory of Music.

Farhat, H. (2004) *The Dastgāh Concept in Persian Music*. Cambridge ; New York: Cambridge University Press.

Farmer, H.G. (1929) A History of Arabian Music to the XIIIth Century. London: Luzac.

Farmer, H.G. (1957) The Music of Ancient Mesopotamia. In: E. Wellesz, ed., *New Oxford History of music. Vol. 1, Ancient and Oriental Music*. New York, NY: Oxford University Press.

Forster, C. (2010) Musical mathematics : on the art and science of acoustic instruments. San Francisco, CA: Chronicle Books.

GärtnerS. (2008) Werkstatt-Spuren : die Sonatine von Pierre Boulez : eine Studie zu Lehrzeit und Frühwerk. Bern ; New York: P. Lang.

Gerson-Kiwi, E. (1964) On the Musical Sources of the Judaeo-Hispanic 'Romance.' *The Musical Quarterly*, L(1), pp.31–43.

Ghoṣn, F. (1984) Al-Madrasa Al-Ḥadītha li ālat al-'Ūd, Volumes 1, 2 and 3. Beirut: n.p.

Ghrab, A. (2005) The Western Study of Intervals in 'Arabic Music,' from the Eighteenth Century to the Cairo Congress. *The World of Music*, 48(3).

Gibrayel, I. (2017) *Identity representation: self-Orientalism and hyper-nationalism in Arab Design*. [Graduation Thesis] Available at: https://www.researchgate.net/publication/317957975_Identity_representation_self-Orientalism_and_hyper-nationalism_in_Arab_design [Accessed 9 Apr. 2022].

Glissant, É. (1989) *Caribbean Discourse: Selected Essays*. Translated by J.M. Dash. Charlottesville, VA: University Press of Virginia.

Glissant, É. (1990) Poétique de la relation: Poétique III. Paris: Gallimard.

Glissant, É. (1997a) *Le discours antillais*. Paris: Gallimard.

Glissant, É. (1997b) *Poetics of Relation*. Translated by B. Wing. Ann Arbor, MI: University of Michigan Press.

Gordon, M. (2012) *Rushes*. [online] Michael Gordon. Available at: https://michaelgordonmusic.com/music/rushes/ [Accessed 9 Apr. 2022].

Gurney, O.R. (1968) An Old Babylonian Treatise on the Tuning of the Harp. *Iraq*, 30(2), p.229.

Guthrie, K.S. (1987) The Pythagorean Sourcebook and Library: An Anthology of Ancient Writings Which Relate to Pythagoras and Pythagorean philosophy. Grand Rapids: MI: Phanes.

Hamourtziadou, L. (2018) *Where is the commemoration of civilians killed in war?* [online] Birmingham City University. Available at: https://www.bcu.ac.uk/news-events/news/where-is-the-commemoration-of-civilians-killed-in-war [Accessed 9 Apr. 2022].

Helmholtz, H. von (1863) Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik. Braunschweig: Friedrich Vieweg Und Sohn.

Helmholtz, H. von and Ellis, A.J. (1912) *On the Sensations of Tone as a Physiological Basis for the Theory of Music*. Fourth Edition translated from the Fourth last German Edition of 1877 ed. London: Longmans, Green, and Co.

Humbert-Lavergne, M. (1932) Le congrès de musique arabe du caire. *La revue musicale*, 13(126), pp.382–384.

Iamblichus (1918) *The Life of Pythagoras*. Translated by T. Taylor. Krotona, CA: Theosophical Publishing House.

'-ic, suffix'. (2022) In: *OED Online*. [online] Oxford University Press. Available at: https://www.oed.com/view/Entry/90756 [Accessed 9 Apr. 2022].

Isacoff, S. (2001) Temperament: How Music Became a Battleground for the Great Minds of Western Civilization. New York, NY: Vintage Books.

'-ise, suffix.' (2022) In: *OED Online*. [online] Oxford University Press. Available at: https://www.oed.com/view/Entry/100447 [Accessed 9 Apr. 2022].

Isgandarova, N. (2015) Music in Islamic Spiritual Care: A Review of Classical Sources. *Religious Studies and Theology*, 34(1), pp.101–114.

'-ism, suffix.' (2022) In: *OED Online*. [online] Oxford University Press. Available at: www.oed.com/view/Entry/100006[Accessed 9 Apr. 2022].

Jairazbhoy, N.A. (1975) An Interpretation of the 22 Srutis. *Asian Music*, 6(1/2), p.38.

James, R. (2019) The Sonic Episteme: Acoustic Resonance, Neoliberalism and Biopolitics. Durham, NC: Duke University Press.

James, R.D. and Takahashi, T. (2017.) *Richard D. James speaks to Tatsuya Takahashi*. [online] warp.net. Available at: https://warp.net/editorial/richard-d-james-speaks-to-tatsuya-takahashi [Accessed 9 Apr. 2022].

Kárpáti, J. (1964) Béla Bartók and the East (Contribution to the History of the Influence of Eastern Elements on European Music). *Studia Musicologica Academiae Scientiarum Hungaricae*, 6(3/4), pp.179–194.

Katz, I.J., Craik, S.M. and Shiloah, A. (2015) *Henry George Farmer and the First International Congress of Arab Music (Cairo 1932)*. Leiden: Brill.

Kayser, H. (1970) *Akróasis: The Theory of World Harmonics*. Translated by R. Lilienfeld. Boston: Plowshare Press.

Kilmer, A.D. (1971) The Discovery of an Ancient Mesopotamian Theory of Music. *Proceedings of the American Philosophical Society*, 115(2), pp.131–149.

Kilmer, A.D. (2019) 'Musik. A. I. In Mesopotamien', in E. Ebeling and E.F. Weidner (eds) Reallexikon der Assyriologie und vorderasiatische Archäologie, Bd. 8. Berlin, pp. 463–482. Available at: https://publikationen.badw.de/en/rla/index#8045 [Accessed 9 Apr. 2022].

Kirn, P. (2021) *Escaping tuning's restrictive default setting - a conversation with Khyam Allami*. [online] CDM Create Digital Music. Available at: https://cdm.link/2021/03/escaping-tunings-restrictive-default-setting-a-conversation-with-khyam-allami/ [Accessed 9 Apr. 2022].

Krishnamurthy, N. (2021) *Nakul Krishnamurthy in conversation with Khyam Allami*. [online] Apr. Available at: https://counterflows.com/interview/nakul-krishnamurthy-in-conversation-with-khyam-allami/ [Accessed 9 Apr. 2022].

Lachmann, R., el-Hefni, M. and Al-Kindī, Y. ibn-Isḥāq (1931) Risāla fī ḫubr tāʾlif al-Alḥān: Über d. Komposition d. Melodien. Leipzig: Kistner & C. F. W. Siegel.

Lampert, V. (2008) Bartók and the Berlin school of ethnomusicology. *Studia Musicologica*, 49(3-4), pp.383–405.

Land, J.P.N. (1880) Over de Toonladders der Arabische Musiek (On the Scales of Arabic Music). In: *Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen. Afdeeling Letterkunde.* Amsterdam: Johannes Müller, pp.246–298.

Land, J.P.N. (1885) Recherches sur l'histoire de la gamme arabe. In: Actes du Sixième Congrès International des Orientalistes tenu en 1883 à Leide. Deuxième partie. Section 1: Sémitique. Leide: E. J. Brill, pp.35–168.

Lang, D. (2014) *almost all the time*. [online] David Lang. Available at: https://davidlangmusic.com/music/almost-all-time/ [Accessed 9 Apr. 2022].

Levarie, S. and Levy, E. (1980) *Tone: A Study in Musical Acoustics*. Second Edition ed. Kent, OH: Kent State University Press.

Levin, F.R. and Nicomachus (1975) *The Manual of Harmonics of Nicomachus the Pythagorean*. University Park, PA: American Philological Association.

Lewis, G.E. (2000) Too Many Notes: Computers, Complexity and Culture in Voyager. *Leonardo Music Journal*, [online] 10, pp.33–39. Available at: https://muse.jhu.edu/article/20320 [Accessed 16 Jul. 2020].

Lewis, G.E. (2009) A Power Stronger than Itself: the AACM and American Experimental Music. Chicago: University of Chicago Press.

Lewis, G.E. (2012) In Search of Benjamin Patterson: An Improvised Journey. *Callaloo*, 35(4), pp.979–992.

Linn, R. (1980) LM-1 Drum Computer Instruction Manual, Linn Electronics, Inc.

Logic Pro 10.73 User Guide (2022) Available at: https://help.apple.com/pdf/logicpro/en_US/logic-pro-user-guide.pdf [Accessed 9 Apr. 2022].

Loock, U. (2012) Opacity. *Frieze*. [online] Available at: https://www.frieze.com/article/opazit%C3%A4t [Accessed 9 Apr. 2022].

Lou Harrison: The Tuning of the Babylonian Harp, (1971) KPFA Radio Music Department/Other Minds Available at: https://archive.org/details/AM_1971_02_12 [Accessed 9 Apr. 2022].

Maalouf, S. (2003) Mikhail Mishaqa: Virtual Founder of the Twenty-Four Equal Quartertone Scale. *Journal of the American Oriental Society*, 123(4), p.835.

Maalouf, S. (2011) History of Arabic Music Theory: Change and Continuity in the Tone Systems, Genres, and Scales. Shelbyville, KY: Wasteland Press.

Marcus, S. (1989) Arab Music Theory in the Modern Period. PhD Dissertation.

Marcus, S.L. (1992) Modulation in Arab Music: Documenting Oral Concepts, Performance Rules and Strategies. *Ethnomusicology*, 36(2), p.171.

Martin, D.-C. (2008) Can Jazz Be Rid of the Racial Imagination? Creolization, Racial Discourses, and Semiology of Music. *Black Music Research Journal*, 28(2), pp.105–123..

Mashshāqa, M. (1899) Al-Risāla Al-Shahābīya fī Al-Ṣinā'a Al-Mūsīqīya. Beirut: Maṭba'at Al-Ābā' Al-Yasū'īyīn.

Mathieu, W.A. (1997) Harmonic Experience: Tonal Harmony from Its Natural Origins to Its Modern Expression. Rochester, VT: Inner Traditions International.

Maul, S.M. (2005) Bilingual (Sumero-Akkadian) Hymns from the Seleucid-Arsacid Period. In: I. Spar and W.G. Lambert, eds., *Cuneiform Texts in the Metropolitan Museum of Art. Volume II, Literary and Scholastic Texts of the First Millennium B.C.* New York: NY: The Metropolitan Museum of Art, pp.11–116.

Mawjāt Martenot - Arabische Klänge und frühe elektronische Musik, (2020) Deutschlandfunk Kultur. 27 Nov. Available at: https://www.hoerspielundfeature.de/arabische-klaenge-und-fruehe-elektronische-musik-mawjat-100.html [Accessed 9 Apr. 2022].

McClain, E.G. (1984) The Myth of Invariance: The Origin of the Gods, Mathematics and Music from the Ṛg Veda to Plato. York Beach, ME: Nicolas-Hays.

McClain, E.G. (1994) Musical Theory and Ancient Cosmology. *The World and I*, [online] 9(2), pp.371–391. Available at: https://ernestmcclain.files.wordpress.com/2017/05/musical-theory-and-ancient-cosmology-by-ernest-g-mcclain-1994.pdf [Accessed 9 Apr. 2022].

Messiaen, O. (1956) *The Technique of My Musical Language*. Translated by J. Satterfield. Paris: Leduc.

Mirelman, S. (2010) A New Fragment of Music Theory from Ancient Iraq. *Archiv fur Musikwissenschaft*, 67(1), pp.45–51.

Mirelman, S. (2013) Tuning Procedures in Ancient Iraq. *Analytical Approaches to World Music*, 2(2), pp.43–56.

Mirelman, S. and Krispijn, T.J.H. (2009) The Old Babylonian tuning text UET VI/3 899. *Iraq*, 71, pp.43–52.

Morayef, S. (2012) *'We Are the Eight Percent': Inside Egypt's Underground Shaabi Music Scene*. [online] Jadaliyya - جدلية. Available at: https://www.jadaliyya.com/Details/26088/We-Are-the-Eight-Percent-Inside-Egypt%60s-Underground-Shaabi-Music-Scene [Accessed 9 Apr. 2022].

Muhsin, S. (2013) The ‘People’s Artist’ and the Beginnings of the Twentieth-Century Arab Avant-Garde. In: T. Burkhalter, K. Dickinson and B.J. Harbert, eds., *The Arab Avant-Garde*. Middletown, CT: Wesleyan University Press, pp.121–144.

n.a. (1933) *Kitāb Mu’tamar al-Mūsīqá al-ʻArabīya*. [online] Cairo: Al-Maṭba’ah Al-Amīrīyah. Available at: http://dlib.nyu.edu/aco/book/columbia_aco003841/1 [Accessed 9 Apr. 2022].

n.a. (1934) Recueil Des Travaux Du Congrès De Musique Arabe. Cairo: Impr. Nationale, Boulac.

Naji, A. (2019) Under the Palm Trees : Modern Iraqi Art with Mohamed Makiya and Jewad Selim. New York, NY: Rizzoli.

Nakaseko, K. (1957) Symbolism in Ancient Chinese Music Theory. Journal of Music Theory, 1(2), p.147.

Neugebauer, O. (1957) The Exact Sciences in Antiquity. Providence, RI: Brown University Press.

Nyman, M. (1999). *Experimental music: Cage and beyond*. Cambridge: Cambridge University Press.

OED Online. (2022) "opaque, adj. and n.". [online] Available at: https://www.oed.com/view/Entry/131685 [Accessed 9 Apr. 2022].

Omnisphere 2 2.8 Manual (2020) — Last update: Feb 03, 2022 Available at: https://support.spectrasonics.net/manual/Omnisphere2/25/en/topic/system-tune-index [Accessed 9 Apr. 2022].

ORACC: Bilinguals in Late Mesopotamian Scholarship. (n.d.) *CTMMA 2, 008 (MMA 86.11.346+)* [online] Available at: http://oracc.museum.upenn.edu/blms/P412181 [Accessed 9 Apr. 2022].

Pacholczyk, J. (1996) Music and Astronomy in the Muslim World. *Leonardo*, 29(2), p.145.

Partch, H. (1979) *Genesis of a Music*. New York: Da Capo Press.

Parviainen, T. (2017) *How Generative Music Works*. [online] teropa.info. Available at: https://teropa.info/loop/#/title [Accessed 9 Apr. 2022].

Peterson, M. (2013) Sonic Cosmopolitanisms: Experimental Improvised Music and a Lebanese-American Cultural Exchange. In: T. Burkhalter, K. Dickinson and B.J. Harbert, eds., *The Arab Avant-Garde: Music, Politics, Modernity*. Middletown, Conn.: Wesleyan University Press, pp.185–208.

Powers, H.S. and Kolinski, M. (1962) Studies in Ethnomusicology, Vol. I, 1961 (Review) *Ethnomusicology*, 6(3), p.220.

"transparent, adj. (and n.)". (2022) In: *OED Online*. [online] Oxford University Press. Available at: https://www.oed.com/view/Entry/204969?redirectedFrom=transparent [Accessed 9 Apr. 2022].

Racy, A.J. (1983) Music. In: J.R. Hayes, ed., *The Genius of Arab Civilization*. London: Eurabia, pp.121–148.

Racy, A.J. (1993) 'Historical Worldviews of Early Ethnomusicologists: An East-West Encounter in Cairo, 1932', in S. Blum, P.H. Bohlman, and D.M. Neuman (eds) *Ethnomusicology and modern music history*. Urbana, IL: University of Illinois Press, pp. 68–91.

Racy, A.J. (2000) The Many Faces of Improvisation: the Arab Taqasim as a Musical Symbol. *Ethnomusicology*, 44(2), p.302.

Racy, A.J. (2003) Making Music in the Arab World: The Culture and Artistry of Tarab. Cambridge: Cambridge University Press.

Railton, L. (2020) *Lament in Three Parts*. Available at: https://www.cafeoto.co.uk/shop/lucy-railton-lament-in-three-parts/ [Accessed 9 Apr. 2022].

Rasmussen, A.K. (1996) Theory and Practice at the 'Arabic org': Digital Technology in Contemporary Arab Music Performance. *Popular Music*, 15(3), pp.345–365.

Rath, R.C. (2018) Ethnodigital Sonics and The Historical Imagination. In: M.C. Lingold, D. Mueller and W.A. Trettien, eds., *Digital sound studies*. Durham,: Duke University Press, pp.29–46.

Reich, S. (2002) *Writings on Music: 1965-2000*. New York: Oxford University Press.

Rich, R. (2019) Personal Communication.

Riedweg, C. (2005) *Pythagoras: His Life, Teaching, and Influence*. Translated by S. Rendall. New York, NY: Cornell University Press.

[Risālah fī khubr taʾlīf al-alḥān] [رسالة في خبر تأليف الألحان] Kindī, Yaʿqūb ibn Isḥāq كندي، يعقوب بن إسحق, British Library: Oriental Manuscripts, Or 2361, ff 165r-168r, in *Qatar Digital Library*. Available through: https://www.qdl.qa/archive/81055/vdc_100131607039.0x00000a [Accessed 9 Apr. 2022].

Robinson, D. (2020) Hungry listening: Resonant Theory for Indigenous Sound Studies. Minneapolis: University Of Minnesota Press.

Rohana, N. (2021) *'Ūd Taqsīm as a Model of Pre-Composition*. [Doctoral Thesis] Available at: https://hdl.handle.net/1887/3247274 [Accessed 9 Apr. 2022].

Rommen, T. (2015) Créolité, (Im)Mobility, and Music in Dominica. *Journal of Musicology*, 32(4), pp.558–591.

Sabat, M. and Nicholson, T. (2018) *Fundamental Principles of Just Intonation and Microtonal Composition*. [online] Plainsound.org. Available at: https://marsbat.space/pdfs/JI.pdf [Accessed 9 Apr. 2022].

Sabat, M. (n.d.) *Marc Sabat: Music & Writings*. [online] www.marsbat.space. Available at: https://www.marsbat.space/ [Accessed 9 Apr. 2022].

Sabat, M., Schweinitz, W. von, Nicholson, T., Lamb, C. and Abbot, M.O. (2020) *Helmholtz-Ellis JI Pitch Notation (HEJI)* [online] Plainsound. Available at: https://marsbat.space/pdfs/HEJI2_legend+series.pdf [Accessed 9 Apr. 2022].

Safa, (2022) *Ibtihalat* (UIQLP004) [audio stream] Available through: https://uiqmusic.bandcamp.com/album/ibtihalat-uiqlp004 [Accessed 9 Apr. 2022].

Saḥḥāb, F. (1997) Muʾtamar al-Mūsīqa al-ʿArabīyah al-Awwal, al-Qāhirah, 1932. Beirut: Al-Sharikah al-ʿĀlamīyah lil-Kitāb.

Said, E.W. (1991) *Musical elaborations*. New York, NY: Columbia University Press.

Said, E.W. (2003) *Orientalism*. London: Penguin.

Said, E.W. (2008) *Music at the Limits*. New York, NY: Columbia University Press.

Sambamoorthy, P. (1951) *South Indian Music: Book V*. Madras: The Indian Music Publishing House.

Sevish (2017) *Scala Tutorial - How to Change the Key of Your Scale*. [online] Sevish. Available at: https://sevish.com/2017/how-to-change-key-scala/ [Accessed 9 Apr. 2022].

Sevish (n.d.) *Scale Workshop*. [online] Sevish Music. Available at: https://sevish.com/scaleworkshop/ [Accessed 9 Apr. 2022].

Shabout, N.M. (2007) *Modern Arab Art : Formation of Arab Aesthetics*. Gainesville, FL: University Press of Florida.

Shawki, Y. (1969) *Qiyās al-Sullam al-Mūsīqī al-'Arabī.* Cairo: Maṭbaʿat Dār Al-Kutub.

Shawki, Y. and Al-Kindī, Y. ibn I. (1969) *Risālat al-Kindī fī khubr ṣināʿat al-ta'līf*. Cairo: Maṭbūʿāt Dār Al-Kutub.

Shiloah, A. (1979) *The Theory of Music in Arabic Writings (c.900-1900), Descriptive Catalogue of Manuscripts in Libraries of Europe and the USA*. RISM. B/X ed. Munich: G. Henle.

Shiloah, A. (1980) The Status of Traditional Art Music in Muslim Nations. *Asian Music*, 12(1), p.40.

Shiloah, A. (1981) The Arabic Concept of Mode. *Journal of the American Musicological Society*, 34(1), pp.19–42.

Shumays, S.A. and Farraj, J. (2019) *Inside Arabic Music: Arabic Maqam Performance and Theory in the 20th Century Middle East.* New York, NY: Oxford University Press.

Signell, K.L. (2008) Makam: Modal Practice in Turkish Art music. Sarasota, FL: Usul Editions.

Silverstein, S. (2013) Transforming Space: The Production of Contemporary Syrian Art Music. In: T. Burkhalter, K. Dickinson and B.J. Harbert, eds., *The Arab Avant-Garde: Music, Politics, Modernity*. Middletown, Conn.: Wesleyan University Press, pp.37–73.

Smith, E., Meshâḳah, M. and Meshakah, M. (1847) A Treatise on Arab Music, Chiefly from a Work by Mikhâil Meshâḳah, of Damascus. *Journal of the American Oriental Society*, 1(3), p.171.

Spar, I. and Lambert, W.G. eds., (2005) C*uneiform Texts in the Metropolitan Museum of Art. Volume II, Literary and Scholastic Texts of the First Millennium B.C.* New York: NY: The Metropolitan Museum of Art.

Stadler, G. (2015) On Whiteness and Sound Studies. *Sounding Out!* Available at: https://soundstudiesblog.com/2015/07/06/on-whiteness-and-sound-studies/ [Accessed 9 Apr. 2022].

Stewart, C. (2016) Creolization: History, Ethnography, Theory. In: C. Stewart, ed., *Creolization: History, Ethnography, Theory*. Walnut Creek, CA: Left Coast Press, pp.1–25.

Strachan, R. (2017) *Sonic Technologies: Popular Music, Digital Culture and the Creative Process*. New York, NY: Bloomsbury.

Surty, M.I.H.I. (1988) *A Course in the Science of Reciting the Qur'ān*. Leicester: Islamic Foundation.

Tenney, J. (2018) James Tenney. In: A. Lucier, ed., *Eight Lectures on Experimental Music*. Middletown, CT: Wesleyan University Press, pp.1–11.

Théberge, P. (1997) *Any Sound You Can Imagine: Making Music/Consuming Technology*. Hanover, NH: Wesleyan University Press.

Touma, H.H. (1971) The Maqam Phenomenon: an Improvisation Technique in the Music of the Middle East. *Ethnomusicology*, 15(1), p.38.

Tsuge, G. (1972) A Note on the Iraqi Maqam. *Asian Music*, 4(1), p.59.

Underground/On the Surface. (2013) [film] https://www.imdb.com/title/tt3460876/ [Accessed 9 Apr. 2022].

United States Library of Congress (2012) *ALA-LC Romanization Tables: Transliteration Schemes for Non-Roman Scripts*. [online] Available at: https://www.loc.gov/catdir/cpso/roman.html [Accessed 9 Apr. 2022].

Vágnerová, L. (2017) 'Nimble Fingers' in Electronic Music: Rethinking sound through neo-colonial labour. *Organised Sound*, 22(2), pp.250–258.

Volk, K. (2005) Nos. 1: Old Babylonian Balag, to the Mother Goddess Aruru. In: I. Spar and W.G. Lambert, eds., *Cuneiform Texts in the Metropolitan Museum of Art. Volume II, Literary and Scholastic Texts of the First Millennium B.C.* New York: NY: The Metropolitan Museum of Art, pp.3–9.

Walden, D.K.S. (2019) The Politics of Tuning and Temperament: Transnational Exchange and the Production of Music Theory in 19th-Century Europe, Asia, and North America. [PhD Dissertation] Available at: https://dash.harvard.edu/handle/1/42013088 [Accessed 9 Apr. 2022].

Wellesz, E. ed., (1957) *New Oxford History of music. Vol. 1, Ancient and Oriental Music*. New York, NY: Oxford University Press.

Wittje, R. (2016) *The Age of Electroacoustics: Transforming Science and Sound*. Cambridge, MA: MIT Press.

Wright, O. (1978) *The Modal System of Arab and Persian music 1250-1300*. London: Oxford University Press.

Wright, O. (2004) The Sight of Sound. *Muqarnas Online*, 21(1), pp.359–371.

Wright, O. (2006) Al-Kindī's braid. *Bulletin of the School of Oriental and African Studies*, 69(1), pp.1–32.

Wulstan, D. (1968) The Tuning of the Babylonian Harp. *Iraq*, 30(2), p.215.

Yūsuf, Z. ʿAlī (1962) *Mūsīqá al-Kindī: Mulḥaq li-kitāb Muʾallafāt al-Kindī al-Musīqīyah*. Baghdād: Maṭbaʿat Shafīq.

Yūsuf, Z. ʿAlī (1965) *Risālat al-Kindī Fī al-luḥūn wa-al-nagham: Mulḥaq Thānin li-kitāb Muʾallafāt al-Kindī al-mūsīqīyah*. Baghdād: Maṭbaʿat Shafīq.

Yūsuf, Z. ʿAlī (2009) *Muʾallafāt al-kindī al-mūsīqīya*. Freiburg a.N: Al-Kamel.

Zeidan, A. (2021) *Haḍihī Ḥijjatī - Muqābala ma3 Khayyam Al-Lāmī*. [online] Ma3azef. Available at: https://ma3azef.com/%D9%85%D9%82%D8%A7%D8%A8%D9%84%D8%A9-%D8%AE%D9%8A%D8%A7%D9%85-%D8%A7%D9%84%D9%84%D8%A7%D9%85%D9%8A/ [Accessed 9 Apr. 2022].

مقام (maqām). (2022) In: *Al-Maany*. [online] Available at: https://www.almaany.com/en/dict/ar-en/%D9%85%D9%82%D8%A7%D9%85/ [Accessed 9 Apr. 2022].

موشح (muwashshaḥ). (2022) In: *Al-Maany*. [online] Available at: https://www.almaany.com/ar/dict/ar-ar/%D9%85%D9%88%D8%B4%D8%AD/?c=%D9%84%D8%B3%D8%A7%D9%86%20%D8%A7%D9%84%D8%B9%D8%B1%D8%A8 [Accessed 9 Apr. 2022].

Discography

3Phaz (2021) *Pressure.* [audio stream] Available through: https://tidal.com/browse/album/171800530 [Accessed: 8 April 2022].

Abdel Rahim, S. (1999). *Tafanen*. [audio stream] Available at: https://www.youtube.com/watch?v=uIgHNrwTdzo [Accessed 9 Apr. 2022].

Abdelwahed, D (2020) *Ah'na Hakkeka* [audio stream] Available through: https://tidal.com/browse/track/122409706 [Accessed: 8 April 2022].

Abu Ghazaleh, Tamer (2016) *Namla*.[audio stream] Available through: https://tidal.com/browse/track/65655703 [Accessed: 8 April 2022].

Adaweyah, A. (1987). *Kont Demont Keresto*. [audio stream] Available at: https://www.youtube.com/watch?v=pH0ACvNQseg [Accessed 9 Apr. 2022].

Alit, D. (2020) *Genetic.* [audio stream] Available through: https://dewaalit.bandcamp.com/album/genetic [Accessed: 8 April 2022].

Al-Khatib, A (2005) *Furatayn (From Jerusalem to Baghdad).* [audio stream] Available through: https://tidal.com/browse/track/24380796 [Accessed: 8 April 2022].

Asfour, H. (2018) *Kouni*. [audio stream] Available through: https://tidal.com/browse/track/89119838 [Accessed: 8 April 2022].

Bachir, J. (1974) *Luth Traditionnel En Iraq.* [LP] Available through: https://www.youtube.com/watch?v=aWnPy99mzPM [Accessed: 8 April 2022].

Bashir, M. (1998) *Iraq-Irak: The Art of the 'ûd (Collection Ocora Radio-France).* [CD] Available through: https://tidal.com/browse/album/17226315 [Accessed: 8 April 2022].

Braxton, A. (2012) *Composition No. 254.* [audio stream] Available through: https://newbraxtonhouse.bandcamp.com/track/composition-no-254 [Accessed: 8 April 2022].

Braxton, A. (2014) *Composition No. 46. (+168 and Language Music).* [audio stream] Available through: https://newbraxtonhouse.bandcamp.com/

album/composition-no-46-168-and-language-music [Accessed: 8 April 2022].

Carlos, W. (1986) *Beauty in the Beast.* [CD] (Audion Recording Co, SYNCD 200)

Carlos, W. (1987) *Secrets of Synthesis.* [CD] (CBS - MK 42333)

Chahine, A. (1965) *Oriental Bouquet*. [LP] (Parlophone, Voix De L'Orient LPVDX134). [audio stream] Available through: https://www.youtube.com/watch?v=s2MXGYmOs2M [Accessed: 8 April 2022].

Dillon, B. (2020) *Workaround 1.* [audio stream] Available through: https://tidal.com/browse/track/125059372 [Accessed: 8 April 2022].

Dolat-Shahi, D (1985) *Sama'*. [audio stream] Available through: https://tidal.com/browse/track/45555053 [Accessed: 8 April 2022].

El Dabh, H. (2002) *The Reappearance of the Lotus Flower*. [audio stream] Available through: https://www.youtube.com/watch?v=bKrl_shaaeU [Accessed: 8 April 2022].

El Shazly (2018) *Afqid Adh-Dhakira*. [audio stream] Available through: https://tidal.com/browse/track/78685673 [Accessed: 8 April 2022].

El-Turk, B. (2012) *Dramaticule IV*. [audio stream] Available through: https://soundcloud.com/bushraelturk/bushra-el-turk-dramaticule-iv [Accessed: 8 April 2022].

ElSaffar (2021) *Dhuha*. [audio stream] Available through: https://tidal.com/browse/track/190655459 [Accessed: 8 April 2022].

ElSaffar, A. (2020) *Live performance.* [video] Jazz Fest Sarajevo. 2020 Available at: https://www.youtube.com/watch?v=2KARzHPGzmM [Accessed 8 April 2022]

Ergun, C. (2020) *Celare.* [audio stream] Available through: https://tidal.com/browse/track/131453578 [Accessed: 8 April 2022].

Gabber Modus Operandi (2021) *Sangkakala*. [audio stream] Available through: https://tidal.com/browse/track/172345563 [Accessed: 8 April 2022].

Haddad, S. (2005) *La Memoire et l'Inconnu (extract).* [audio stream] Available through: https://saedhaddad.com/audio.html / https://www.dropbox.com/s/6taaeblkhew3ngz/La%20Memoire%20et%20l%27Inconnu%20%28Oud%20Concerto%29.mp3?dl=0 [Accessed: 8 April 2022].

Hassler, W and Jubran, Kamilya (2019) *Wa.* [audio stream] Available through: https://tidal.com/browse/track/119408061 [Accessed: 8 April 2022].

Hujairi, H. (2020) *Hijaz on Tape*. [audio stream] Available through: https://tidal.com/browse/track/138740899 [Accessed: 8 April 2022].

Iskandar, N. (n.d.) *Oud and String Trio*. [audio stream] Available through: https://www.youtube.com/watch?v=RWnuJ-S4NbE [Accessed: 8 April 2022].

Jerusalem in My Heart (2021) *Abyad Barraq.* [audio stream] Available through: https://tidal.com/browse/track/192772099 [Accessed: 8 April 2022].

Jubran, K. and Murcia, S., Nhaoul', Accords Croisés AC147, France, 2012

Jubran, Khaled. (2009) *Isfahan*. [audio stream] Available through: https://open.spotify.com/track/57KELMRmevgaWblJkm61nE?si=19e466893add47ba [Accessed: 8 April 2022].

Johnston. B (2011) *String Quartet No. 5: (1979).* [audio stream] Available through: https://tidal.com/browse/track/8614785 [Accessed: 8 April 2022].

Karkhana (2021) *Nafas Kahrouba'i.* [audio stream] Available through: https://tidal.com/browse/track/181817517 [Accessed: 8 April 2022].

Khan, H. (2001) *tabla dubb #11.* [audio stream] Available through: https://soundcloud.com/hassankhan/tabla-dubb-11 [Accessed: 8 April 2022].

Khan, H. (2019) *A Short Story Based on a Distant Memory.* [audio stream] Available through: https://tidal.com/browse/track/104971471 [Accessed: 8 April 2022].

Krishnamurthy, N. (2021) *Tesserae*. [audio stream] Available through: https://www.cafeoto.co.uk/shop/nakul-krishnamurthy-tesserae/ [Accessed: 8 April 2022].

Lamb, C (2021) *divisio spiralis (2019): I.* [audio stream] Available through: https://tidal.com/browse/track/209455949 [Accessed: 8 April 2022].

Lekhfa (2017) *Teskar Tebki.* [audio stream] Available through: https://tidal.com/browse/track/77491610 [Accessed: 8 April 2022].

Lewis, G.E. (1976) *Toneburst (Piece For 3 Trombones Simultaneously).* Available through: https://tidal.com/browse/track/6176296 [Accessed: 8 April 2022].

Lewis, G.E. (1993) *Lewis: Voyager*. [CD] (Avant, Avan 014)

Louca, M. (2014) *Benhayyi Al-Baghbaghan.* (Salute the Parrot). [audio stream] Available through: https://tidal.com/browse/track/50904958 [Accessed: 8 April 2022].

Louca, M. (2019) *The Leper.* [audio stream] Available through: https://tidal.com/browse/track/111430061 [Accessed: 8 April 2022].

Louca, M. (2021) *Saet El Hazz*. [audio stream] Available through: https://tidal.com/browse/track/193081469 [Accessed: 8 April 2022].

Mashayekhi, A. (2007) *Chahargah 1, OP.75.* [audio stream] Available through: https://tidal.com/browse/track/28570174 [Accessed: 8 April 2022].

Miniawy, A. (2022) *Meanwhile The Survivors Are Shamefull...* [audio stream] Available through: https://tidal.com/browse/track/215766060 [Accessed: 8 April 2022].

Moultaka, Z. (2003) *Fanariki*. [audio stream] Available through: https://soundcloud.com/zadmoultaka/fanariki-concerto-pour-cymbalum-et-ensemble [Accessed: 8 April 2022].

Muqata'a (2021) *Simya*.[audio stream] Available through: https://tidal.com/browse/track/172521671 [Accessed: 8 April 2022].

MSYLMA and Ismael (2021) *Ending Unto Dust.* [audio stream] Available through: https://tidal.com/browse/track/193776926 [Accessed: 8 April 2022].

Murcia, S. and Jubran, Kamilya (2013) *Kam.* [audio stream] Available through:https://tidal.com/browse/track/18762493 [Accessed: 8 April 2022].

Murcia, S. and Jubran, Kamilya (2017) *Balad.* [audio stream] Available through: https://tidal.com/browse/track/78340123 [Accessed: 8 April 2022].

Odeh-Tamimi, S. (2015) *Alif*. [audio stream] Available through: https://www.youtube.com/watch?v=ldh7cUfDrd4 [Accessed: 8 April 2022].

Railton, L. (2020) Lament in Three Parts [audio stream] Available through: https://lucyrailton.bandcamp.com/album/lament-in-three-parts [Accessed: 8 April 2022].

Rohana, N. (2016) *Madar Hijaz*. [audio stream] Available through: https://tidal.com/browse/track/58163620 [Accessed: 8 April 2022].

Sabat, M (2017) *Euler Lattice Spirals Scenery.* [audio stream] Available through: https://www.youtube.com/watch?v=xOoXPN44YHk [Accessed: 8 April 2022].

Safa (2022) *Bel Abbes*.[audio stream] Available through: https://uiqmusic.bandcamp.com/track/bel-abbes [Accessed: 8 April 2022].

Said, M. (2015) *Dawr 1 Instrumental Istihlal Bayyati 4 Pulse*. [audio stream] Available through: https://mustafasaid.bandcamp.com/track/dawr-1-instrumnental-istihlal-bayyati-4-pulse [Accessed: 8 April 2022].

Sote (2019) *Brass Tacks.* [audio stream] Available through: https://tidal.com/browse/track/106921085 [Accessed: 8 April 2022].

Shaheen, H. (2009) *The Horse of Darwish*. [audio stream] Available through: https://tidal.com/browse/track/10402434 [Accessed: 8 April 2022].

Shukur, S (1977) *Oud*. [CD] Available through: https://www.youtube.com/watch?v=7db7YJeal2w [Accessed: 8 April 2022].

Taha, H. (2007) *string quartet nr.1.* [audio stream] Available through: https://www.youtube.com/watch?v=WuMfT6WgMv0 [Accessed: 8 April 2022].

Tenney, J. (1999) *Koan (1971)*. [audio stream] Available through: https://tidal.com/browse/track/46691743 [Accessed: 8 April 2022].

Turkmani, M (2008) *Allyal Agsal Layl.* [audio stream] Available through https://tidal.com/browse/track/16651033 [Accessed: 8 April 2022].

Trapani, C (2012) *Widening Circles*. [audio stream] Available through: http://christophertrapani.com/wordpresssite/widening-circles/ [Accessed: 8 April 2022].

Two or the Dragon (2021) *Dance Grooves for the Weary, Pt. 1.* [audio stream] Available through: https://tidal.com/browse/track/181938530 [Accessed: 8 April 2022].

Uwalmassa (2022) *Rantas.* [audio stream] Available through: https://divisi62.bandcamp.com/track/rantas [Accessed: 8 April 2022].

Wasl (2016) *Waswas.* [video] Available through: https://www.youtube.com/watch?v=zbFPbbMdejE [Accessed: 8 April 2022].

Yamani, T. (2017) *Indisar*. [audio stream] Available through: https://tidal.com/browse/track/70804370 [Accessed: 8 April 2022].

Yassin, R (2020) *Imama of Dawn.* [audio stream] Available through: https://tidal.com/browse/track/161398703 [Accessed: 8 April 2022].

Appendix 1: *Requiem for the 21st Century* - Credits

Commissioned and Produced by Opera North Projects for the PRS Foundation's New Music Biennial 2019 in partnership with Southbank Centre, London and Absolutely Cultured, Hull.

Concept and Composition:	Khyam Allami
Technical direction and MAX/MSP programming:	Arnaud Mercier
Oud:	Khyam Allami
Voices:	Members of the Chorus of Opera North
Violins, violas, cellos, basses:	Members of the Orchestra of Opera North
System Designer:	Arnaud Mercier
Acoustic Design:	Igor Borovik
Production Manager:	Jane Earnshaw
Technical Manager:	Jamie Saye
Producer:	Jo Nockels
Assistant Producer:	Kathryn Gasic
Carpentry:	Chris Tribe
Metalwork:	Ralph Tricker
PR & Photography:	Rowland Thomas

Khyam Allami would like to thank Alya Karame, Sarah Nohra, Eliane Abou Jaoude, Rouba Mhaissen and Albert Mansour for their kind donations of ouds for this installation.

Appendix 2: Names of Iraq war victims from IBC database

Syllable	Name or Identifying Details	IBC code
Heem	Ibrahim Al-Yussuf	j020-ds280
Lal	Jalal Al-Yussuf	j020-eb297
Mad	Ahmad al-Bath / Ahmad al-Enezi	x018-db186
Rān	Imran Sreihin / Omran al-Serihaine	x018-vn303
Man	Hussein Osman	j003-nw1245
Leel	Sahar Khalil	x021-xv234
Tha	Thamer Aiz	j005-ka292
Ja	Ali Jassim	j005-xm273
Sein	Hussein Jassim, brother of Ali	j005-kb218
Sem	Mother of Ali Abed Qassem	j005-kd288
Ra	Wife of Haytham Rahi	x027-fw325
Za	Esmaeel Abbas Hamza	x025-xu328
Bīr	Abeer Taha Abbas	x025-xc114
Na	Muna Taha Abbas	x025-ek239
Dee	Madeeha Abd Kathem	x025-xd174
Noo	Nora Sabah Gadan	x025-kw295
Nal	Manal SaadAllah Matti	j016-ec218
Leed	Walid Abu Shaker	x036-bd181
Zee	Zeena Akram, granddaughter of Abed Hassan Hamoodi	j017-hf242
Yad	Hassan Iyad, grandson of Abed Hassan Hamoodi	j017-sd235
Sam	Wissam Abed, son of Abed Hassan Hamoodi	j017-ed148
Shar	Bashar Handi	x045-zw221
Shīd	Rashid Majid	j027-ua147
Kaan	Arkan Majid, son of Rashid Majid	j027-eb217
You	Tareq Ayoub	x041-hx193
Va	Vatche Arslanian	x046-nx116
Hou	Jumhour el-Zergany	x490-zx551

Ma	Malik al-Kharbit	j030-xb123
Daa	Dana Ali	x071-uw215
Ya	Lamiya Ali	x071-dn164
Meer	Samir `Ali al-Dulaimi	x066-xe3287
Nees	Anis Muhammad `Alwani	x066-xa3221
Waar	Sabah Nawwar Dhahir	x066-ea3232
Nad	Muhannad Fadil al-Tamimi	x066-ec3418
Bar	Abd al-Jabbar Mossa	x087a-ur142
Haa	Hady Jaber / Jasim Mohammed	x080-xh259
Laam	Salam Muhamad	x132c-ks209
Kii	Hakima Khalil	x097-fn202
Zii	Ghazi Musa Hassan	x100-xm249
Fa	Haifa Aziz Daoud	d3970-kz1187
Lay	Laith Khalil / Laith Khalil Dahham	x105-ur166
Baa	Anas Basil Hamed	x122-xn161
Hār	Ezhar Mahmood Ridha, wife of Jamil Sultan Hachim al-Tamimi	x128-ke222
Dil	Adel / Adil Abd al-Karim al-Kawwaz	x130-fb174
Reed	Farid Abdul Khahir	d8108-ef2227
Leen	Leen Assad Al-Quadi	k1099-xh131
Ja	Jassem Jubara	d10059-hx2425
Roo	Farooq Ati Lasam Al-Zuhairi	d6508-xz2400
Haan	Jihan Omran / Channar Abbas	x178-ds112
Waan	Marwan Hayad al-Issawi	x182-sb334
Aa	Ayat Jawrani, daughter of Muhammad	x203-hd136
Heir	Zoheir Abdallah Ahmad Al-Sheikhly	x190-sv183
Woud	Daoud Yass	x205-ek287
Jeed	Majeed al-Jumaidy, father of Khalid	x214-fe323
Led	Khalid Victor	d3850-kh1324
Reem	Ali Karim Abbas	x235-hr253
Lal	Bilal Hindawi	x286-bc204
Sheer	Bashir Toma Elias	x257-kx173

Doun	Zaidoun Fadel Hassoun	k240-kx125
Nan	Ghassan Adnan	k105-nh113
Moud	Mahmoud Halo	k021-kx117
Rouz	Behrouz Qeshqe	k021-bh136
Seen	Yasin Shero	k021-za286
Zīz	Aziz Anwer	k021-ec282
Rees	Idris Mohammed Asad	k021-hr181
In	Intisar, daughter of Shaha Saleh	d3299-kh884
Bas	Muhannad Abbas al-Dulaymi	d4245-fm1624
Reem	Karim Mullah Thanun	d4311-xu1568
Deen	Saifidin Hamza	d4009-ur1366
Neen	Raneen Azzo	d4011-xh1243
Beeb	Abib AlHesein Abid Allan Hasein	d6088-bv2025
Zar	Nazar Allawi Mahedi,	x360-bh224
Wad	Awad Salih Jassim	k14594-ck1808
Meed	Hamid al-Sweady	k17112-sk2127
Raid	Duraid Sabri Hanna	d6532-nm2266
Sham	Hisham Omar / Hisham 'Umar	d6532-ks2321
Yad	Iyad Khursheed Abdel al-Razzak	x337-db266
Dha (That)	Shatha Audisho	d4594-nh2329
Way	Rwaida Shenen Al-Shemre	c0193-hn512
Tar	Sattar Khalil	k303-zm233
'Ay	Luay Abdullah	k317-sa158
Lee	Ali al-Khalisi	k347-sz293
Zad	Azad Hawar	d7468-dh2258
Ee (Eeman)	Iman Abdul Moneam Younis	k370-nh305
May	Maitham ?	d4681b-nz1878
Bou	Hani Boulos Toma Sliwa	d2695-hc1095
Ka	Kadhim Ahmed Hussein	k469-sk247
Neer	Muneer Jaber	k616-xz312
Sool	Rasul Ahmed / Abd-al-Rasul Muhammad	k713-fw285

Zef	Josef Touma	c0310-za510
Mal (Malign)	Jamal al-Alusi / Gamal al-Alusi	k918-zv174
Ras (Rasterize)	Firas Hussein	k1109-bh216
Sha	Faris Shakir	c0253-df440
Waa	Wa'el Abbas Salem Al-Zawba'i	k1594-hu373
Ya	Dhiya Hilal	k1843-hv571
Mun	Munqith Faroun	c0128-sa414
Mi	Sami Tawfig Jassim	d7745-zv2318
Sheed	Rasheed Abdul Hameed Hassan, son of Abdul-Hamid Hassan Ali	k2171-fw429
Faw	Fawzi Ali Uklaa	k2307-kb474
Res	Fares Hamdany	d7023-nw2341
Beel	Abu Nabil	k2646-xr586
Nar	Manar Mudhafar Abdul Jabbar	d1978-bz1131

Appendix 3: *Requiem for the 21st Century* - Additional audio

These additional audio files are stereo mix downs of 1-2 mins extracts of 31 presets of the *Requiem* rendered "as live".

It is ideal to listen to them through speakers by loading them into a software music player and setting the player to "shuffle" mode before pressing play. This is to simulate the random selection of presets inherent within the composition.

A listening time of 10-15 min is sufficient to get an impression of the variety of compositional ideas, but approx 45min of audio has been provided.

The audio files can be found in the following location:

4. Appendices Assets / 3.1 Requiem Extracts [folder]/

The track listing of the preset names including their maqām and istiqrār is as follows:

1. Preset 15 – Trem + Short Voices 4c Athar Kurd G
2. Preset 14 – Ouds 5h Short Fast Soznak F
3. Preset 11 – Bows 1a all Nairuz C
4. Preset 30 – Voices 4g Bow Verb Hijaz Kar C
5. Preset 07 – Ouds 6c Short Fast Bayat D
6. Preset 24 – Voices 2c Short+Bow Iraq E-b
7. Preset 09 – Oud Chords 1e Bayatayn G
8. Preset 13 – Voice 5b Dark Basses Nikriz C
9. Preset 32 – Oud Trem Dis 1c Sparse Iraq C
10. Preset 25 – Voices Sop Alt 8d Short Fast Kurd G
11. Preset 08 – Trem 3c Basses Kurd A
12. Preset 18 – Voices 8f Fades Hijaz F
13. Preset 06 – Ouds 8g Delay Segah C
14. Preset 02 – Bows 3a short Bastanegar E-b

15. Preset 26 – Bows 4b Quartet Saba Zamzam C
16. Preset 28 – Voices 7d Bursts Bayat Shuri B
17. Preset 17 – Dis 4a Low Bows Lami E
18. Preset 12 – Oud Trem 1f Iraq C
19. Preset 04 – Voices 1e All Zanjaran F
20. Preset 05 – Voices 6d Bwds Mustaar E-b
21. Preset 21 – Dis + Fem Voices Bayatayn G
22. Preset 19 – Bows 5e Bursts Ajam F
23. Preset 03 – Bows Swells 1e Juno Segah B-b
24. Preset 22 – Voices 9g Dis Delay Huzam B-b
25. Preset 27 – Bows 2a all Mustaar E-b
26. Preset 20 – Ouds Short 1c Saba G
27. Preset 10 – Trem Bows Dis 3g Nawa Athar B
28. Preset 31 – Dis 3d Sop+Alt Mustaar B-b
29. Preset 23 – Voices 3b Alt Ten Rast C
30. Preset 01 – Bows 6b Vlns+Mezzos Hijaz Kar E
31. Preset 16 – Ouds Short 2a Athar Kurd A

Appendix 4: *Apotome* - Additional videos

The additional video files can be found in the following location:

4. Appendices Assets / 4.1. Apotome autonomous audio-visual generation.mov

4. Appendices Assets / 4.2. Apotome demo MPE Ableton Live 11.mov

Appendix 5: Allami, K. (2021a) - Apotome and Leimma user guide

The pdf of this document can be found in the following location:

4. Appendices Assets / 5. Allami, K. (2021a) - Apotome and Leimma user guide.pdf

Appendix 6: *'32* - Additional audio

The additional audio files can be found in the following location:

4. Appendices Assets / 6.1. ’32 - Part II [audio].wav

4. Appendices Assets / 6.2. ’32 - Part III [audio].wav

Appendix 7: *'32* - Maqāmāt used

The tuning system of al-Farābi, the subsets of the maqāmāt and their mappings in Leimma are as follows:

17 pitch classes from Al-Fārābī's 25-tone system (ca. 950 CE)
Forster (2016:639)
Ref Pitch/1:1 = G3 195.998 Hz:
1:1 • 256:243 • 162:149 • 9:8 •32:27 • 27:22 • 81:64 • 4:3 •
24:17 • 216:149 • 3:2 • 128:81 • 18:11 • 27:16 • 16:9 • 32:17 • 288:149

Bayāt al-Dūgāh
3:2 • 18:11 • 16:9 • 1:1 • 9:8 • 27:22 • 4:3
https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/138/solfege/0~10~0~1s0~0~10~1s0~5~13~1s0~8~16~1s1~5~3~ts1~10~7~1s1~8~6~1s0~7~15~2

'Iraq
27:22 • 4:3 • 3:2 • 18:11 • 16:9 • 1:1 • 9:8
https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/1166/solfege/0~0~10~1s0~5~13~1s0~8~16~ts0~10~0~1s1~5~3~1s1~8~6~1s1~10~7~1

Bayātayn al-ʻUshayrān

9:8 • 27:22 • 4:3 • 3:2 • 18:11 • 16:9 • 1:1

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/1167/solfege/0~0~10~1s0~5~13~ts0~8~16~1s0~10~0~1s1~5~3~1s1~8~6~1s1~10~7~1

Bestenegār al-Segāh

18:11 • 16:9 • 1:1 • 162:149 • 81:68 • 81:64 • 3:2

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/280/solfege/0~0~10~1s0~3~12~1s0~7~15~1s0~9~16~1s1~5~3~1s1~8~6~ts1~10~7~1

Bayāt al-Nawā

1:1 • 162:149 • 81:68 • 4:3 • 3:2 • 18:11 • 16:9

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/70/solfege/0~0~10~ts0~10~0~1s1~5~3~1s1~8~6~1s1~10~7~1s0~3~12~1s0~7~15~1s1~7~5~n

Ḥijāz al-Kurdān

4:3 • 24:17 • 27:16 • 16:9 • 1:1 • 162:149 • 81:68

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/1168/english/0~0~10~1s0~3~13~1s0~7~16~1s0~10~0~ts1~2~3~1s1~9~6~1s1~10~7~1

Rāst al-Chahargāh

16:9 • 1:1 • 162:149 • 32:27 • 4:3 • 3:2 • 18:11

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/221/solfege/0~0~10~1s0~3~13~1s0~6~16~1s0~10~0~1s1~5~3~1s1~8~6~1s1~10~7~t

Ṣabā al-Dugāh

3:2 • 18:11 • 16:9 • 4096:2187 • 9:8 • 81:68

https://isartum.net/leimma/68/refpitch/G3-55/tuningsystem/1r1_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s4r3_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68~27r22~81r64~4r3s16r9_1r1~256r243~18r17~162r149~54r49~9r8~32r27~81r68s64r27_1r1s256r81_1r1s1024r243_1r1/scale/430/solfege/0~5~13~1s0~7~16~1s0~10~0~1s1~5~3~ts1~8~6~1s1~10~7~1s2~1~10~1

Appendix 8: *NKHṬ* - Rāgs used

The 22-śrūtīs tuning system, the subsets of the rāgs and their mappings in Leimma are as follows:

22-śrūtīs tuning system (1:1 = C#4 at 268.3 Hz)
1:1 • 256:243 • 16:15 • 10:9 • 9:8 • 32:27 • 6:5 • 5:4 • 81:64 • 4:3 • 27:20 • 45:32 • 729:512 • 3:2 • 128:81 • 8:5 • 5:3 • 27:16 • 16:9 • 9:5 • 15:8 • 243:128
https://isartum.net/leimma/63/refpitch/Cs4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128

Charukeshi on 9:8
9:8 • 81:64 • 45:32 • 3:2 • 27:16 • 9:5 •1:1 (2:1)
https://isartum.net/leimma/63/refpitch/C4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128/scale/new/southindian/0~0~16~1s0~4~0~ts0~8~3~1s0~11~6~1s0~13~7~1s0~17~10~1s0~19~13~1

Gowri Manohari on 10:9
10:9 • 5:4 • 4:3 • 3:2 • 5:3 • 15:8 • 256:243
https://isartum.net/leimma/63/refpitch/C4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128/scale/new/southindian/0~1~16~1s0~3~0~ts0~7~3~1s0~9~6~1s0~13~7~1s0~16~10~1s0~20~13~1

Bhoopal Todi on 16:15
16:15 • 10:9 • 81:64 • 8:5 • 27:16
https://isartum.net/leimma/63/refpitch/C4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128/scale/new/southindian/0~2~0~ts0~3~3~1s0~8~6~1s0~15~10~1s0~17~13~1

Bhoopal Todi on 256:243

256:243 • 16:15 • 5:4 • 128:81 • 5:3

https://isartum.net/leimma/63/refpitch/C4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128/scale/new/southindian/0~1~0~ts0~2~3~1s0~7~6~1s0~14~10~1s0~16~13~1

Bhoopal Todi on 1:1

1:1 • 256:243 • 6:5 • 3:2 • 8:5

https://isartum.net/leimma/63/refpitch/C4-60.43612/tuningsystem/1r1_1r1~256r243~16r15~10r9~9r8~32r27~6r5~5r4~81r64~4r3~27r20~45r32~729r512~3r2~128r81~8r5~5r3~27r16~16r9~9r5~15r8~243r128/scale/new/southindian/0~0~0~ts0~1~3~1s0~6~6~1s0~13~10~1s0~15~13~1

Appendix 9: Allami 24 tone Tuning system (2022)

The pdf of this document can be found in the following location:

4. Appendices Assets / App 9. Allami 24 tone Tuning system (2022).pdf

Appendix 10: Al-Kindī's Interwoven Braid

As mentioned in the commentary for *Ma-a a-ba ud me-na-gin Ma-a di-di-in*, the revered Iraqi polymath al-Kindī (d. ca. 874 CE) wrote a musical treaties titled رسالة في خبر تأليف الألحان *Risālah fī khubr ta'līf al-alḥān* (Treaties concerning the knowledge on the composition of melodies), in which he described and defined a tuning system based on the fretting of the oud, and discussed the maqāmāt and guidelines for how melodies should be composed.

In the same treaties, which is one of the earliest known works on Arabic music[142], he also describes, in written words, six methods for crafting musical phrases; the first two, the ascending and descending, are simple. The following four on the other hand are based on visual shapes: اللولبي الداخل والـلولـبي الـخارج *al-lawlabī al-dākhil and al-lawlabī al-khārij* (the inward and outward spirals), الـضفير المـنفصل *al-ḍafīr al-munfaṣil* (the separate braid), and الـضفير المشـتبك *al-ḍafīr al-mushtabik* (the interwoven braid). These four are accompanied by two grids that al-Kindī states are "prefaced as a comprehension aid for the learner" (Wright, 2006: 4).

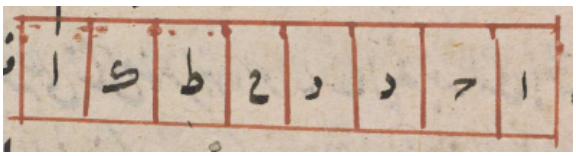
[142] The only surviving manuscript is at the British Library, London, UK (Oriental Manuscripts, Or 2361, ff 165r-168r). It is a copy was completed on 29 November 1662 from a manuscript written in Damascus and dated late November 1224, which was itself copied from another manuscript described as defective and unreliable. A digitised copy, alongside fourteen other Arabic and Persian music theory manuscripts in the Codex ff. I+269+iv. (created in 1073-1075), is available online through the Qatar Digital Library at https://www.qdl.qa/en/archive/81055/vdc_100035587376.0x000001 (accessed 29 March 2022).

Al-Kindī's methods for composing melodies—his spirals and braids—are written in two ways, but the actual shapes are not illustrated visually. The first is what I will refer to as the 'descriptive text'. It defines the melodic movement in general yet relative terms such as: *it starts on a naghma, then moves to another, then to another in the area of the first* etc. The second is what I will refer to as the 'sequential text'. It verbalises the movement from one letter to another, such as: *from the high ا alif to the first و wāw, then from و wāw to the first ب bā' etc.* I have refrained from presenting the exact original text so far for reasons that will become apparent shortly.

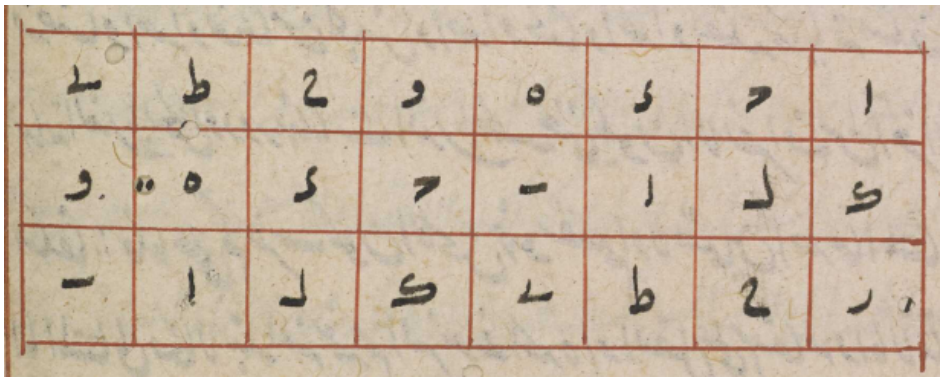
The sequential text relies on visually represented grids of Arabic letters in the *abjadīya* (alphabetic) notation sequence. Letters that correspond to the frets on the oud defined earlier in the treaties (minus two letters because Al-Kindī states that their related frets are not used in the lower octave).

Two grids are presented, one row of seven letters to be used for the ascending/descending and inward/outward spirals, and three rows of seven letters to be used for the separate and the interwoven braids. Al-Kindī also specifically states that the grids are provided as aids to help with the understanding and usage of his compositional method.

The first interpretation and commentary on this treaties was published in German in 1931 by musicologist Robert Lachmann, in collaboration with Egyptian musicologist Mahmoud El-Hefni (Lachmann et al., 1931). It includes diagrammatic visual representations of the shapes, and a translation of the German introduction into English. The only Arabic text is a typeset version of the original manuscript text.



Al-Kindī's single rank, seven letter/note grid, for the ascending/descending and inward/outward spirals



Al-Kindī's three rank, twenty one letter/note grid, for the separated and interwoven versions of the braid

Since 1931, four other scholars have also provided translations and interpretations, all of which have relied heavily on the logic of Lachmann and el-Henfi's interpretations and most importantly, on their original visualisations of the shapes. The Iraqi researcher Zakariya Yusuf provided the first commentary in Arabic (1962), American musicologist Carl Cowl provided the first translation and commentary in English (1966), and the Egyptian scholar Yusuf Shawki published a compilation of previous versions and his own commentary in Arabic (1969). The most recent interpretation was published by British ethnomusicologist Owen Wright (2006).

To summarise the problems briefly, al-Kindī's "rather cryptic", descriptive text for the interwoven braid, states the following as per Wright's translation:

”فهو المبتدأ من نغمة ثم ينتقل منها إلى أخرى ثم ينتقل منها إلى دور الأولى ثم ينتقل منها إلى خلف نهايته ثم كذلك حتى يؤتي على نغم الجمع ثم تكون النقلة من آخره إلى مبتدأه مؤتلفة“[143]

“From the initial note one moves to another, then back to the area [*ilā dawr*] of the first, then to beyond its end, and so on *until the notes of the group are used up*, with the final move back to the beginning being a consonant one” (op. cit., 3, my italics and addition in parenthesis)

The sequential text, which one would presume to be straight forward, is equally cryptic, again as per Wright’s translation:

”كإنتقالنا من ا الحادة إلى و الأولى ثم من و إلى ب الأولى ثم من ب إلى ي الأولى ثم من ي إلى ه ثم من ه إلى ل ثم من ل إلى ت الأولى ثم من ت إلى ك الثانية وكذلك إلى حيث يتبناها الضفير ثم العود إلى المبتدأ“[144]

“It is like our going from the high *ā* to the first *w*, then from *w* to the first *b*, then from *b* to the first *y*, then from *y* to *h*, then from *h* to *l*, then from *l* to the first *t*, then from *t* to the

[143] “fa huwa al-mubtada’ min naghma thumm yuntaqal minhā ilā ukhrā thumm yuntaqal minhā ilā dawr al-ūlā thumm yuntaqal minhā ilā khalf nihāyatih thumm kadhālik hattā yu'tī ‘alā nagham al-jam‘ thumm takūn al-nuqla min ākhirih ilā mubtada'ih mutalifa.” Wright’s transliteration (op. cit, 3)

[144] “Kaintiqālinā min ā al-hādda ilā w al-ūlā thumm min w ilā b al-ūlā thumm min b ilā y al-ūlā thumm min y ilā h thumm min h ilā l thumm min l ilā t al-ūlā thumm min t ilā k al-thāniya wa-kadhālik ilā hayth yatanāhā al-dafīr thumm al-‘awd ilā al-mubtada” Wright’s transliteration (op. cit, 5)

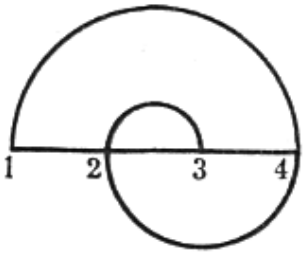
second *k*, and so on until the braid is complete, after which there is a return to the initial note." (op. cit., 5)

The main issues with these texts and translations are *ilā dawr* as "the area of the first" and *hattā yu'tī 'alā nagham al-jam'*, "until the notes of the group are used up". The first of which is acknowledged by Wright as being defined earlier in the treaties, "where *dawr* is used to refer to a span of either an octave or a fifth", and as having multiple potential readings (op. cit, 3). Despite that earlier definition by al-Kindī, Wright chooses to opt for "the area", because the use of the term *jam'* (lit. group) in the second phrase can also refer to a group of notes that are the span of a fifth, an octave or even a double octave, but in the context of the sequential text it is, according to Wright, required to be "greater than *dawr*" i.e greater than the span of a fifth or an octave. As for the second, it literally translates to "until it arrives at the *note of* the group [*jam'*]".

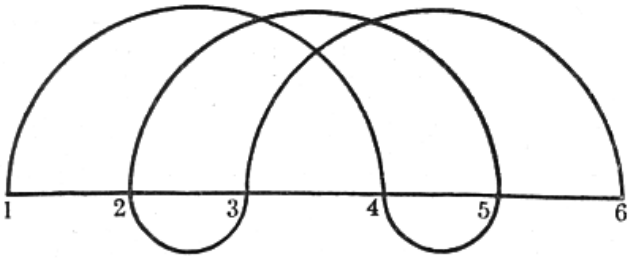
The issue with the sequential text is that not all the letters have their position defined as being the high, the first or the second. Some simply have no definition at all. Also in the context of the grid and more specifically the precedent set by Lachmann and el-Hefni's logics, it is difficult to know what "the first" etc. refers to, i.e is it the first encountered in sequential order of the grid (ascending in pitch), or the first encountered through the movement from one note to another (asc. or desc.). This in turn affects the choice of which exact notes that don't have delineations to use. All of the above is interrogated by Wright in detail through his article, and it becomes

clear that there are many potential renditions. Ultimately though, it all depends on the logic that is followed.

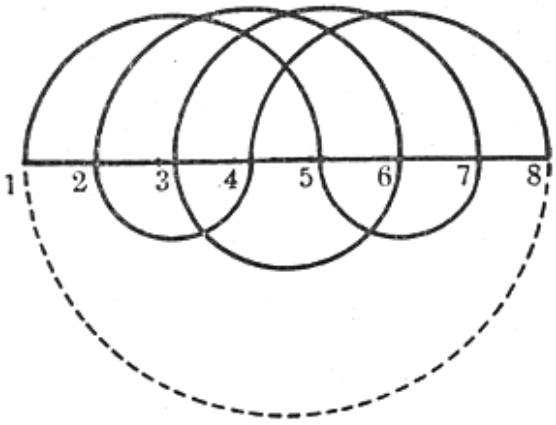
To illustrate the logics, I have included below all the visual forms published by Lachmann and el-Hefni (1931), Yūsuf (1962)—including Shawki's visualisation of Yūsuf's interwoven braid (1969)—and lastly Wright's interwoven braid (2006). I don't include Cowl's because they are the same as Lachmann and el-Hefni.[145] I recognise that these images are without their entire due context, but I believe a brief account of it can give enough representation:



Spiral (Lachmann et al., 1931: 12)

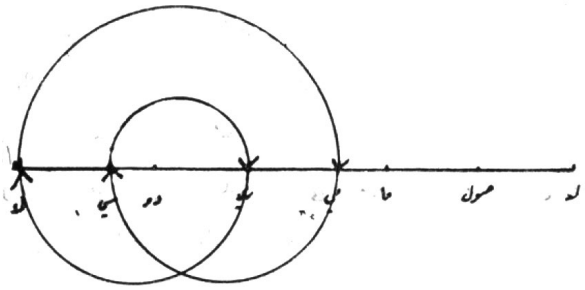


Separate Braid (Lachmann et al., 1931: 13)

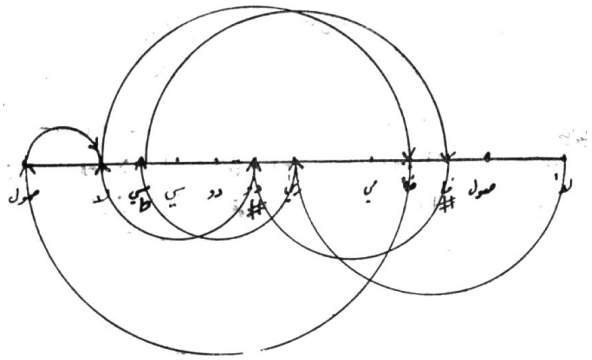


Interwoven Braid (Lachmann et al., 1931: 13)

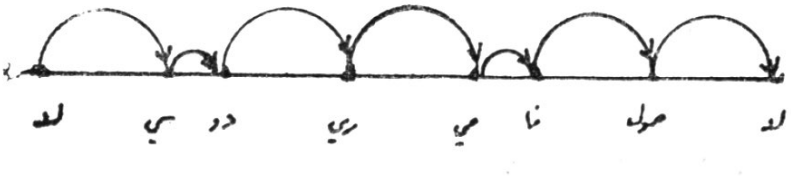
[145] Cowl (1966: 136) copies Lachmann and el-Hefni's versions exactly, hence the omission of his images here. Shawqi (1969) does not provide any visual interpretations of his own except for his rendering of Yūsuf's interwoven braid, executed in the same manner as Lachmann and el-Hefnī.



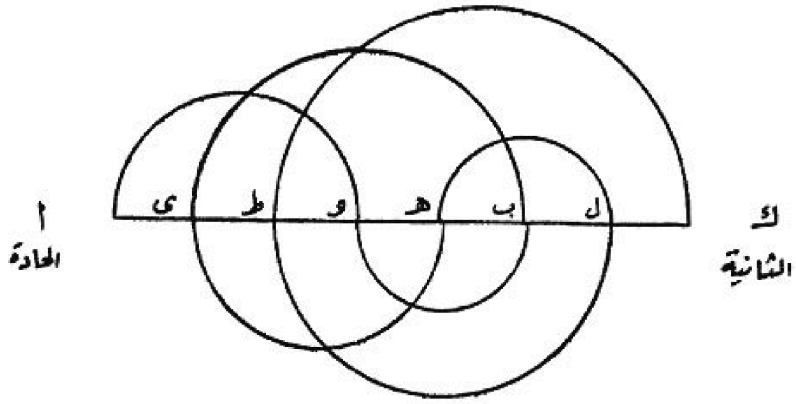
Yūsuf (1962: 16): Inward and outwards spirals presented as one figure due to them supposedly being inversions of each other.



Yūsuf (1962: 16): Interwoven braid



Yūsuf (1962: 16): Ascending/descending, which no other scholars visualised

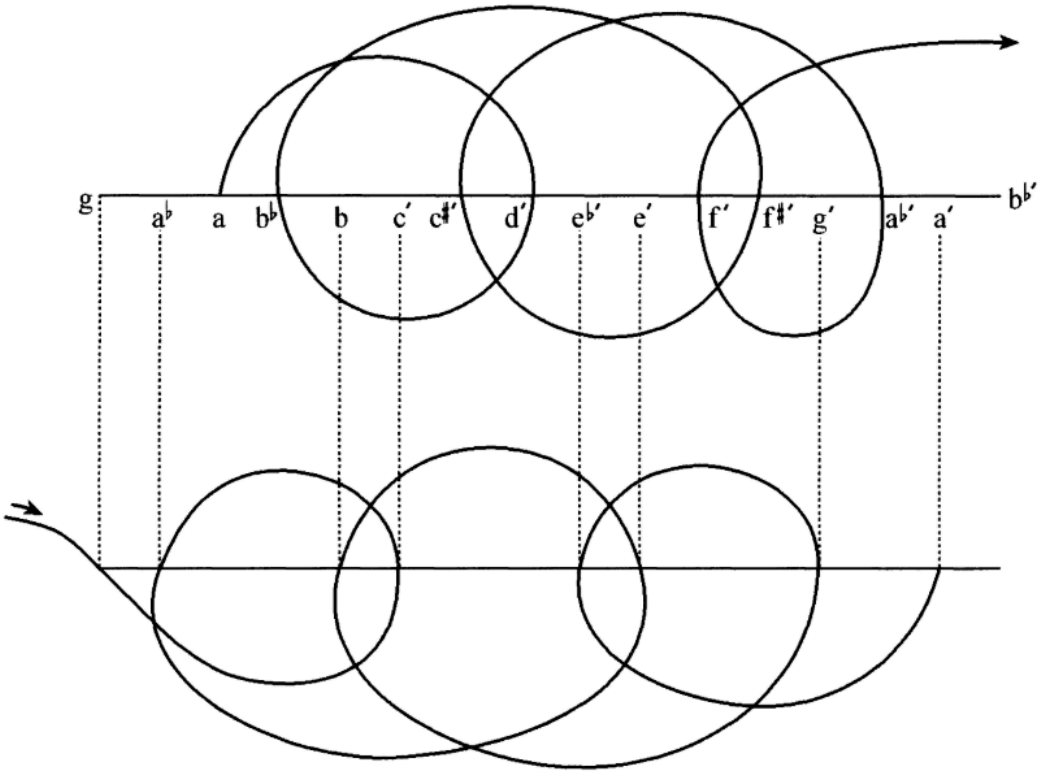


Shawki's rendition of Yūsuf's interwoven braid (Shawki, 1969: 185)

As is quickly evident from a glance, Lachmann and el-Hefni's logic is to plot only the notes used in their final interpretation on a plane, in an equidistant ascending pitch sequence from left to right. Although they acknowledge that this equidistant placement and bilaterally symmetric

representation are their choice for the "simplest" option, they support them "as valid representations of the melodic movements distinguished by al-Kindī" (Lachmann et al., 1931: 14)[146].

This precise and perfectly "geometrical" representation set a precedent that all subsequent scholars followed, including Wright. Although as was noted earlier, Wright's logic led him to translate the sequential text to mean "until the notes of the group are used up", hence his proposal uses all the notes used in the grid and not only those in the sequential text:



Wright (2006: 24): Interwoven braid

Rather than follow the precedent set by Lachmann and el-Hefni, I decided to try and follow al-Kindi's logic exclusively. I did this by reading through the entire manuscript to get a clear insight into the narrative flow

[146] English is my translation. The original German: "Man darf daher die angeführten graphischen Figuren als gültige Darstellungen der von al-Kindī unterschiedenen Melodiebewegungen ansehen".

of the information within it, just as Wright does (2006), but with the main difference of exclusively using the grid to render the visual forms.

By reading the descriptive and sequential texts and looking at the grid al-Kindī had provided, as a comprehension aid for the learner to understand, three principle questions arise: how do we interpret (read) the texts? How do we visualise (draw) the texts? And how do we construct the melody (compose) from the texts?

Without expanding on the minutiae for the sake of brevity, earlier in the treaties al-Kindī mentions two core compositional concepts[147]:

1. Movement from group to group (from a group of a fifth, or an octave, to another) should be either as octave equivalents, or a simple ratio of clear consonance, such as a fifth or that which is close to it (Shawki 1969: 104, section 49)

2. A *dawr* is a cycle or a melodic cycle of an octave or a fifth (op. cit.: 106, section 54)

By going over the instructions in both the descriptive and sequential texts with these in mind, we can clearly define the options for which letters/ notes we should use, which in turn posits that these two texts, although directly related, may serve two separate purposes: the sequential text tells us how to visualise (draw) the shape it is based on, whilst the descriptive text tells us how to construct (compose) the melody.

[147] For the sake of brevity and clarity I use Shawqi's Arabic typesetting of the manuscript as a reference due to its inclusion of section numbers. I have provided the original Arabic alongside my own translation at the end of this appendix.

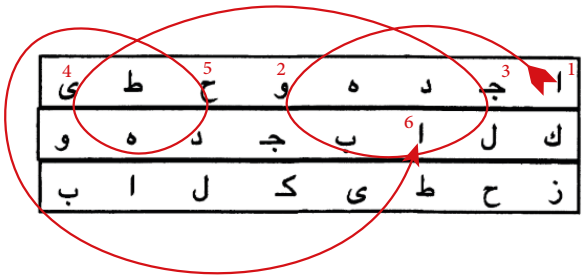
Another clue towards this is that al-Kindī's naming of the shape as a dhafīr/braid, supplants a singular previous naming of it as *muwashshaḥ,* which Wright translates as ‘sash’ (Wright, 2006: 26). The conjugation of muwashshaḥ means that which is made into or has the characteristics of something, but the word itself also relates to الـوِشـاح *al-wishāḥ*, a textile that is worn as a scarf or a turban (مـــوشـــح (muwashshaḥ), 2022), therefore also meaning something that has the characteristics of a scarf and wrapped around the neck, or a turban and wrapped around the head.

In order to test this hypothesis with less complexity and compare Lachmann and el-Hefni’s logic with the new approach outlined here, it is easier to turn to the separated braid. Al-Kindī presents the sequence of letters for the separated braid as follows (right to left):

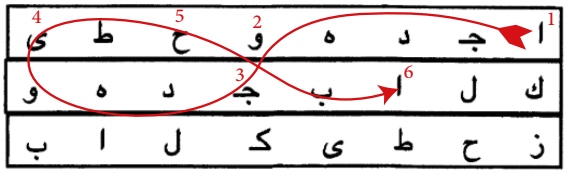
6	5	4	3	2	1
ا	ح	ي	جـ	و	ا
alif	ḥā’	yā’	jīm	wāw	alif
ā	ḥ	y	j	w	ā

Following Lachmann and el-Hefni, we can indeed interpret the sequence text as two loops, in a similar fashion to their visual representation on a plane. This makes some sense when thinking of it as a wishāḥ being wrapped around the neck twice. Whereas if we read the two texts as serving separate functions, whilst considering that the purpose of the sequential text is to define the pattern/shape and not the exact melodic contour, it is also possible to visualise it as a wishāḥ, but with a tie that is also similar to a braid. Crucially, the two letters that allow this move are و *w*[2]

and جـ *j*[3], precisely the two that do not have a delineation of first, second etc. in the description:



Lachmann et al.1931 interpretation visualised on the grid



Allami 2022 visualisation of the 'separate braid'

This therefore leads us to a new perspective of how to deal with the non-delineated letters used in the sequential text.

Having defined the principle moves and the shape using the sequential text, we can move onto the descriptive text and use it as a guide for the melodic construction:

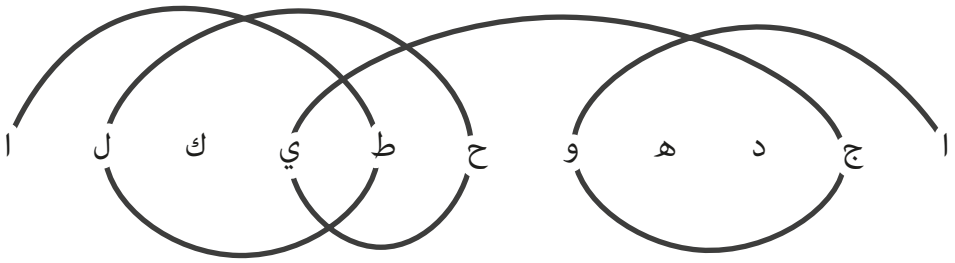
"يبتدأ من نغمة ثم ينتقل منها إلى أخرى ثم ينتقل منها إلى دور الأولى ثم ينتقل منها إلى خارجة من الثانية ثم ينتقل منها آلى خارجة من الثانية تقع في ما بين الثانية واللتي انتقل منها ثم ينتقل منها إلى خارجة عن التي انتقل منها أيضا حتى يؤتى على آخر نغم الجمع وتكون النقلة من آخره إلى ابتداء النغم نقلة مؤتلفة"

"From the initial note one moves to another, then back to the [dawr][148] of the first, then to a note going beyond the second, then to a note going beyond the second which lies between

[148] Wright's original is "area of the first" (2006: 7)

> the second and that from which one has moved, then from this again to one going beyond that from which one has moved, [until it reaches the last note of the grouping][149], with the final move back to [the beginning of the nagham][150] being a consonant one."(Wright 2006: 7, my edits in parenthesis, original translation cited in footnotes)[151]

Although my proposition for the separated braid has a different visual representation, we can now use a plane to plot the melodic movement by following the descriptive text, and al-Kindī's previous note defining "dawr" as a span of a fifth. Here we can deduce the same six-note phrase (plus octave return) that Lachmann and el-Hefni propose, or we can continue it for one more round "until it reaches the last note of the grouping" as per my edits to Wright's translation:



Allami 2022: proposition for an extended melodic construction of the 'separated braid'

[149] Wright's original is "until all the notes of the group are used up" (2006: 7)

[150] Wright's original is "back to the beginning" (2006: 7)

[151] Wright's transliteration "*yubtada' min naghma thumm yuntaqal minhā ilā ukhrā thumm yuntaqal minhā ilā dawr al-ūlā thumm yuntaqal minhā ilā khārij[a] min al-thāniya thumm yuntaqal minhā ilā khārij[a] min al-thāniya taq' fimā bayn al thāniya wa-'llatī `ntuqil minhā thumm yuntaqal minhā ilā khārija 'an allatī `ntuqil minhā ayḍan hattā yutā 'alā ākhir nagham al-jam wa-takūn al-nuqla min ākhirih ilā `btidā' al-nagham nuqla mu'talifa."* (2006: 7)

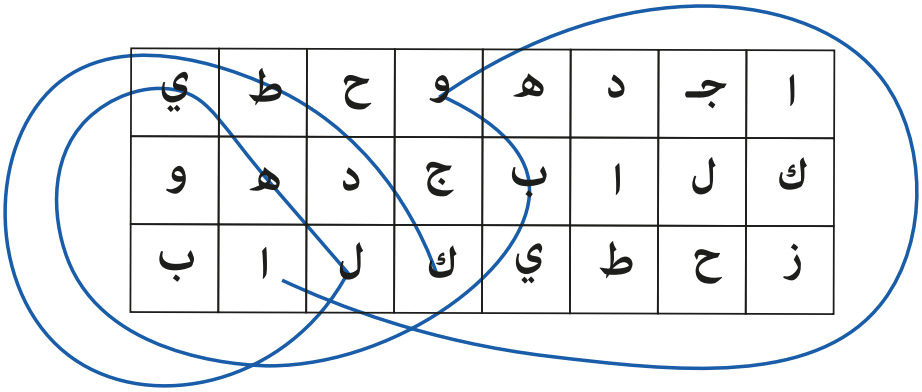
To summarise, what I have proposed thus far is a new reading of al-Kindī's texts based on the logics of the treaties as a whole, that engages with the descriptive and sequential texts as having two separate purposes, not only one as has been presumed by all previous scholars. Within this reading, we can achieve the same melodic construction for the separated braid as previous scholars, but also provide an extended form that respects and follows every instruction given by al-Kindī, literally to the letter.

By using this logic and specifically relying only on the grid to create the visual forms of spirals and braids, I was able to find a new interpretation for the interwoven braid, and more so new interpretations for the spirals as well. Interestingly the spirals also exhibit the same principle of shape (sequential text) and execution (descriptive text), and although I refrain from outlining them here for the sake of brevity, I would be happy to present and discuss them during the viva voce examination.

Coming onto our main subject, *al-ḍafīr al-mushtabik* the interwoven braid, al-Kindī gives the sequence of letters as follows (right to left):

8	7	6	5	4	3	2	1
ك	ط	ل	ه	ي	ب	و	ا
kāf	ṭā'	lām	ḥā'	yā'	bā'	wāw	alif
k	ṭ	l	ḥ	y	b	w	ā

By following the sequential text and dealing with the non-delineated letters by moving across the grid visually, we can generate a clear pattern that mimics the movement of some of the various complex ways to wrap and tie a wishāḥ:



Allami 2022: Interpretation of the initial pattern for the interwoven braid on al-Kindī's grid

This pattern can be precisely duplicated visually for a second round, or by using the same method of *p... p + n* etc. as Wright (2006: 9) with *p* signifying the current letter in use on the grid and *n* signifying the number of sequential moves along the grid in +/- i.e. ascending or descending order. Starting from the high ā as described in the sequential text the, pattern is:

-18 +7 -4 +7 +7 -15 +14

In following al-Kindi's instructions "and so on until the braid is complete, after which there is a return to the initial note", this pattern can be continued precisely, the lack of such continuation being the initial problem with Lachmann and el-Hifni's interpretation and what Wright sought to engage with in his proposed solution. Furthermore, while plotting the pattern on a plane, we begin to see the formation of a complex braid of little similarity to the loops proposed by Lachmann and el-Hefni, who presented theirs as "geometric" movements (Lachmann et al., 1931: 14).

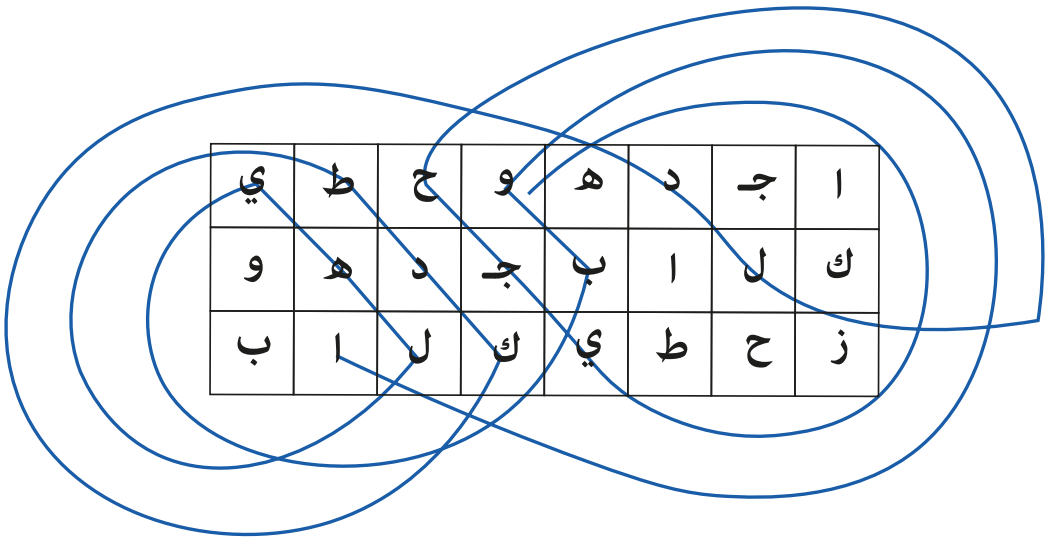
By following our newfound +/- sequential pattern, we can do two full cycles of the exact sequence provided by al-Kindī in the sequential text

(numbered 1-7 in the table below) , and by the end of the second cycle (numbered 8-14) we land on و *w*, the perfect fourth (4:3) of al-Kindi's oud fretting and tuning system. This can be interpreted as the completion of the braid in that it provides us with the consonant return to the initial note so prized by al-Kindī throughout his treaties, particularly because the continuation of a third cycle takes us off the grid in an illogical way.

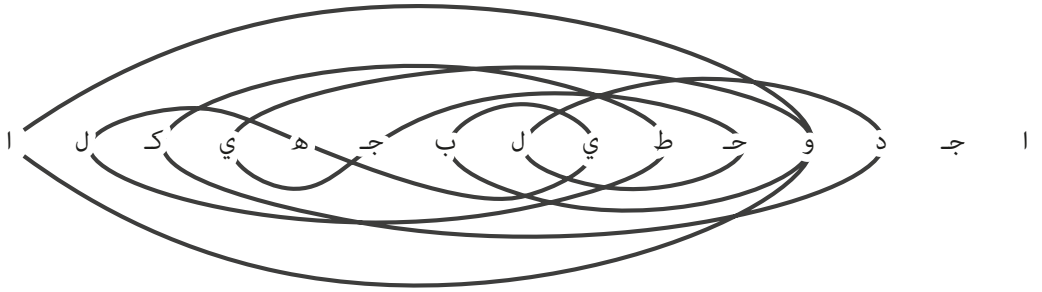
7	6	5	4	3	2	1
ط	ل	ه	ي	ب	و	ا
ṭā'	lām	hā'	yā'	bā'	wāw	alif
ṭ	l	h	y	b	w	ā
128:81	4096:2187	162:64	27:16	512:243	4:3	2:1
14	13	12	11	10	9	8
و	ي	ج	ح	ل	د	ك
wāw	yā'	jīm	ḥā'	lām	dāl	kāf
w	y	j	ḥ	l	d	k
4:3	27:16	18:8	3:2	4096:2187	32:27	16:9

Allami 2022: Interpretation for the final sequence of al-Kindī's separated braid

Leading us then to the final version of the braid, as per my interpretation, displayed below on al-Kindī's grid and on a plane for reference:



Allami 2022: Interpretation of Al-Kindī's full interwoven braid on al-Kindī's grid



Allami 2022: Interpretation of Al-Kindī's full interwoven braid on a plane utilising only the final sequence of notes. The low ا ā and جـ are provided for reference

As a result of the above, we can critically review the perspective and interpretation first presented by Lachmann and el-Hefni and how it was inherited by all subsequent Arab and Anglo-European scholars for almost a century. A perspective that can be summarised in Lachmann's own words by the opening line and the two following paragraphs, of his English translation of the German introduction to his commentary, interpretations and visualisations, which were published in German only:

"The rise of the nations of Western Europe in the Middle Ages opened an entirely new perspective in music beyond the outlook of the ancients as exhibited in Greek theory. This was chiefly due to the development of polyphony, an element which had been absent from the practice of the ancient nations, and, along with that, to the development of an adequate notation which, for the first time in musical history, allowed performers to be independent of oral tradition.

Islamic civilization has been less progressive in music than European. It did not present any essentially new features beyond those of Greek or other ancient music; above all, the music of the Arabs and the other nations united by Islam was, and is still, purely melodic. This conservative attitude is clearly reflected by the theory. Arabian musical theory has always kept closer to the Greek doctrines than European.

Still, it is not a mere repetition of what Greek and Hellenistic authors had taught; it also contains traits of its own. Among these, some point back to ancient Oriental traditions while others refer to musical practice in the writers' own times. As a matter of course, it is these data which most attract our attention when we study Arabian theory." (Lachmann et al. , 1931: 17)

It is difficult to read in this text what agency, if any, el-Hefni had or was allowed by Lachmann in their entire venture.[152] What is prominent on the other hand, is the supremacist lens through which Lachmann engages with Arabic and Islamic culture, particularly in the irrelevant historical subjectivity of the 'east vs west' dialectic that he posits in the opening paragraph. In a later part of the introduction, Lachmann also shows clear orientalist tendencies in his comparing this single manuscript by al-Kindī to al-Fārābī's 10th century tome *Kitāb al-Mūsīqī al-Kabīr* The Great Book of Music, highlighting the absence of the Persian Middle Finger and Zalzal's Middle Finger before concluding that al-Kindī's account "lacks the references to ancient indigenous traditions that give al-Fārābī's work its outstanding value for us" (op. cit.: 14)[153].

This shows a total lack of imaginary on Lachmann's behalf, in that he could not, and did not, consider al-Kindi capable of positing anything of value or of his own thinking, even if he notes that al-Kindī's work "is not a mere repetition of what Greek and Hellenistic authors had taught" (op. cit.: 17). Leading to the simplistic interpretation of al-Kindi's visual forms and their representation as "geometric devices" (op. cit.: 19), which is quite frankly an insult to Arab and Islamic geometry.

Wright, on the other hand, recognises that "however schematic the various spiral and braid structures may be the possibility should

[152] El-Hefni studied musicology in Berlin under Curt Sachs (Lampert, 2008:401), so we can assume that he could both read and speak German although I was unable to find any source attesting to it.

[153] My translation. Original German is: "Überhaupt entbehrt al-Kindis Darstellung der Hinweise auf alte einheimische Überlieferungen, die dem Werk al-Färäbls für uns seinen überragenden Wert geben".

nevertheless be entertained that they are in some way derivable from the compositional processes of contemporary musicians", but goes on to add, that the treaties' "tenor is fundamentally abstract and speculative rather than empirical and descriptive" (Wright 2006: 10). To conclude his article he also states the following:

> "It can be claimed with confidence, despite our general ignorance of the melodic norms operative in ninth-century Baghdad, that in attempting to devise a taxonomy of pitch contours al-Kindī incorporates formal generative processes the outputs of which stand at some remove from anything a composer or performer of the period—or of any other, for that matter—might have produced. In short, whether inherited or devised wholly or in part by al-Kindī, the rules of the game, rather than being auditory and performance-related, are in essence a working out of a visual metaphor. One might wish to seek analogies elsewhere for rigorous structures that are profoundly intellectual and characterized by the detailed implementation of recursive patterns—bell-ringing in English culture and svaraprastāra in Indian come readily to mind—but however specialized and schematic, these can be and are realized in sound. They are, in short, functional, whereas al-Kindī is engaged in an exercise in

abstract typology of little or no relevance to either performers or audiences." (Wright 2006: 26)

Although Wright is clearly making his remarks with regards to the medieval period, the lack of imaginary and the playing down of such an experimental approach by al-Kindī serves to repress any possible inspiration it may have, specifically by casting the visual forms as purely metaphorical. A clear representation on both his part and that of Lachmann of filiative as opposed to Relational thinking.

***

My translations of Al-Kindi as referenced earlier

On transitions from group to group (Shawqi, 1965: 104, para 49):

وأما الانتقال من جمع إلى جمع: فأن تكون نهايتا الجمعين الذين انتقل من أحدهما إلى آخر نغمة مشتركة؛ أو بعد نهاية المبتدأ منها الأخيرة إلى نهاية المبتدأ منها الأولى نسبة بسيطة ظاهرة الائتلاف كالذي بالخمسة او ما قرب منه؛ وأن تكون أول نغم الثاني من الجمعين موألفة لبعد النقلة أعني المسافة بين نهايتي الجمعين، وأن تكون نهاية الجمع الأخير عائدة إلى مبتدأ الجمع الأول بالكيفية ليكون الانتقال في دور متصل.

As for the transition from group to group: It could be that the two ends of the two groupings that one has moved from to the other are a common tone;

Or the distance of the end of the last grouping begun with, to the end of the first grouping begun with, a simple ratio of clear consonance, such as the grouping of a fifth or that which is close to it; And it could be that the first note of the second of the two groupings be consonant to the distance of the move, I mean the distance between the two ends [the distance between the last and the first] of the two groupings, And it could be that the end of the last grouping is a return to the beginning of the first grouping in a continuous manner so that the move is in a connected cycle.

On *dawr* as a cycle of an octave or a fifth (Shawqi, 1965: 106, para 54):

فلنقل الآن على صنعة اللحن، التي هي غرض هذه الصناعة، فنقول: إن صناعة اللحن أن يقصد جمعاً مؤتلفاً، أعني مؤتلف النغم، يستعمل فيه جنساً واحداً، ونوعاً من الجنس واحداً، ولحناً واحداً، ونقلة نهايته مؤتلفة إما دوراً تاماً، أعني دور نهاية الذي بالكل، أو دور نهاية الذي بالخمسة، حتى يكون الإنصراف من آخر التأليف الذي فيه إلى مبتداه مؤتلفا

Let us now turn to the crafting of melody, which is the purpose of this craft, we shall say: In that the crafting of a melody means a consonant grouping, I mean [a grouping] of consonant notes, within it is used one genus and one type of the genus, and one melody, and its ending move either consonant or a full cycle, I mean the cycle of the whole [octave], or the cycle of the five [fifth], so that the departure from the end of the composition that is within it, to its beginning is a consonant one.

Appendix 11: Allami, K. (2019a) Microtonality

The pdf of this document can be found in the following location:

4. Appendices Assets / 11. Allami, K. (2019) Microtonality and the Struggle for Fretlessness in the Digital Age.pdf

Appendix 12: Allami, K. (2021b) The Third Place

The pdf of this document can be found in the following location:

4. Appendices Assets / 12. Allami, K. (2021b) The Third Place.pdf