

Row partitioning and tetrachordal transformation in Ernst Krenek's Nocturne, Op. 110, No. 5

Ernst Krenek'in Nocturne, Op. 110, No. 5 eserinde dizi bölümlenmesi ve tetrakordal dönüşüm

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ABSTRACT

Ernst Krenek is widely regarded as one of the most important composers of the twentieth century. This study examines Krenek's work titled Eight Piano Pieces, Op. 110, No. 5, "Nocturne", analysing its structural, aesthetic and technical characteristics in terms of both its relationship to the traditional nocturne genre and the innovations it presents within the context of the composer's modernist and serialist approaches. During the analysis process, content analysis was employed alongside the multimodal data analysis approach proposed by Bauer and Gaskell. Furthermore, the prime sequence was redefined based on Morris's (MOF) "Multiple Order Function" theory. The findings reveal that, whilst the work bears similarities to a two-part song form, it employs the twelve-tone technique flexibly and distinguishes itself from traditional serial approaches by utilising four-note pitch groups (tetrachords), canon and counterpoint techniques. Despite the absence of a tonal centre, the melodic structure offers a consistent and inward-looking lyrical narrative. Consequently, Krenek's Nocturne reveals the development of an expressive musical language that transcends serialism's tendency towards rigid systematisation. This work presents a unique musical language by bringing together technical and aesthetic approaches. This language interprets serialism not as a break with tradition, but as a transformative process.

Keywords: Ernst Krenek, nocturne, modernism, twelve-tone technique, analysis

ÖZ

Ernst Krenek, yirminci yüzyılın en önemli bestecilerinden biri olarak yaygın biçimde kabul edilmektedir. Bu çalışma, Krenek'in Eight Piano Pieces, Op. 110, No. 5, "Nocturne" başlıklı yapıtını; yapısal, estetik ve teknik özellikleri bakımından hem geleneksel noktürn türüne yönelik ilişkisi hem de bestecinin modernist ve seriyalist yaklaşımları bağlamında ortaya koyduğu yenilikleri incelemektedir. Analiz sürecinde, Bauer ve Gaskell tarafından önerilen multimodal veri analizi yaklaşımıyla birlikte içerik analizi yöntemi kullanılmıştır. Aynı zamanda Morris'in (MOF) "Multiple Order Function" teorisinden hareketle prime dizisinin yeniden belirlenmesi sağlanmıştır. Elde edilen bulgular ile, eserin iki bölümlü şarkı formuna benzerlikler taşıması ile birlikte, on iki ton tekniğini esnek bir biçimde kullandığını ve dört-sesli perde gruplamaları (tetrakordlar), kanon ve kontrpuan tekniklerinden yararlanarak geleneksel dizisel yaklaşımlardan ayrıldığını ortaya koymaktadır. Tonal bir merkezin yokluğuna rağmen, melodik yapı tutarlı ve içsel yönelimli bir lirik anlatım sunmaktadır. Sonuç olarak Krenek'in Nocturne'ü, diziselciliğin katı sistemleştirme eğilimini aşan dışavurumcu bir müzik dilinin gelişimini gözler önüne sermektedir. Bu eser, teknik ve estetik yaklaşımları bir araya getirerek benzersiz bir müzik dilini ortaya koymaktadır. Bu dil, diziselciliği gelenekten bir kopuş olarak değil, dönüştürücü bir süreç olarak yorumlamaktadır.

Anahtar kelimeler: Ernst Krenek, noktürn, modernizm, on iki-ton tekniği, analiz

1. INTRODUCTION

Music of the Romantic era emerged in the nineteenth century following the Classical period (Roberson, 1979). This period is characterised by a musical aesthetic shaped by social and cultural transformations that placed individual emotion and imagination at the heart of artistic expression. During this period, music increasingly favoured a continuous and fluid flow, moving away from the sharply defined phrase structures of the Classical period, which contributed to a more emotionally charged musical expression (Cubero, 2021). This shift allowed musical structures to develop more freely and enabled composers to express greater emotional depth. In this context, the piano became a key instrument for enhancing emotional expression and individual creativity (Jia, 2024).

Within this broader aesthetic shift, composers developed new forms of expression that emphasised personal narrative, and the nocturne, in particular, emerged as a significant genre. The nocturne has become one of the most compelling genres of Romantic piano music, offering emotional depth and melancholy (Alexander, 1957) and expanding the expressive possibilities of the piano (Piggott, 1968).

Derived from the Latin word *nocturnus* ('pertaining to the night'), this genre is generally associated with solo piano works characterised by a slow tempo, lyrical melodies and an introspective quality (Rosen, 1995). First developed in the early 19th century by John Field, the nocturne is thought to have reached its artistic zenith in the works of Frédéric Chopin, who composed twenty-one nocturnes and is widely regarded as having elevated the genre to new heights of expression (Pan, 2024; Piggott, 1968). However, in music, the nocturne's establishment as a "wordless love song" and the shaping of its identity within Romantic music were aided by Field's contributions (Clark, 2022).

Historically, the term 'nocturne' and its equivalents in other languages—such as the German *Nachtstück* and the Italian *notturmo*—were used in the early 18th century to describe both vocal and instrumental works. Italian nocturnes were generally associated with open-air evening performances and shared stylistic features with the serenade, including lyrical melodies accompanied by pizzicato textures. Examples can be found in the works of composers such as Wolfgang Amadeus Mozart (K. 286) and Joseph Haydn (Murdock, 2012). Whilst earlier forms were largely functional and performance-oriented, the Romantic nocturne evolved into an introspective and expressive piano genre. Chopin's nocturnes, in particular, have been widely recognised as lyrical expressions of emotion and are generally associated with the contexts of salon culture and domestic performance; this has contributed to the genre being interpreted as 'feminine' and to debates regarding Chopin's role in challenging gender norms in music. (Eigeldinger, 1986; Kallberg, 1996).

Although general information has been provided on the nocturne genre, the primary aim of this study is to examine how serial structure is organized through the tetrachord system in a twelve-tone composition based on the nocturne form. To understand this structure, it is necessary to examine the origins and fundamental principles of early serialism.

Impressionism, which emerged in the late nineteenth century and spread across the European continent, is an artistic philosophy rooted in the ideas of Ernst Mach; it is an artistic approach based on empirical and sensory experience. Ernst Mach's empiricism, which became particularly influential, also shaped the intellectual climate of Vienna at the end of the nineteenth century. Consequently, modernism in Vienna is also grounded in a conception of perception and subjectivity shaped by Mach's empiricism. This perspective led to a transformation in the artistic understanding of Vienna modernism, prioritising the sensory impression over the object itself and embracing a fluid and variable conception of the self rather than a fixed notion of identity. By emphasising the transient nature of sensations and bringing the viewer's subjective experience to the fore, this artistic movement challenged traditional conceptions of art (Slivinska & Sapyelkina, 2024).

Following the emergence of Expressionism, Arnold Schönberg deliberately abandoned the tonal centre in the first decade of the 20th century. This system, also employed by Krenek, laid the foundations for a new musical language known as free atonality (Kurth, 2025). This approach involved the rejection of the functional relationships specific to the major-minor tonal system and the avoidance of establishing a hierarchical tonal centre between sounds. Schoenberg's atonal works from this period constituted a significant structural and aesthetic turning point in music history by extending the expressive power of music beyond the tonal system (Teitelbaum, 1965).

Although the development of the twelve-tone system is now studied in relation to the works of Webern, Berg and Krenek, Arnold Schoenberg was unable to take his approach to a more advanced stage in the process of introducing and disseminating the system he had developed, due to his heavy workload and the prejudices he faced. Nevertheless, the twelve-tone technique left a lasting impact on music theory and pedagogy and became a significant source of inspiration for subsequent generations of composers (Auner, 2010). Schoenberg's foremost pupils—Hanns Eisler, Alban Berg and Anton Webern—composed important works using the twelve-tone technique. These composers further advanced the musical thinking shaped by Schoenberg's teachings, making significant contributions to the development of the twelve-tone system (Wörner, 1993/2001).

Ernst Krenek is regarded as one of the most important figures in this development, particularly for his technique of generating various serial combinations from smaller structural units by segmenting twelve-tone rows.

Ernst Heinrich Křenek was born in Vienna, the capital of the Austro-Hungarian Empire, at the beginning of the twentieth century. He was the only child of Arnost and Emanuela Křenek. During his youth, he studied with the Austrian composer Franz Schreker, before moving to Berlin in 1920 to pursue his composition studies. By his early twenties, Křenek had become a highly productive composer who was a regular fixture on the concert and operatic scene. In addition to several operas, he composed around 250 works spanning various genres (Lindal, 2024).

Krenek's compositional output encompasses a wide range of stylistic approaches. His early works reflect the late-Romantic idiom, influenced by his teacher, Franz Schreker. Subsequently, he embraced atonality, but following a visit to Paris he adopted a neoclassical style influenced by the works of Igor Stravinsky and *Les Six*. His opera *Jonny spielt auf* (1926), which drew inspiration from jazz idioms, enjoyed remarkable success during his lifetime and was widely performed throughout Europe (Duffie, 2012).

Krenek's musical journey spans the eclectic style of *Jonny spielt auf* to the rigorous application of the twelve-tone technique in *Karl V*. During this period, his relationships with contemporaries such as Alban Berg and Arnold Schoenberg were particularly significant (Tregear, 2013). Although Krenek was initially critical of the twelve-tone method, he gradually became convinced of the historical inevitability of serial composition. The influence of figures such as Franz Schreker and Karl Kraus played a substantial role in shaping his evolving aesthetic perspective during this process (Krapivina, 2017).

During the 1950s, Krenek embraced the ideas of integral serialism, testing these concepts within his own compositional practice. At a time when serial determinism was in crisis, many contemporary composers turned to aleatoric techniques. In his theoretical writings on serialism, Krenek examined the interactions between predetermined and indeterminate elements. His piano cycle *Sechs Vermessene* demonstrates that serial expansion encompasses parameters such as pitch, rhythm, density, dynamics and register. This work offers an opportunity to re-examine the traditional relationship between serialism and aleatoric techniques, arguing that aleatoric techniques may be a logical consequence of serialist thought (Okuneva, 2019).

These approaches contributed to the emergence of new modes of structural thinking and expanded the aesthetic possibilities of music. Krenek's works offer particularly important examples of the structural and aesthetic dimensions of the twelve-tone technique. Krenek's innovations were not confined to serial procedures; he also produced original reinterpretations of historical genres. For instance, the Romantic conception of the nocturne was reshaped within his musical world during the twentieth century, evolving into a multi-layered aesthetic strategy articulated through his modernist idiom.

From the 1920s onwards, Krenek boldly navigated between free atonality, the twelve-tone technique and traditional forms. Simultaneously, he integrated Romantic characteristics, such as melodic contour and emotional intensity, with modernist compositional techniques (Tregear, 2013). Certain piano works and lieder in Krenek's repertoire are notable for containing passages that evoke the introspective character, lyrical discourse and night-time atmosphere of the nocturne. However, in Krenek's approach, these lyrical representations are not framed by a tonic-centred aesthetic ideal. Instead, they present the listener with narratives woven from the fragmentation of individual existence, the solitude of the modern subject and psychological complexity (Botstein, 2001).

The internal musical structure and emotional depth of Krenek's works function as central elements in shaping the listener's cognitive experience. Accordingly, his music reflects the aesthetic interrogations of musical modernism by presenting complex structures and profound expressive layers that activate emotional responses in the listener.

2. PROBLEM SITUATION

In the analysis and compositional application of twelve-tone music, a set-form is defined not only by its internal interval content but also by its intersections and structural relationships with various transformations (transposition, inversion, retrograde). Whilst traditional analytical approaches tend to focus on a single set-form within a musical passage, the concept of the 'Multiple Order Function' (MOF), developed by Robert Morris and Philip Batstone, emphasises the capacity of a series' segments to serve multiple set-forms simultaneously. The central issue of this study is the 'segmental invariance' exhibited by the twelve-tone sequences used in Ernst Krenek's Eight Piano Pieces, Op. 110 No. 5 - Nocturne under standard operations (T, I, R, RI), and the structural overlaps arising from this property. In these specific scales, a particular collection of pitch classes (segment) may occupy specific sequence numbers within one form (e.g. P-0), whilst appearing in the same or different sequence numbers in another transformation. This phenomenon demonstrates that the scale possesses an extremely systematic multi-sequence function, rather than creating 'scale indeterminacy'. This function allows for the 'merging' of different line forms through shared segments.

2.1. Research sub-questions

In Krenek's Op. 110 No. 5 'Nocturne', how do tetrachordal segmentation and transformational analysis—particularly in relation to competing E $\flat$ - and G-based interpretations—undermine the stability of serial identity, and how does this structural ambiguity reshape both the intervallic organisation and the formal structure within the work?

2.2. Significance of the Research

It is considered that this study is significant in that it offers new insights into the transformation of Romantic genres and forms within the framework of twentieth-century serialism, and demonstrates how expressive and structural elements can coexist within a modernist style. In this context, the analysis of Ernst Krenek's eight piano pieces, Op. 110 No. 5 "Nocturne", is particularly important, as it raises an issue of sequence indeterminacy that allows for a re-evaluation of the tetrachordal division, in which the prime sequence begins with G rather than E $\flat$. Addressing this ambiguity through segmental theory, set-theoretic saturation and transformational logic not only clarifies the structural function of tetrachords as independent units, but also highlights the flexibility of serial organisation within Krenek's compositional practice. Accordingly, the study is significant in that it contributes to a deeper understanding of analytical uncertainty in twelve-tone music and broadens interpretative perspectives regarding the enduring presence of the nocturne genre within the modernist musical language.

2.3. The Purpose of the Research

The aim of this study is to analyse Ernst Krenek's eight piano pieces, Op. 110 No. 5 "Nocturne", within a tetrachordal segmentation framework in order to address the issue of sequence indeterminacy arising from serial organisation, and in particular to examine alternative interpretations such as the prime sequence beginning with G rather than E $\flat$. In this context, the study examines how segmental theory, set-theoretic saturation and transformational logic contribute to the understanding of tetrachords as independent structural units within the work's twelve-tone texture. Rather than focusing on a historical transformation of the nocturne genre, the study aims to clarify how flexible serial procedures produce multiple yet structurally coherent interpretations of the sequence. In doing so, it seeks to demonstrate that the analytical indeterminacy in Krenek's serial design is not accidental but structurally embedded, and how this has expanded interpretative approaches to serial organisation and tetrachordal structure in twentieth-century music.

3. METHODOLOGY

This study examined Ernst Krenek's Nocturne No. 5 from Eight Piano Pieces, Op. 110 (1946) using content analysis. Content analysis is a widely used method in qualitative research that allows for the examination of various data sources, including text, images, and audio (Kleinheksel et al., 2020). It can be applied to qualitative and quantitative data, adopting either an inductive or deductive approach. Inductive content analysis is used to explain previously unexplored or fragmented phenomena, whereas the deductive approach is used to test an existing theory in a different context or compare categories across different time periods (Elo & Kyngäs, 2008).

In the present study, content analysis involved systematically coding the musical text, classifying it into categories, and interpreting it within an analytical framework. During the analytical process, the reliability criteria and coding procedures proposed by Krippendorff (2018) were adopted to ensure a systematic examination of musical variables. The multimodal data analysis approach proposed by Bauer and Gaskell (2000) guided the integrated evaluation of musical sound and notation.

Analysing the work from the perspective of the twelve-tone technique was based on the fundamental principles of serial composition developed by Arnold Schoenberg (Boss, 2014; Perle, 1968). Dodecaphony is a compositional technique based on ordering the twelve pitches of the chromatic scale into a fixed sequence, known as a 'row', which is then used through various transformations (Haimo, 1993). In this technique, musical material is generated using the prime form and its transpositions, as well as its retrograde, inversion and retrograde-inversion forms (Perle, 1968).

A detailed examination of the work's notation revealed the basic twelve-tone row and its transformations, with musical parameters systematically coded. The coded data were categorised according to the principles of content analysis (e.g. formal sections, row usage, texture types and rhythmic patterns), and each category was examined in detail using twelve-tone analytical methods. The findings were then interpreted in the context of Krenek's stylistic characteristics and compositional practices of the period. Finally, the musical-aesthetic qualities of the work were discussed.

In the analysis process, the fundamental prime sequence of the work was determined, and its distribution within the work was systematically identified. The prime sequence presented in J. D. Houser's work formed the starting point of the analytical framework; however, based on the (MOF) analysis methods presented in Morris's (1977) work, a new prime sequence was created focusing on tetrachords determined by canon and counterpoint elements within the work, and the systematic repetition of these tetrachords within the work. This provided a different perspective to the analysis through the structural similarities it established with the existing matrix structure. In this context, a new series matrix specific to the work was created based on the newly discovered prime series, and the use and distribution of all derivative forms (P, I, R, RI) within the work were examined in detail. The findings point to a common structural principle in both the proposed new matrix table and the matrix presented by J. D. Houser: the compositional organization of the work is clearly based on tetrachordal connections. The distribution of tetrachords in the horizontal and vertical planes is shown in the score; it has been shown that this distribution is directly related to the formal structure and motif integrity of the work. Detailed analyses of the data obtained in the study are presented under the analytical headings in the findings section.

4. FINDINGS

4.1. Analysis

Ernst Krenek's Nocturne from Eight Piano Pieces, Op. 110 (1946) was selected for analysis to examine the genre, form and tone rows in relation to the 19th century's formal and tonal organization.

Table 1

Formal characteristics of Ernst Krenek's Eight Piano Pieces, Op. 110, No. 5: Nocturne

A	B	Coda
mm. 1-14	mm. 15-21	mm. 22-24

Graph 1*Percentage Distribution of Formal Sections*

As shown in Table 1, Figure 1 and Graph 1, the work is divided into two main sections. Comprising a total of 24 bars, the work consists of a 14-bar A section, a 7-bar B section and a 3-bar coda. This formal structure corresponds to the song (lied) form. However, the relevant analysis has revealed that the work's phrasing differs from the symmetrical and periodic phrasing patterns typically associated with the nineteenth-century Romantic tradition.

The Nocturne represents a radical departure from the preceding four pieces in the series. Here, the twelve-tone row no longer functions as an indivisible unit that is essential to serial organisation. Instead, the row is divided into three segments, each consisting of four adjacent pitches. These four-note segments, known as tetrachords, dominate the Nocturne's compositional design, as they are used as 'independent units of construction', in Krenek's own words (Houser, 1977, pp. 81-82).

The only pattern that emerges in this passage is the avoidance of all twelve tones within a very limited temporal span. There are no explicit instances of aggregate completion or vertical alignment of tetrachords, nor any segment that clearly articulates the complete twelve-tone collection. The closest approximation to an aggregate occurs when all three tetrachords of P1 are presented in succession (Houser, 1977, p. 83).

Figure 1

J. D. Houser (1977). 'The Evolution of Ernst Krenek's Twelve-Tone Technique' (p. 83). Eastman School of Music, University of Rochester

Example 44. Krenek, Eight Piano Pieces, "Nocturne," meas. 12-14, Quasi-aggregate formation

The musical notation shows three staves (treble, bass, and a grand staff) with measures 12-14. The first tetrachord (a P1) is in measure 12, the second (b P1) in measure 13, and the third (c P1) in measure 14. The notes are: a P1 (Bb, Ab, Gb, Fb), b P1 (Ab, Gb, Fb, Eb), and c P1 (Gb, Fb, Eb, Db).

Figure 2

Prime Row of Eight Piano Pieces, Op. 110, No. 5: 'Nocturne', as identified in the study by J. D. Houser



Figure 2 displays the prime series utilized in Houser's analytical study of Krenek's *Eight Piano Pieces*, Op. 110, No. 5: "Nocturne."

Figure 3

An alternative prime row of eight piano pieces, Op. 110, No. 5: 'Nocturne', as identified in the study by J. D. Houser



As shown in Figure 3, the twelve pitches are distributed between the right and left hands in the first four measures of the piece. The musical material is organised within the piece in the form of tetrachords, using canonic technique.

Figure 4

Prime Row of Eight Piano Pieces, Op. 110, No. 5: 'Nocturne', as identified in the study by J. D. Houser



Figure 4 shows the first twelve pitch classes of the piece. In twelve-tone analysis, two numbering systems are used to represent pitch classes:

- The first pitch of the row may be designated as '0', with the remaining pitches numbered chromatically from '0' to '11'.
- Alternatively, the first and last pitches of the row can be numbered sequentially from 1 to 12.

Although J. D. Houser appear to assume that the scale begins with E flat, this study proposes an alternative sequence beginning with G, based on the pitch range and canonical distribution of the first twelve tone classes.

Figure 5

E-flat row variants of eight piano pieces, Op. 110 No. 5, 'Nocturne', as identified by J. D. Houser

Op.110 No.5 Nocturne

Ernst Krenek

Prime

Retrograde

Inversion

Retrograde Inversion

Figure 5 shows the placement of the prime, retrograde, inversion, and retrograde-inversion rows utilized in Houser's analysis of Krenek's *Eight Piano Pieces*, Op. 110, No. 5: "Nocturne."

Table 2

E-flat row matrix of eight piano pieces, Op. 110, No. 5, 'Nocturne', as identified by J. D. Houser

	I ₀	I ₁₀	I ₁	I ₇	I ₆	I ₁₁	I ₅	I ₈	I ₃	I ₉	I ₂	I ₄	
P ₀	E _b	D _b	E	B _b	A	D	A _b	B	G _b	C	F	G	R ₀
P ₂	F	E _b	G _b	C	B	E	B _b	D _b	A _b	D	G	A	R ₂
P ₁₁	D	C	E _b	A	A _b	D _b	G	B _b	F	B	E	G _b	R ₁₁
P ₅	A _b	G _b	A	E _b	D	G	D _b	E	B	F	B _b	C	R ₅
P ₆	A	G	B _b	E	E _b	A _b	D	F	C	G _b	B	D _b	R ₆
P ₁	E	D	F	B	B _b	E _b	A	C	G	D _b	G _b	A _b	R ₁
P ₇	B _b	A _b	B	F	E	A	E _b	G _b	D _b	G	C	D	R ₇
P ₄	G	F	A _b	D	D _b	G _b	C	E _b	B _b	E	A	B	R ₄
P ₉	C	B _b	D _b	G	G _b	B	F	A _b	E _b	A	D	E	R ₉
P ₃	G _b	E	G	D _b	C	F	B	D	A	E _b	A _b	B _b	R ₃
P ₁₀	D _b	B	D	A _b	G	C	G _b	A	E	B _b	E _b	F	R ₁₀
P ₈	B	A	C	G	F	B _b	E	G	D	A _b	D _b	E _b	R ₈
	RI ₀	RI ₁₀	RI ₁	RI ₇	RI ₆	RI ₁₁	RI ₅	RI ₈	RI ₃	RI ₉	RI ₂	RI ₄	

Table 2 shows the matrix table generated from the prime row utilized in Houser's analysis of Krenek's *Eight Piano Pieces*, Op. 110, No. 5: "Nocturne."

Figure 6

'G' row versions of eight piano pieces, Op. 110, No. 5 'Nocturne', identified in the present study



In the present study, Figure 6 displays the retrograde, inversion, and retrograde-inversion series for the alternative prime row beginning on the pitch G, proposed in contrast to Houser's analysis.

Table 3

'G' matrix of eight piano pieces, Op. 110, No. 5, 'Nocturne', identified in the present study

	I ₀	I ₂	I ₁₁	I ₅	I ₆	I ₁	I ₇	I ₄	I ₉	I ₃	I ₁₀	I ₈	
P ₀	G	A	F _♯	C	C _♯	G _♯	D	B	E	A _♯	F	D _♯	R ₀
P ₁₀	F	G	E	A _♯	B	F _♯	C	A	D	G _♯	D _♯	C _♯	R ₁₀
P ₁	G _♯	A _♯	G	C _♯	D	A	D _♯	C	F	B	F _♯	E	R ₁
P ₇	D	E	C _♯	G	G _♯	D _♯	A	F _♯	B	F	C	A _♯	R ₇
P ₆	C _♯	D _♯	C	F _♯	G	D	G _♯	F	A _♯	E	B	A	R ₆
P ₁₁	F _♯	G _♯	F	B	C	G	C _♯	A _♯	D _♯	A	E	D	R ₁₁
P ₅	C	D	B	F	F _♯	C _♯	G	E	A	D _♯	A _♯	G _♯	R ₅
P ₈	D _♯	F	D	G _♯	A	E	A _♯	G	C	F _♯	C _♯	B	R ₈
P ₃	A _♯	C	A	D _♯	E	B	F	D	G	C _♯	G _♯	F _♯	R ₃
P ₉	E	F _♯	D _♯	A	A _♯	F	B	G _♯	C _♯	G	D	C	R ₉
P ₂	A	B	G _♯	D	D _♯	A _♯	E	C _♯	F _♯	C	G	F	R ₂
P ₄	B	C _♯	A _♯	E	F	C	F _♯	D _♯	G	D	A	G _♯	R ₄
	RI ₀	RI ₂	RI ₁₁	RI ₅	RI ₆	RI ₁	RI ₇	RI ₄	RI ₉	RI ₃	RI ₁₀	RI ₈	

As shown in Table 2 and Table 3, the twelve-tone matrixes are constructed using the first twelve pitches of the piece to identify the material of the tone rows used in the composition. Analysis reveals that only the prime form (P1) of the row is used throughout the piece, with no instances of transposition, inversion, retrograde or retrograde inversion. However, the row itself is segmented into three internal units, each consisting of four pitches (tetrachords).

In the retrograde inversion section of Table 4, the pitch content of the prime row appears in the nocturne in groups of four pitches (tetrachords).

According to Table 4, the tetrachords that are the subject of the study were realized on the P_9 , $P_{3'}$, $P_{10'}$, and P_8 rows in Houser's study.

Table 4

'E-flat' Matrix Table – Tetrachord for Eight Piano Pieces Op. 110 No. 5 'Nocturne', as identified in the study by J. D. Houser

	I_0	I_{10}	I_1	I_7	I_6	I_{11}	I_5	I_8	I_3	I_9	I_2	I_4	
P_0	E $\flat$	D $\flat$	E	B $\flat$	A	D	A $\flat$	B	G $\flat$	C	F	G	R_0
P_2	F	E $\flat$	G $\flat$	C	B	E	B $\flat$	D $\flat$	A $\flat$	D	G	A	R_2
P_{11}	D	C	E $\flat$	A	A $\flat$	D $\flat$	G	B $\flat$	F	B	E	G $\flat$	R_{11}
P_5	A $\flat$	G $\flat$	A	E $\flat$	D	G	D $\flat$	E	B	F	B $\flat$	C	R_5
P_6	A	G	B $\flat$	E	E $\flat$	A $\flat$	D	F	C	G $\flat$	B	D $\flat$	R_6
P_1	E	D	F	B	B $\flat$	E $\flat$	A	C	G	D $\flat$	G $\flat$	A $\flat$	R_1
P_7	B $\flat$	A $\flat$	B	F	E	A	E $\flat$	G $\flat$	D $\flat$	G	C	D	R_7
P_4	G	F	A $\flat$	D	D $\flat$	G $\flat$	C	E $\flat$	B $\flat$	E	A	B	R_4
P_9	C	B $\flat$	D $\flat$	G	G $\flat$	B	F	A $\flat$	E $\flat$	A	D	E	R_9
P_3	G $\flat$	E	G	D $\flat$	C	F	B	D	A	E $\flat$	A $\flat$	B $\flat$	R_3
P_{10}	D $\flat$	B	D	A $\flat$	G	C	G $\flat$	A	E	B $\flat$	E $\flat$	F	R_{10}
P_8	B	A	C	G	F	B $\flat$	E	G	D	A $\flat$	D $\flat$	E $\flat$	R_8
	RI_0	RI_{10}	RI_1	RI_7	RI_6	RI_{11}	RI_5	RI_8	RI_3	RI_9	RI_2	RI_4	

In the retrograde section of Table 5, it was identified that the pitch content of the prime row appears in the work in groups of four pitches (tetrachords).

Table 5

'G' Matrix Table – Tetrachord for Eight Piano Pieces Op. 110 No. 5 'Nocturne', as identified in the present study

	I_0	I_2	I_{11}	I_5	I_6	I_1	I_7	I_4	I_9	I_3	I_{10}	I_8	
P_0	G	A	F $\sharp$	C	C $\sharp$	G $\sharp$	D	B	E	A $\sharp$	F	D $\sharp$	R_0
P_{10}	F	G	E	A $\sharp$	B	F $\sharp$	C	A	D	G $\sharp$	D $\sharp$	C $\sharp$	R_{10}
P_1	G $\sharp$	A $\sharp$	G	C $\sharp$	D	A	D $\sharp$	C	F	B	F $\sharp$	E	R_1
P_7	D	E	C $\sharp$	G	G $\sharp$	D $\sharp$	A	F $\sharp$	B	F	C	A $\sharp$	R_7
P_6	C $\sharp$	D $\sharp$	C	F $\sharp$	G	D	G $\sharp$	F	A $\sharp$	E	B	A	R_6
P_{11}	F $\sharp$	G $\sharp$	F	B	C	G	C $\sharp$	A $\sharp$	D $\sharp$	A	E	D	R_{11}
P_5	C	D	B	F	F $\sharp$	C $\sharp$	G	E	A	D $\sharp$	A $\sharp$	G $\sharp$	R_5
P_8	D $\sharp$	F	D	G $\sharp$	A	E	A $\sharp$	G	C	F $\sharp$	C $\sharp$	B	R_8
P_3	A $\sharp$	C	A	D $\sharp$	E	B	F	D	G	C $\sharp$	G $\sharp$	F $\sharp$	R_3
P_9	E	F $\sharp$	D $\sharp$	A	A $\sharp$	F	B	G $\sharp$	C $\sharp$	G	D	C	R_9
P_2	A	B	G $\sharp$	D	D $\sharp$	A $\sharp$	E	C $\sharp$	F $\sharp$	C	G	F	R_2
P_4	B	C $\sharp$	A $\sharp$	E	F	C	F $\sharp$	D $\sharp$	G	D	A	G $\sharp$	R_4
	RI_0	RI_2	RI_{11}	RI_5	RI_6	RI_1	RI_7	RI_4	RI_9	RI_3	RI_{10}	RI_8	

Based on the analysis developed in the present study as an alternative to Houser's work, Table 5 indicates that the tetrachords under investigation were carried out on the I_9 , I_3 , I_{10} , and I_8 columns.

- Identification of tetrachords (four-pitch groups) within the 'E₁' Matrix of Eight Piano Pieces, Op. 110, No. 5, Nocturne
- Identification of tetrachords (four-pitch groups) within the 'G' matrix of eight piano pieces, Op. 110, No. 5 nocturne.

Figure 7

Based on a tetrachord analysis of the G prime series, the notation of the relevant tetrachords

5. Nocturne

The musical score for Chopin's Nocturne Op. 9, No. 5, is presented in five systems. The title "5. Nocturne" is centered at the top. The tempo marking "Andante" is at the beginning. The score includes various dynamics such as *pp*, *p*, *pp esp.*, *f*, *mp*, and *ppp*. Tetrachords are identified and numbered (1-12) with orange and blue boxes and arrows. The analysis shows the distribution of these tetrachords throughout the piece, with some appearing multiple times. The score is divided into five systems, with measures 1-12, 13-24, 25-36, 37-48, and 49-60. The final measure is marked with a double bar line and a repeat sign.

Based on the analysis of the G prime series, the distribution of the relevant tetrachords throughout the piece is illustrated in Figure 7.

As discussed by Tomás (2019) in his analysis of Roberto Gerhard, Krenek's use of tetrachords diverges from the Schoenbergian paradigm by treating them as 'internally unordered collections'. Evaluated within Morris's (1983) framework of "set-type saturation", this approach is revealed to be a strategy that enriches the sonic complexity of the work.

Segmentation in twelve-tone music concerns the ways in which subdivisions of a row are defined and how these subdivisions are functionally deployed within the musical structure. Lewin's seminal work introduced the theory of segmental association in twelve-tone music, demonstrating how subsegments of a row—particularly hexachordal and subset relationships—can be related to one another (Lewin, 1962). According to Lewin, segments may acquire formal functions, and both row segmentation and inter-segmental mapping can be analytically defined (Lewin, 1962).

Similarly, Morris's study on set-type saturation provides an analytical account of the pitch-class set families generated by a row and the recurrence of specific set-types (Morris, 1983). This approach emphasizes the distribution of overlapping segments within a row in terms of set-type content and offers an applicable framework for evaluating the set-type properties of Krenek's use of tetrachords in Op. 110 (Morris, 1983). In the present study, the initial deployment of a four-note group within the retrograde row is consistent with the set-type theoretical principles outlined in these studies.

In their work on isomorphic partitioning, Haimo and Johnson (1984) explain Schoenberg's practices of row partitioning and the alignment of these partitions with rhythmic and tonal frameworks. However, in the present analysis, no explicit correspondence between four-note pitch groups and rhythmic elements has been identified. Krenek's use of tetrachords thus diverges from Schoenberg's hexachordal approach. Whereas Schoenberg's experiments focus primarily on six-note groupings, the analysis of the work clearly demonstrates that Krenek applies row partitioning not into two but into three segments.

According to Mead (1985), terminal hexachords may assume formal roles, and row segmentation can play a decisive role in shaping the structural meaning of a composition. Krenek's use of tetrachords in Op. 110 differs from the large-scale approaches described by Mead in that, rather than hexachordal segmentation, Krenek favours tetrachordal partitioning, applying it with greater flexibility. This hierarchical approach provides a useful methodology for understanding how tetrachords combine to form larger structural units in Krenek's Nocturne.

Studies on twelve-tone serialism have primarily focused on Schönberg's six-note serial system and the formal relationships arising through inter-section relationships, set saturation, and isomorphic division (Haimo & Johnson, 1984; Lewin, 1962; Mead, 1985; Morris, 1983). In contrast, the serial treatment in Krenek's Nocturne, Op. 110, No. 5, as observed by Tomás (2019), demonstrates a more flexible tetrachord strategy in which tone collections function not as fixed sequential units but as internally unordered segmental fields. Rather than expressing large-scale hexachord symmetry, Krenek divides the sequence into three tetrachord sections canonically distributed between the hands, thereby bringing localised set-type relationships and register interactions to the fore. When evaluated within the framework of Morris's concept of set-type saturation, this procedure demonstrates that the work's structural coherence arises not through collective completion or rigid division symmetry, but through the repeated transformation and redistribution of tetrachord material.

Finally, this study parallels Hook and Douthett's analysis of how small-scale structures evolve into larger formal organisations. The study demonstrates how the transformational relationships between tetrachords contribute to the formation of structural integrity and formal continuity in Krenek's Nocturne, Op. 110, No. 5 (Hook & Douthett, 2008). This approach can be used to determine the perceptual boundaries of tetrachords and row fragments in short, multi-sectional works such as Op. 110, and process-oriented perspectives can strengthen the connection between surface and deep structures (Lefkowitz & Taavola, 2000).

Tetrachordal segmentation functions as a central organizational principle in Krenek's Op. 110, No. 5 Nocturne. Houser's analysis demonstrates that, rather than treating the twelve-tone row as an indivisible unit, Krenek partitions the row into three segments, each consisting of four adjacent pitches, and employs these tetrachords as "independent design units" (Houser, 1977).

Flexible serialism refers to the relaxation of strict serial rules, allowing the composer greater intuitive freedom. Krenek's approach in Op. 110 constitutes an example of flexible serialism: row forms are not employed systematically; instead, tetrachords are manipulated as autonomous units (Houser, 1977). This approach diverges markedly from Schoenberg's more systematic use of row forms.

Johnson's study of the serial segmentation in Schoenberg's **Moses und Aron** demonstrates how serial types can assume structural functions within serial composition (Johnson, 2015). In contrast, Krenek's

approach to tetrachords in his Op. 110, No. 5 reflects a more flexible approach, in which serial sections function as relatively autonomous units rather than as components of a rigid systematic division scheme.

Tomás's study of Roberto Gerhard's *Andantino* examines how a composer within Schoenberg's circle treats tetrachords as internally unordered collections, thereby distinguishing his approach from that of Schoenberg (Tomás, 2019). This finding provides a methodological point of comparison for alternative tetrachordal practices among Krenek and his contemporaries (Tomás, 2019). The theoretical foundations of flexible serialism may also be found in Andreatta's work on algebraic formalization and transformational set theory (Andreatta, 2003). This framework provides a practical methodology for tetrachord-based serial reorganization and flexible serialism (Andreatta, 2003).

In his analysis, J. D. Houser defines the work's twelve-tone structure as a chronological indeterminacy (indeterminacy of order) and presents the fluidity between forms in the series as 'chaos'. However, drawing on Robert Morris's 'Multi-Order-Function' (MOF) theory, this study argues that this is not an uncertainty but a deliberate structural multifunctionality. Whilst Houser's linear reading based on 'Eb' obscures the symmetry within the series' sub-units, our analysis, which refers to the 'G' note (P-7), maximises the series' potential for constancy amidst transformations. Consequently, the phenomenon defined by Houser as 'interweaving' is explained by Morris's principle of 'segmental coalescence'. In contrast to Houser's Eb-based reading, while this study presents a possible ordering interpretation of the series, it proposes a G-based segmentation (P-7) as an alternative analytical perspective. This reading does not claim exclusivity; rather, it demonstrates that, under MOF principles, the G-based configuration provides a structurally coherent interpretation of the work's tetrachordal organisation and formal design. Consequently, what Houser defines as linear ambiguity can also be understood as a product of segmental multifunctionality, in which different initial orderings produce competitive yet coherent structural readings.

5. DISCUSSION AND CONCLUSION

Ernst Krenek's *Eight Piano Pieces*, Op. 110 No. 5, 'Nocturne', is one of the works of an important twentieth-century composer that has been examined using content analysis. This analysis discusses the piece's structural, aesthetic, and technical features, considering both the traditional nocturne form and Krenek's modernist and serialist approaches. In this piece, Krenek focuses on serialism rather than the characteristic features of the Romantic period.

Ernst Krenek's *Eight Piano Pieces*, Op. 110, No. 5 *Nocturne* (1946) was examined using the content analysis method, and the work's structural, aesthetic, and technical characteristics were evaluated with reference both to the traditional nocturne form and to Krenek's modernist and serial approach. The analytical findings indicate that the work exhibits similarities to a bipartite song (lied) form. Consisting of 24 measures, the piece is structured as a 14-measure A section (58%), a 7-measure B section (29%), and a 3-measure coda (13%). However, analyses have shown that the work's sentence structure differs from the symmetrical and periodic sentence patterns typically associated with the nineteenth-century Romantic tradition.

According to Morris (1977), the subsequences or segments contained within a sequence have the capacity to remain invariant (invariance) or repeat themselves under certain transformations. This study distinguishes between three levels of identity: Set-Class Identity (SC Identity), which refers to set-class equivalence; Tetrachordal Partition Identity (TPI), which refers to segmental invariance among tetrachordal partitions; and Transformational Identity (T/I Equivalence), which refers to invariant relationships in the transformational network of P, I, R, and RI forms. The most distinctive feature of the work lies in its application of the twelve-tone technique outside conventional serial procedures. In alignment with Houser's (1977) analysis, Krenek does not treat the twelve-tone row as an indivisible unit; instead, he partitions the row into three tetrachords, each consisting of four adjacent pitches. These tetrachords function as "independent design units" and dominate the compositional fabric of the work. In addition to the Eb-based row identified in the study by J. D. Houser, the present study also identifies a G-based serial row, demonstrating that Krenek approaches serial material in a flexible and creative manner. Matrix analyses reveal that only the Prime 1 row is employed in the work and that no standard row forms (retrograde, inversion, retrograde-inversion) are applied systematically. Rather, the tetrachordal partitions of the row appear in the Retrograde Inversion and Retrograde sections as four-pitch groups within the musical texture.

This approach diverges markedly from Schoenberg's hexachordal partitioning strategy and represents an original contribution by Krenek to the practice of serialism. Evaluated within the framework of Lewin's (1962) theory of segmental association and Morris's (1983) concept of set-type saturation, the tetrachordal structure, supported by canonic and contrapuntal techniques, demonstrates that Krenek organises serial material in a way that gives it a formal function. As Tomás (2019) discusses in his analysis of Roberto Gerhard, treating tetrachords as 'internally unordered collections' constitutes a significant departure from the Schoenbergian paradigm and exemplifies flexible serialism.

The aesthetic dimension of the work is directly related to its technical approach. Despite lacking a tonal centre, the melodic structure provides meaningful and internally directed lyrical expression, demonstrating that Krenek treats serialism as an expressive language rather than an abstract system. This perspective reveals a modernist reinterpretation of the nocturne's traditional 'night music' character, emotional depth and melancholy (Piggott, 1968; Rosen, 1995). However, Krenek's Nocturne departs radically from the ideal of lyrical beauty associated with tonally centred melodies and grounded in the works of composers such as Field and Chopin (Eigeldinger, 1986; Pan, 2024). Instead, it presents a narrative reflecting the loneliness, existential fragmentation and mental complexity experienced by the modern twentieth-century individual (Botstein, 2001, 2005).

In this work, Krenek's approach demonstrates the development of an expressive language that transcends the rigid, systematic framework of serialism. Evaluated within the context of Andreatta's (2003) algebraic formalisation and the transformational approaches proposed by Hook and Douthett (2008), the tetrachordal organisation reveals a hierarchical structure that progresses from small units to larger formal entities. While this structure differs from Mead's (1985) large-scale strategic organisational concepts, it offers an original methodology that establishes a strong connection between surface and deep structure (Lefkowitz & Taavola, 2000).

Morris's study notes that scales can be treated not merely as a linear sequence, but as reconfigurable systems through various matrix operations and segmentation methods (Morris, 1977). In this study, too, the relevant tetrachord structures demonstrate that the scale is organised in a flexible manner. The division of the scale into sub-groups allows for the joint evaluation of the relationships between tetrachords within a framework of mathematical and musical analysis.

In conclusion, Eight Piano Pieces, Op. 110, No. 5: Nocturne presents an innovative musical language that conceptualises serialism as a process of transformation rather than a rupture from tradition. Krenek's use of tetrachordal segmentation, flexible serial practice and contrapuntal texture successfully reconciles the strict principles of twentieth-century serialism with individual expressive freedom. In light of these findings, future research is encouraged to pursue comparative analyses of other works within Krenek's Op. 110 series to trace the development of tetrachordal organisation across different periods of the composer's output and to more deeply examine the role of serialism in individual musical expression. Furthermore, comparative studies of Krenek's nocturne approach alongside those of contemporaries such as Berg and Webern, as well as other composers of the Second Viennese School, would provide valuable insights into the aesthetic diversity of twentieth-century serialism.

Ethical approval

This study does not require ethics committee approval as it does not involve human, animal or sensitive data.

Author contribution

Study conception and design: MGA, RC; data collection: MGA; analysis and interpretation of results: MGA, RC; draft manuscript preparation: RC. All authors reviewed the results and approved the final version of the article.

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