A Creative Approach to the Historical Tuning Systems from Medieval Iran

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Abstract

This article explores the integration of medieval Iranian music theory with contemporary composition through the author's Holographic Composition Technique. Drawing on the works of Persian polymaths such as Omar Khayyam and Safiaddin Ormavi, the technique utilises historical tuning systems, psychoacoustic principles and philosophical frameworks such as Deleuze's nomadology and rhizomatic thinking.

The approach is illustrated by the analysis of composition "Eternal Chasms" for brass quintet and fixed media, which reimagines the ancient tuning concepts within a modern, experimental soundscape. The article also looks at the historical development of Iranian music notation systems and their adaptation for contemporary performance. By combining ancient traditions and contemporary composition techniques, the work invites a recontextualisation of music as a living, evolving art form.

Introduction (Targeting Multiple Audiences)

This article serves as a bridge between the academic study of historical Iranian music theory and its practical application in contemporary composition. It is intended for musicologists interested in the theoretical development of tuning systems, performers exploring microtonality, and general readers interested in the intersection of history, philosophy, and the sound art.

To facilitate understanding, key terms frequently used in the article are defined below:

Key Terms Glossary

Radif/Dastgāh System*: The contemporary modal framework in Persian classical music, consisting of 12 modal categories (Dastgāh) and their respective melodic structures (Gusheh).*

Maqām/Adwār System*: A medieval modal system foundational to Persian, Arabic, and Turkish classical music.*

Holographic Composition Technique*: A compositional approach that integrates psychoacoustics, microtonality, and historical tuning systems to create immersive, multidimensional soundscapes.*

Just Intonation*: A tuning system based on pure intervals derived from the harmonic series, as opposed to the equal temperament system of Western classical music.*

HEJI Notation*: Extended Helmholtz-Ellis Just Intonation notation, a microtonal system representing exact intervals derived from the harmonic series with specialized accidentals.*

Tetrachord*: A four-note musical scale segment central to Persian and Greek music theories, categorized into diatonic, chromatic, and enharmonic genera.*

Nomadology*: A concept from Gilles Deleuze's philosophy, describing fluid, non-linear movement that resists traditional hierarchical structures.*

Rhizomatic Thinking*: A philosophical model emphasizing interconnectedness and decentralization, akin to the structure of a rhizome in botany.*

Introduction

In this article, I will outline my artistic journey of exploring and engaging with medieval Iranian tuning systems through the lens of my compositional approach, the "Holographic Composition Technique". The purpose of this article is to provide insights into the integration of historical music theory with contemporary compositional techniques, particularly in the context of Iranian music. The Holographic Composition Technique combines psychoacoustics, microtonality and historical Iranian music theory to create an immersive and multidimensional sound world. At the centre of this technique is the idea of "holography" in music, which is inspired by the superimposition of tones that generate various perceptual phenomena, including the combination tones, the illusory sounds arising in the listener's inner ear. By utilising these auditory effects in composition and implementing tuning systems detailed by Persian polymaths such as Fārābi (870–950), Ibn Sinā (d. 1037) and Safiaddin Ormavi (1216–1294), this technique offers the potential to reinvent the reuse of traditional musical frameworks for modern contexts.

In this article I will also look at the history of musical notation in Iranian classical music and how ancient systems have shaped contemporary practise. I will also write about a short treatise by the philosopher, polymath and poet Omar Khayyam that offers insights into his unique perspective on music and sheds light on the intellectual and cultural milieu of the 11th century. By emphasising the philosophical and scholarly context that influenced his work, I will demonstrate its resonance with the musical traditions of the time. This combination of personal artistic practice and historical research provides a comprehensive understanding of how ancient Iranian music and philosophy continues to inform and inspire my contemporary compositional language with each new artistic project.

"Eternal Chasms" for brass quintet and fixed media is the artistic work at the centre of this article. Inspired by the philosophy and tuning system of Omar Khayyam, this composition embodies an interplay between existence and non-existence with infinitely expanding soundscapes that invite the listener into a reflective, almost meditative sound space. Using the Holographic Composition Technique, ancient tuning systems are combined with psychoacoustic principles to create textures that grow and evolve organically. These sounds have a deep resonance, not only as musical phenomena, but also as philosophical statements about time, space and transformation, attempting to create a personal and emotional connection with the listener. With this work, which is part of a triptych of compositions for brass instruments and fixed media, I aim to translate philosophical ideas — particularly the nomadology and rhizomatic thinking of Gilles Deleuze — into a musical way of life. The Holographic Composition Technique remains a central tool for me to develop a deeply personal and expansive musical language by weaving the non-linear yet interconnected principles of the above theories with ancient and experimental sound practices. I firmly believe that this approach allows me to connect deeply to my historical roots by recognising the physical musical principles that resonate with Deleuze's philosophical ideas.

Radif/Dastgāh and Maqām/Adwār Systems

My music is often described as experimental and deeply rooted in the rich traditions of Iranian music. To truly understand what constitutes Iranian music, it is important to establish basic terms and definitions that contextualise its particular qualities and historical developments. This multidimensional art form has been shaped by thousands of years of cultural exchange, philosophical research and regional diversity. It therefore offers a rich heritage characterised by modal systems, intricate rhythms and microtonal structures.

The Radif/Dastgāh system and its predecessor, the Maqām/Adwār system, form the basis of classical Iranian music and represent centuries of cultural and artistic development in the region. The Maqām/Adwār tradition, which was prevalent in medieval Iran, represents a modal framework of melodic types that are often closely linked to philosophical and cosmological ideas. These modes formed the structural foundation for compositions and improvisations that are deeply rooted in Persian poetry and spiritual practices. The Maqām and the Adwār systems are two distinct frameworks that characterised medieval music in the Middle East. The Maqām system is a modal structure that organises melodies based on scales with microtonal intervals and creates specific tonal and emotional characteristics for each mode. It focuses on melodic improvisation and is rooted in the oral tradition, in which musicians return to specific motifs within each Maqām. In contrast, the Adwār system, developed by Safiaddin Ormavi (1216–1294), combines modes with rhythmic cycles (iqa'at) and offers a more structured approach that integrates melody and rhythm in a cyclical manner. While Maqām emphasises improvisatory performance, focusing on melodic freedom and expressive performance, Adwār incorporates formalised rhythms and mathematical ratios to guide compositional design and internal logic, reflecting the attempt of medieval Islamic scholars to systematise music theory.

The Dastgāh system and the Radif are an integral part of classical Iranian music, but fulfil different functions. The Dastgāh system is the theoretical framework that organises pitches, intervals and melodic patterns into modal structures, each of which has unique tonal characteristics and expressive possibilities. It provides the blueprint for composition and improvisation and comprises seven primary Dastgāh and five secondary Āvāz modes. In contrast, the Radif is a repertoire of melodic phrases (Gusheh) organised according to the Dastgāh system. It functions as a practical aid and pedagogical tool that enables musicians to internalise the modal system through memorisation and practice. While the Dastgāh system provides a fixed theoretical structure, the Radif varies depending on the interpretations of different masters or schools, offering the material for artistic exploration and mastery and forming the backbone of the development of Iranian classical music.

In the 19th century, the Dastgāh system emerged as a contemporary development of these earlier frameworks, transforming the modal approach into a refined structure of twelve modal

categories called Dastgāh, each containing a repertoire of melodic structures called Gusheh. The system emphasises nuanced ornamentation, microtonal intervals and expressive melodic phrasing, reflecting the subtle and introspective aesthetic of Persian art. The Maqām and Dastgāh systems, which have been fundamental to my artistic inspiration for many years, together form a rich continuum that bridges the historical and contemporary landscape of Iranian music. They offer a unique perspective on the cultural identity and emotional depth of this ancient yet enduring musical tradition. As an architectural rule, in the compositional process I seek to combine this timeless essence of Iranian music with contemporary musical techniques to create a sound world that is both forward-looking and deeply connected to its historical roots. This duality is the basis for my dialogue between the past and the present, fostering a unique and evolving auditory experience that helps me discover the past through its contemporary understanding.

Exploring the Notations of Iranian Classical Music

Whether rooted in the ancient Maqām/Adwār system or the contemporary Radif/Dastgāh system, Iranian classical music is fundamentally characterised by its sophisticated use of microintervals. This unique feature sets it apart from the pitch structures of Western classical music. Over time, the theoretical structure of Iranian music has evolved, but a core concept remains a potential chromatic scale, often described as consisting of seventeen unequal divisions of the octave. This scale, which is central to both historical and modern Iranian music theory, offers a more flexible and nuanced approach to pitches and intervals than the rigid equal temperament 12-tone system of Western classical traditions. The wide-ranging flexibility of interval sizes in Iranian music incorporates microtonality and subtle pitch variations that lie between Western semitones, resulting in a rich and expressive soundscape.

In modern times, these microtonal nuances often defy the conventional Western notation systems adopted by Iranians in the late 19th century for notating their music, leading Iranian theorists and musicians to develop specialised methods for documenting Iranian music. In the past, however, theorists from the medieval Islamic world, including Iranian, Arabic and Turkish scholars, used a unique notation technique for their musical treatises, the Abjad System. It has its roots in the Phoenician alphabet and assigned numerical values to Arabic letters, providing a unique method of organising musical concepts.

The earliest use of the Abjad System in music is attributed to Al-Kindi (801–873), who linked letter values to finger positions on the fingerboard of a stringed instrument. On this foundation, later scholars such as Fārābi, Ibn Zaila (d. 1048) and Safiaddin Ormavi refined the system by introducing advanced numerical methods to account for octave distinctions and complex modal structures. Their techniques consisted of labelling finger positions with individual letters of the

alphabet, calculating the ratio or proportion of each finger position based on the divisions of the string and assigning precise mathematical ratios to these letters. This meticulous approach enabled them to develop the precise and detailed tuning systems of their time. The mathematical precision allowed for the construction of tetrachord-based systems, which formed the theoretical foundation of Persian, Arabic and Turkish musical traditions. Although its use declined by the 15th century, the Abjad System remains a testament to the sophisticated integration of mathematics and music in medieval Iran.

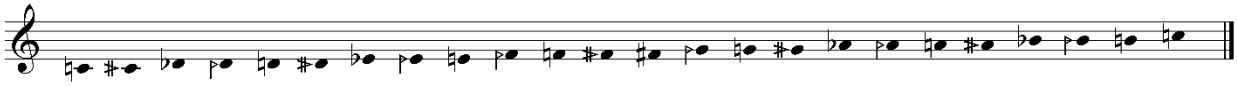
In the early 20th century, the Iranian composer and theorist Ali-Naqi Vaziri (1886–1979) revolutionised the notation of Iranian music by introducing two new symbols, koron and sori, and proposing a 24-note equal division of the octave (EDO) scale to represent the microtonal structure of Persian classical music.

𝄲 – sori, raises the pitch by a quarter-tone

𝄳 – koron, lowers the pitch by a quarter-tone

These symbols were integrated into Western notation to take into account the microtones that are important for Persian classical music. By enabling the notation of quarter-tones, Vaziri's system preserved the sonic nature of Iranian music to a certain extent, for despite its significant contributions, this innovation also had its limitations. While the simplified quarter-tone scale was useful, it could not fully capture the subtle and nuanced microtonal intervals that make up the rich sound world of Iranian music.

The 24-tone EDO scale of Vaziri



Despite the above-mentioned limitations, many Iranian scholars and musicians continue to accept Vaziri's 24-note EDO scale as their primary system of notation. In practice, however, they do not tune their instruments to the 24 equally spaced quarter tones per octave as suggested by the system, but remain faithful to their ear and their acoustic heritage, which has evolved over the centuries of the development of Iranian classical music. This discrepancy is one of the reasons why I decided to use an alternative notation system that allows me to capture the smallest nuances of Iranian music with greater precision in writing and hopefully stay true to the sonic potential that my country's music offers.

As a composer who works daily with microtonality and different tuning systems from the past, I have been searching for notation systems that can represent the detailed intervallic relationships in my music. Since 2015, I have adopted the Extended Helmholtz-Ellis Just Intonation (HEJI) pitch

notation system for my compositions, as it is the most promising and closest interpretive tool to describe the tuning dilemmas of the past in contemporary music. Developed by Marc Sabat (1965) and Wolfgang von Schweinitz (1953), the HEJI system precisely represents natural intervals using special accidentals. The HEJI system provides an accurate notation for any interval that can be derived from the harmonic series[1], with clear visual markings (logos) for each harmonic family to facilitate understanding and performance. As a rule of thumb, the HEJI system assigns new accidentals to each prime number within the harmonic series. These accidentals indicate deviations from Pythagorean tuning (3-limit) and increase the expressiveness of the system for microtonal and just intonation music.

[1] The harmonic series is a sequence of frequencies that are integer multiples of a fundamental frequency. To calculate the harmonics of a given fundamental frequency f_o, the n-th harmonic is given by the equation:

$f_n = n \times f_o$

Where:

f_n is the frequency of the n-th harmonic,
n is the harmonic number (1, 2, 3, ...),
f_o is the fundamental frequency (the first harmonic, also known as the tonic).

For example, if the fundamental frequency f_o is A0 (27.5 Hz), the frequencies of the first six harmonics are:

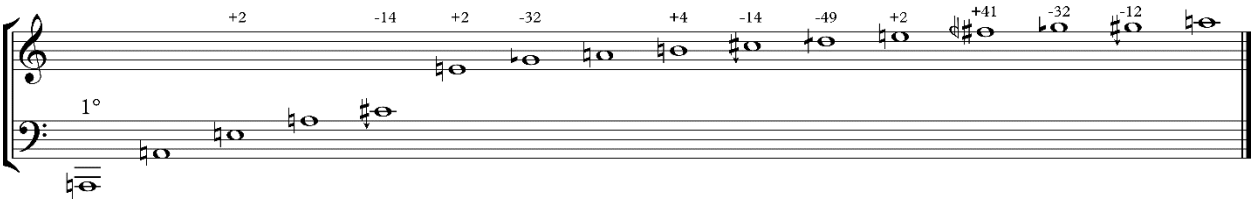
$f_1 = 1 \times 27.5 = 27.5$ Hz (A0)
$f_2 = 2 \times 27.5 = 55$ Hz (A1)
$f_3 = 3 \times 27.5 = 82.5$ Hz (E2)
$f_4 = 4 \times 27.5 = 110$ Hz (A2)
$f_5 = 5 \times 27.5 = 137.5$ Hz (C#3)
$f_6 = 6 \times 27.5 = 165$ Hz (E3)

This pattern continues indefinitely, with each harmonic being an integer multiple of the fundamental and generating the overtones that form the harmonic series. The intervals between the successive harmonics are not constant. They start wide and become narrower and narrower as the number of overtones increases.

Prime dimension	HEJI symbol	Symbol alters by
5		81/80
7		64/63
11		33/32
13		27/26
17		2187/2176
19		513/512
23		736/729
29		261/256
31		32/31
37		37/36
41		82/81
43		129/128
47		752/729

The following example shows the first sixteen harmonics of A0, notated with the accidentals of the Extended Helmholtz-Ellis Just Intonation (HEJI) system, and represents the natural overtones of the harmonic series. Starting from the fundamental (A0), each harmonic introduces pitches derived from integer multiples of the base frequency, including pure intervals such as the perfect fifth (E), the major third (C#) and others, which are adjusted with HEJI accidentals to reflect their exact position in the harmonic series. This system visually distinguishes prime-number harmonics and their deviations and provides a precise way to notate microtonal and Just Intonation-based music.

First sixteen harmonics of A0 notated with the HEJI accidentals



Composing with Omar Khayyam

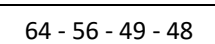
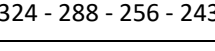
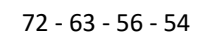
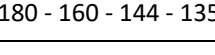
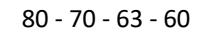
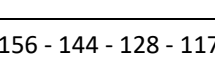
Omar Khayyam (1048–1131) was a Persian polymath known for his contributions to mathematics, astronomy, philosophy and poetry. He was born in Nishapur, Khorasan, and made groundbreaking advancements in algebra, in particular his geometric method for solving cubic equations, which involved the intersection of conic sections. Khayyam also played a crucial role in the development of the "Jalali calendar", a solar calendar still used today in Iran and Afghanistan, and made notable contributions to non-Euclidean geometry. His work on the parallel postulate in geometry opened up new paths for future mathematicians.

Khayyam is perhaps best known to the Western world for his Rubāiyāt (quatrains), which were popularised in the 19th century through the English translation by Edward FitzGerald (1809-1883). His poetry, which often deals with existentialism, fate and the transience of life, has had a profound influence on both Eastern and Western literary traditions. Khayyam's philosophical outlook, influenced by a mixture of Aristotelian logic and Persian mysticism, emphasised the inevitability of time and the acceptance of the fleeting beauty of life.

In creating "Eternal Chasms" for brass quintet and fixed media, I have tried to transfer and combine my fascination with the historical tuning systems of Iran, the nomadology and rhizomatic thinking of Deleuze, and the idea of social interaction between composer, performer and performance space into sound. The pitch organisation in "Eternal Chasms" comes from a short treatise I discovered during my doctoral research on the historical tuning systems of Iran. This treatise, attributed to the Persian polymath Omar Khayyam, can be found in the public library of Manisa in Turkey. As Jalaluddin Homaei (1900–1980) explained in his seminal work "Khayyami-Nameh" (1967), the surviving fragments are most likely part of Khayyam's commentary on the Elements of Music, a now-lost work attributed to Euclid (300 BCE). These pages, entitled "Discussion on the Genera Contained in a Fourth", offer theoretical insights and a glimpse into the rich history of medieval Persian music.

Like many medieval treatises on music, Khayyam's work integrates mathematical principles to describe the proportions of intervals within tetrachords. In his writings, Khayyam calculates the sizes of these intervals using numerical ratios, providing a precise mathematical framework for understanding their structure. He identifies twenty-one types of tetrachords, categorised into the genera Ghavi (diatonic), Molawwan (chromatic) and Ta'lifi (enharmonic), each defined by specific intervallic relationships. These ratios articulate interval sizes and serve as a systematic framework for practical application in tuning systems and musical performance.

Diatonic Genera

#	The String Lengths	Ratio	HEJI
1	64 - 56 - 49 - 48	8:7 - 8:7 - 49:48	
2	324 - 288 - 256 - 243	9:8 - 9:8 - 256:243	
3	100 - 90 - 81 - 75	10:9 - 10:9 - 81:75	
4	72 - 63 - 56 - 54	8:7 - 9:8 - 28:27	
5	180 - 160 - 144 - 135	9:8 - 10:9 - 16:15	
6	220 - 198 - 180 - 165	10:9 - 11:10 - 12:11	
7	80 - 70 - 63 - 60	8:7 - 10:9 - 21:20	
8	396 - 352 - 320 - 297	9:8 - 11:10 - 320:297	
9	156 - 144 - 128 - 117	13:12 - 9:8 - 128:117	

10	16 - 14 - 13 - 12	8:7 - 14:13 - 13:12	𝄮A 𝄾B 𝄲C 𝄮D

Chromatic Genera

#	The String Lengths	Ratio	HEJI
1	24 - 20 - 19 - 18	6:5 - 20:19 - 19:18	𝄮A 𝄰C 𝄳C 𝄮D
2	36 - 30 - 28 - 27	6:5 - 15:14 - 28:27	𝄮A 𝄰C 𝄾C 𝄮D
3	48 - 40 - 39 - 36	6:5 - 40:39 - 13:12	𝄮A 𝄰C 𝄲C 𝄮D
4	60 - 50 - 48 - 45	6:5 - 25:24 - 16:15	𝄮A 𝄰C 𝄯C 𝄮D
5	16 - 15 - 14 - 12	16:15 - 15:14 - 7:6	𝄮A 𝄭B 𝄾B 𝄮D
6	28 - 24 - 22 - 21	7:6 - 12:11 - 22:21	𝄮A 𝄽C 𝄬D 𝄮D
7	40 - 36 - 35 - 30	10:9 - 36:35 - 7:6	𝄮A 𝄱B 𝄾B 𝄮D

Enharmonic Genera

#	The String Lengths	Ratio	HEJI
1	40 - 32 - 31 - 30	5:4 - 32:31 - 31:30	𝄮A 𝄯C 𝄲𝄯C 𝄮D
2	100 - 80 - 78 - 75	5:4 - 40:39 - 26:25	𝄮A 𝄯C 𝄳𝄯C 𝄮D
3	140 - 112 - 108 - 105	5:4 - 28:27 - 36:35	𝄮A 𝄯C 𝄽𝄱D 𝄮D
4	60 - 48 - 46 - 45	5:4 - 24:23 - 46:45	𝄮A 𝄯C 𝄬𝄱D 𝄮D

Khayyam's contributions to music theory extend the Greek-Arabic traditions of figures such as Fārābi and Ibn Sinā. He emphasised the mathematical foundations of intervals and their correspondence to the string lengths of musical instruments. This approach reflects the medieval Islamic conception of music, which is both a category of art and a branch of mathematics expressing the harmony of the universe through precise numerical structures. Conversely, Khayyam's categorisation of tetrachords is based on earlier systems and at the same time integrates Persian musical traditions. Some of the intervals resemble the historical Greek Pythagorean-Ptolemaic theories as well as the modal systems of contemporary Iranian classical music. Khayyam also recognised the limits of mathematical precision in music, noting that certain microintervals are theoretically sound but not necessarily musically appealing. This realisation suggests that, in addition to his theoretical expertise, Khayyam also had practical experience as a musician.

Although Khayyam's work has been partially lost or obliterated, it emphasises the synthesis of mathematics and music in medieval Persian scholarship. His mathematical precision and practical

understanding of musical intervals make his contributions a valuable bridge between ancient Greek theories, medieval Islamic thought and enduring Iranian musical traditions.

My Holographic Composition Technique translates the ancient principles into a sound world with the intention of connecting both the contemporary ear and historical practice. One of the main features of this technique is the use of psychoacoustic phenomena, such as combination tones, which become an integral part of the listener's perception when two or more pitches interact. These auditory effects are not merely coincidental, but form the basis of the technique and create a dynamic listening experience that goes beyond the direct tonal relationships between the sounds. The relationship between the layers of sound, whether acoustic or electronic, brings the visual metaphor of holography to life - each sound event contributes to a larger, multidimensional musical universe, much like each dot in a hologram contributes to the overall picture. The core idea here is that I use the layered intervals derived from Khayyam's tetrachords to form the basis for an evolving sound world of a composition. These layers of sound are not static, but develop over time, just as the philosophy of time and transformation permeates much of Khayyam's work. The process of continuous metamorphosis, coupled with the historical depth of Iranian music theory, forms a deep and meditative sonic experience for me. In "Eternal Chasms", this technique is brought to life as the brass quintet and electronics create a harmony of contrasting elements. The piece explores the tension between stability and change, with each harmonic connection having a dramatic impact on the sonic landscape of the music and the ongoing tensions of musical progression.

The pitch organisation in Eternal Chasms is derived from Khayyam's tetrachords. I have developed twenty-eight potential pitch gamuts, each corresponding to a different set of intervals derived from the selected tetrachords. These pitches, taken from the harmonic series, have been translated into their closest enharmonic equivalents playable on brass instruments, with a tolerance of up to 11 cent difference. This approach ensures that the pitches remain as faithful as possible to the original tuning systems, while taking into account the performance possibilities of brass instruments. To achieve this, I have distributed these selected pitches among the five instruments in the ensemble, considering their ability to play higher harmonics up to the 13th. This distribution also respects the specific timbral qualities and range of each instrument and ensures that the overall texture remains balanced and rich.

In cases where certain pitches could not be realised directly, such as the pitch derived from the 49th harmonic (which is impossible to play on real instruments), I looked for alternative solutions by finding the closest rational ratios with the smallest possible difference. For example, I replaced the 49th harmonic of the fundamental A with the 11th harmonic of Cb, which shares a similar harmonic relationship to the first one. Similarly, I used the 13th harmonic of E in place of the 39th harmonic of A, using the lower harmonic of one pitch to approximate the desired interval from another.

This process illustrates the complicated blending of historical precision with contemporary performance practise. The resulting pitch material is not only faithful to historical principles, but also practical and performable within the limits of the brass quintet performance capabilities.

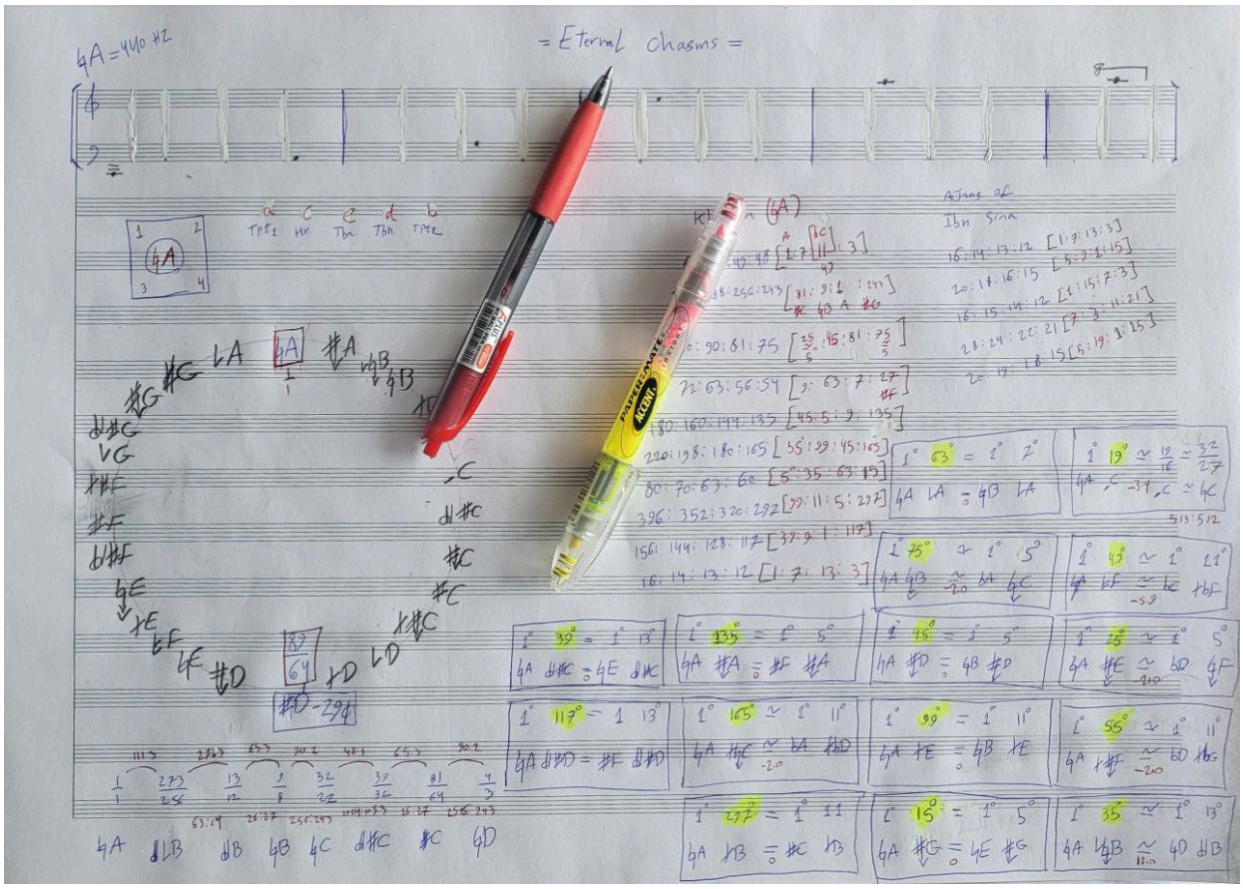
Samimi Mofakham/Khayyam Gamut:

Gamut derived from Khayyam's work (Reference ♮A)	HEJI	Enharmonic pitches / Alternative fundamental	HEJI	Difference in Cents (approximated)	Cents from reference
1/1	♮A	-	♮A	-	0
135/128	𝄲A	5°/♯F	𝄲A	0	92
35/32	𝄳𝄮B	13°/♮D	𝄩B	+11	155
9/8	𝄮B	-	𝄮B	-	204
297/256	𝄱B	11°/♯C	𝄱B	0	257
75/64	𝄲B	5°/♭A	𝄬C	-2	275
19/16	𝄎C	32/27	𝄮C	-3	298
39/32	𝄩♯C	13°/♮E	𝄩♯C	0	343
5/4	𝄲C	-	𝄲C	-	386
81/64	♯C	-	♯C	-	408
165/128	𝄱♯C	11°/♭A	𝄱♭D	-2	440
21/16	𝄳D	7°/♮E	𝄳D	0	471
11/8	𝄱D	-	𝄱D	-	551
89/64[2]	♯D^{-29}	-	♯D^{-29}	-	571
45/32	𝄲D	5°/♮B	𝄲D	0	590
3/2	𝄮E	-	𝄮E	-	702
49/32	𝄭F	11°/♭C	𝄱♭F	-6	738
99/64	𝄱E	11°/♮B	𝄱E	0	755
25/16	𝄲E	5°/♭D	𝄬F	-2	773

[2] The ratio results from the addition of the two adjacent ratios above and below it, which represent its medians. This mediant also serves as the centre point of the scale. No specific accidental is given for this interval as it is based on the 89th harmonic, whereas the HEJI system is limited to the 47th harmonic. Therefore, the pitch is notated as D sharp to indicate the deviation from the standard 12-TET.

13/8	𝄲#F	-	𝄲#F	-	840
27/16	#F	-	#F	-	906
55/32	𝄳#F	11°/♭D	𝄳♭G	-2	938
7/4	𝄾G	-	𝄾G	-	969
117/64	𝄲#G	13°/#F	𝄲#G	0	1044
15/8	𝄳G	5°/𝄮E	𝄳G	0	1088
243/128	#G	-	#G	-	1110
63/32	𝄾A	7°/#F	𝄾A	0	1173
2/1	𝄮A	-	𝄮A	-	1200

Sketch for the pitch organisation of the piece



Deleuze's Nomadology and Rhizomatic Thinking in Music

In "Eternal Chasms", the interplay between performers and fixed media encourages active listening, spatial awareness and a group co-creation. The fixed media act as a dynamic "wall of sound' that is constantly evolving and requires the performers to adapt in real time. The musicians engage with this multilayered sound environment by intuitively responding to both the fixed media and each other, making the surrounding space an active element of the performance. This concept is reminiscent of the approaches of John Cage and Christian Wolff, whose works break down the traditional boundaries between composer and performer practice and emphasise interaction and interpretative freedom given from the composer towards the performers.

The score provides a framework that is easy to interpret but rich in possibilities. Performers have complete freedom to navigate the given pitches, which have been carefully selected based on the principles of Rational Intonation[3] and Khayyam's previously introduced tetrachord database, and notated for each instrument according to the principles of the HEJI system. This precision ensures a harmonic foundation while granting performers the liberty to develop unique melodic lines out of the compositional material. Since there are no fixed melodies or rhythms in the traditional sense, the score can be treated as a guide rather than a prescriptive directive, encouraging creativity and personal interpretation of material potential.

This philosophy is consistent with Cage's and Wolff's open-form compositions, in which the performers actively shape the music. Wolff's emphasis on interaction between performers mirrors the collaborative ethos of "Eternal Chasms", transforming the score into a space for collective exploration. The flexibility of the score invites performers to "break the formal canon" and reshape the piece through their engagement, making each performance a unique, co-created experience.

The underlying intention is rooted in Deleuze's monadology and rhizomatic thinking, which emphasise fluidity, non-linearity and interconnectedness. By breaking down the traditional roles

[3] Rational intonation is a tuning system based on precise mathematical frequency ratios. It allows the intervals to be flexibly adapted to specific harmonic or melodic requirements. In contrast to Just Intonation, which is tied to a single fundamental pitch, rational intonation allows dynamic shifts in the reference pitch, which facilitates modulations and a broader tonal exploration.

Historically, "just intonation" has its origins in European traditions such as Pythagorean tuning, which focussed on intervals derived from consecutive fifths (3:2 ratios) and later incorporated ratios such as pure thirds (5:4) for consonant harmonies. In contemporary music, composers such as Harry Partch, who created a 43-tone scale and custom instruments able to perform in it, or Ben Johnston, who further developed Just Intonation for Western instruments, are some of the key figures in the exploration of the microtonal potential and harmonic complexity of tones.

of composer, performer and listener, "Eternal Chasms" transcends performance and becomes a social practice — a shared act of freedom, collaboration and spontaneous creation.

The fixed media layer reinforces this dynamic. It is not a static backdrop, but a reactive element that challenges the performers to negotiate their interaction with the environment. This creates a continuous dialogue between the musicians, the electronics and the performance space, ensuring that each rendition of the piece is its own distinct creation.

Ultimately, "Eternal Chasms" embodies a philosophy of collective and social freedom. By dissolving hierarchical roles, it encourages performers to reimagine and reinterpret the work in real time. There is no conventional score for this composition. Instead, the performers are provided with five circular diagrams. These circles emphasise non-linearity, openness and interaction. They symbolise the lack of a fixed beginning or end and encourage each musician to have a fluid, interpretative engagement with the notated specifications. Each circle contains pitches from the Samimi Mofakham/Khayyam Gamut. The brief description of how to read the circle, or rather, not to be afraid of its creative interpretation, is included as a technical guideline for composition.

A particular challenge for me in translating ancient musical theories into the musical material for contemporary compositions is the integration of the complex intervallic structures of the past into modern instruments which, due to the natural evolution of musical practises and theories over the past centuries, are not designed to reproduce pitches with such precision - the result of the standardisation of commonly used tuning systems in the Western musical practice. Although the brass quintet is ultimately capable of playing microtonal intervals, the ensemble requires both specialised training and heightened pitch sensitivity to portray the subtle nuances inherent in Khayyam's systems. In Eternal Chasms, the performers must not only navigate through the intricacies of the HEJI notation system, but also find a deep understanding of the microtonal nuances characteristic of Iranian classical music - often the country to which they have no musical or cultural connection. This interpretative flexibility is the key to a living, breathing performance that remains true to the historical and philosophical elements of the piece. It also allows the performers to broaden their perspective on different approaches to the music, regardless of the origin of the idea, an endless rooting of knowledge through the openness of the sound itself.

The precision required in the execution of the microtonal intervals also leads to a unique junction between the acoustic and fixed media components. The electronic layer, while pre-composed, is designed to interact organically with the live brass instruments, responding to their timbral variations and contributing to the overall harmonic flow. This exchange between acoustic and electronic elements is emblematic of the rhizomatic structure of Eternal Chasms, in which no one element dominates and each sound interacts dynamically with the others. The tension and interplay between the two forces creates a multidimensional, immersive sonic experience that

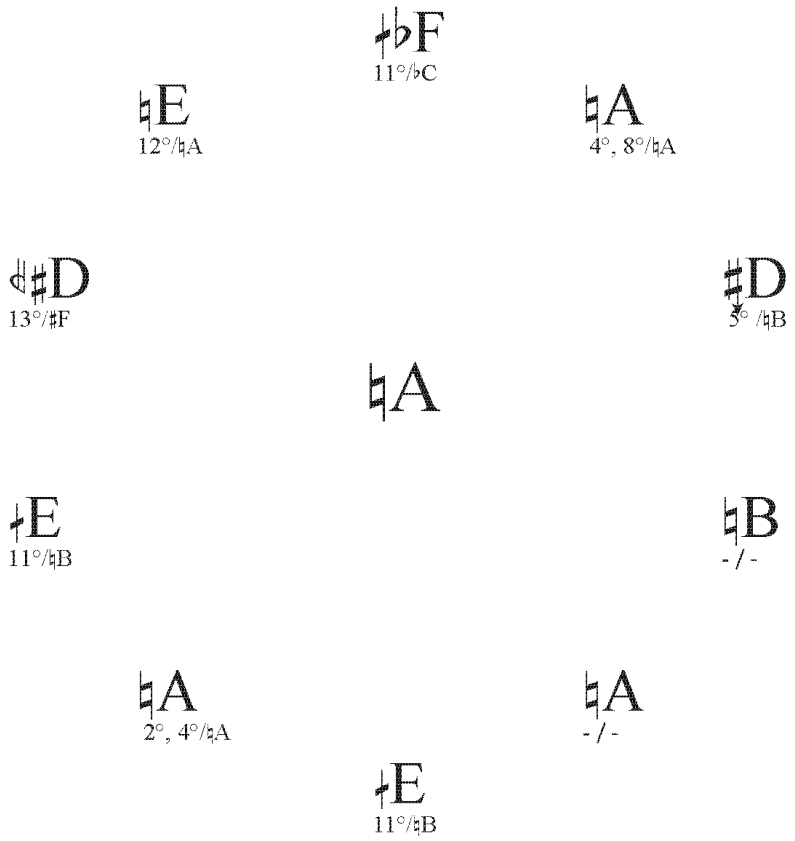
reflects the interconnectedness and constant flux found in the philosophical teachings of both Khayyam and Deleuze.

The application of Deleuze's nomadology and rhizomatic thinking to my compositions enables the creation of a musical landscape that defies the linearity of traditional Western and Eastern tonal systems. In Eternal Chasms, this philosophical model manifests itself in the exploration of shifting modal landscapes. The harmonic structure of the piece is constantly in flux, bypassing traditional harmonic cadences and resolutions in favour of an open, nomadic exploration of sound. This fluidity in the musical form reflects Deleuze's idea of the nomad moving without a fixed destination, breaking through the notion of a static home or chosen goal. Rather than building the tension towards a final resolution, the music remains in a state of continuous transformation, reflecting the nomadic movement that Deleuze formulates in his philosophy.

Horn in F

Eternal Chasms

Idin Samimi Mofakham



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The rhizomatic model offers another convincing way of understanding the compositional concept behind "Eternal Chasms". According to Deleuze and Guattari, a rhizome is a non-hierarchical system that grows in multiple directions simultaneously without having a clear centre or origin. Applied to music, each point in a piece can lead to another without there being a predetermined or linear progression. In "Eternal Chasms", this is realised through the relationship between live instruments and electronic sounds, where each element can influence and reshape the other in real time. Although the A natural is used as the reference pitch for the calculation and creation of the gamut in this piece, there is no singular "centre" or focal point within the composition. Instead, each sound event is part of a larger, interconnected web of sonic relationships. This is consistent with the rhizomatic perspective, where each node is unexpectedly and unpredictably connected to others. This interconnectivity within the music is not just a structural principle, but a sonic manifestation of Deleuze's ideas. The electronics in "Eternal Chasms" function not as accompaniment, but as an autonomous force that interacts with the live performance. This blending of electronic and acoustic elements symbolises the rhizomatic thought that no one element takes precedence over the others. The performers, the fixed media and the entire sound world form a complex, evolving network in which every interaction is significant and contributes to the ongoing development of the composition.

When I look at Khayyam's musical theories through the lens of Deleuze's rhizomatic thinking, new dimensions of meaning open up to me. His categorisation of tetrachords and intervals can be seen as a rhizomatic system in its own right, resisting linear categorisation and instead offering a network of possible connections between sounds. The mathematical ratios that Khayyam outlines for the different types of tetrachords are not merely theoretical constructs; they are part of a broader system that embraces the interconnectedness of all intervals. In "Eternal Chasms", this rhizomatic approach to Khayyam's theory allows for the creation of a harmonic space that grows organically, without the constraints of traditional Western tonal systems. The piece becomes an exploration of this interconnectivity, where each interval and harmonic progression creates a new set of possibilities. The sound world of "Eternal Chasms" is not rigid or static; it evolves, just as the philosophical systems of Deleuze and Khayyam suggest. This constant movement, both in terms of sound and meaning, invites us to experience the piece in a very personal way, as each moment in the music connects to the next, creating a continuous and unfolding personal sonic journey.

Conclusion

The revival of ancient practices through the Holographic Composition Technique is not about restoring historical systems to their original form, but rather about reinterpreting and recontextualising them for contemporary purposes. In my understanding, the work of Khayyam

and other Persian polymaths is not something that should be preserved in a museum-like state, but rather it should be brought to life to offer fertile ground for artistic exploration and expansion of the now.

By adapting Khayyam's intervallic systems with the harmonic principles of Deleuze's rhizomatic philosophy, I aim to offer a fresh perspective on the ancient theories, presenting them not as static relics of history, but as living concepts that can contribute to the ongoing evolution of music.

The ability to reinterpret these ancient practices in a modern context reflects my broader compositional philosophy: that music is a living, breathing entity that is constantly evolving in response to new ideas and cultural contexts. The Holographic Composition Technique thus serves as both a bridge to the past and a portal to the future. It allows historical Iranian musical traditions to be dynamically combined with contemporary concepts of sound, perception and philosophy. Through this process, the music becomes a continuous, ever-expanding conversation between different eras and different ways of thinking, creating a deeply connected yet forward-looking sonic landscape. It can even transcend the boundaries of Iranian musical tradition and be used in any desired cultural and global context to bring the past, present and future musical practices of any region of the world closer together.

By recontextualising Khayyam's theories and engaging deeply with Deleuze's ideas of nomadology and rhizomatic thinking, I strive to create compositions that reflect the fluid, interconnected nature of music and the world around us. Once again, my work and philosophy of composing is not an attempt to preserve the past, but rather to allow the past to speak to the present in new and transformative ways. By doing so, I aim to offer a deeper, more reflective sonic experience that invites us to reflect on the vast, interconnected web of ideas that has shaped ancient and contemporary musical traditions to this day.

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