

Musical Alphabet Evolution and Contemporary Composition Techniques: The Theory of Zvi Harry Nadel

YUVAL SHAY-EL

Abstract: Zvi Harry Nadel was a music theorist, composer, and educator based in the city of Haifa, Israel. Born and educated in Central Europe, he was a contemporary of the founding generation of Israeli art music. This paper, written by a former student, presents some of his main theoretical concepts and compositional techniques while illuminating his original approach and personality. The enduring influence of Nadel is portrayed through an examination of recent compositions created by his students, demonstrating the lasting impact of his contributions to Israeli art music.

Keywords: Zvi Harry Nadel, tonality, modality, dodecaphony, tritonicity

Introduction

I was a young jazz player in Haifa when I came to Zvi Harry Nadel in 1982 to study theory and harmony. At the time, I was not yet even thinking about becoming a composer. Nadel was a household name in the city and being accepted to study with him was considered a great honor. In his house—a historic house with high ceilings in the International Style located in the Bat Galim neighborhood near the sea—I was greeted by an old man in a wheelchair, a remnant from his injury in the Polish army, sitting at a writing desk, on the far opposite wall was an upright piano (“Never use a piano during the writing phase and rely only on inner hearing” was a fundamental rule according to his method), a third wall was lined with a rich library, and the fourth wall featured a window facing the sea breeze. This was the beginning of a 5-year journey, during which I would come every week from my physics studies at the Technion or later from military service in uniform directly to this house, which was a kind of temple of music under the guidance of Nadel, the charismatic teacher—a unique person, who turned me into a composer.

I was one of the last students of Nadel, who passed away in 1987, just a few months after completing my studies with him. Even after decades, Nadel and his original compositional methods and musical theory still have a significant presence in the music I compose. And it is not just me; recently, I reunited with several of Nadel’s other former students, including composers, conductors, music teachers (see Figure 1), and it turns out that we all shared this special Nadel experience that is still a magnet for personal creation.

However, outside our circle of students, Nadel and his teachings were almost forgotten. Nadel developed an alternative view of the world of music that combined theoretical ethnomusicological concepts with new composition methods. This approach was somewhat inspired by that of European composers of his generation or earlier, in particular, Schoenberg and Hindemith, who were also involved in studying music systematics from the perspective of a creative composer.

Mostly confined to his home due to his health, Nadel maintained a cosmopolitan perspective despite sitting in a corner of the world. This article aims to open a window into his musical worldview for the wider audience of musicians who did not get to know him.



Figure 1 Nadel's class gathering, 21 October 2022. From left to right: Ya'aqov Ziso, Yuval Shay-El, Moshe Rasiuk, Ofra Katzir, Arie Lipsky, host Shulamit Rubinovich.

Photo by Rachel Haim.

From Europe to Haifa

Zvi Harry Nadel (1908-1987) was born in Budapest and grew up in Lviv, where he graduated from the local conservatory majoring in piano. He continued to study at the Chopin Conservatory in Warsaw, as a student of Aleksander Michałowski, one of the leading Polish pedagogues of his generation. Due to army enlistment, he had to stop his studies, and the need for a living prompted him to play in jazz and popular music orchestras. He participated in radio broadcasts and recordings.

Nadel arrived in the Land of Israel during World War II as a soldier in the Polish Anders army and settled down in Haifa. In the new country, he continued to be active in the field of popular music as a composer, arranger, and musical director. During the War of Independence, he founded "Tsil Tslil," which was one of the first and most successful military bands.¹ He continued his music studies with Josef Tal and Paul Ben-Haim, before pursuing further his career in composition, teaching, and in the independent research and development of his musical theory.² Nadel was one of the founding members of The Rubin Conservatory of Music in Haifa, where he taught piano, music theory, and harmony. Many musicians who grew up in Haifa studied with Nadel and hold him in high regard. Concurrently, he taught composition at his home and served as a music teacher at local elementary schools.

Early publications

An early and unpublished manuscript, titled "Verwandtschaftstheorie der diatonischen Tonreihen und ihre weitere Entwicklungen" (in German, trans.: Relationship theory of the diatonic tone series and further developments), was highly acclaimed by the

¹ A list of mentions and articles about "Tsil Tslil" in the Israeli daily press in Hebrew, including links on the *Historical Jewish Press* site, is available on the Hebrew Wikipedia article dedicated to Nadel and initiated by the author of this article (https://he.wikipedia.org/wiki/צבי_הרי_נדל), accessed 10 March 2023.

² The main source for this biography is Moshe Gorali's "One of three," published in *Davar* on 28 October 1955 (in Hebrew), accessed on 10 March 2023, at <https://www.nli.org.il/he/newspapers/dav/1955/10/28/01/article/128/>. As evident from this article, Gorali was a vocal supporter of Nadel as a music theorist, which led to the inclusion of Nadel's paper in the first volume of *Tatzlil* journal, devoted to music research and bibliography, and published and edited by Gorali from 1960 to 1980.

American scholar Joseph Yasser in 1952.³ A Hebrew version with the same title was published later in 1960 in the first volume of the Israeli musicological journal *Tatzlil*,⁴ followed by another publication in 1978.⁵ Despite being well-regarded by important composers and music researchers in Israel such as Yitzhak Edel, Paul Ben-Haim, Ödön Pártos,⁶ and Josef Tal,⁷ most of Nadel's writings remained unpublished due to a lack of institutional support.

In his 1960 article in *Tatzlil*, Nadel introduced several concepts central to his theory. He began by discussing the significance of modal mirror inversions as a structural basis for the diatonic system, and then presented a systematic method for incorporating additional scales with mixed accidentals, supported by examples from music literature. Nadel referred to the scales based on augmented seconds as “super-diatonic” scales and highlighted the difficulties of using highly altered intervals, such as the double augmented second between F \flat and G \sharp . To address these issues, Nadel proposed a new orthographic method of music notation that utilizes 19 note names for the 12 tones of the octave. He arranged these 19 notes in what he called the “double dodecatonic scale,”⁸ which may provide “the missing link between the diatonic system and new contemporary methods, without changing the ever evolving musical structure.”⁹ In conclusion, Nadel suggested that this 12-19 method is a logical extension of the methodologies of both Schoenberg and Hindemith.

Since the initial publication of his theory in *Tatzlil*, Nadel continued to revise, elaborate, and extend his ideas, often with the assistance of his dedicated students. He frequently rewrote earlier texts, building upon previous concepts and adding new sub-theories. This article focuses on presenting some of Nadel's main concepts, based on the final version of his writings: an archive collection of photocopies received from Nadel of eight handwritten manuscripts in Hebrew from 1983 until March 1987, just a few months before his death. These materials are available with the author of this paper for further research.¹⁰

As an example, Figure 2 shows a handwritten page from the manuscripts, showing two of the basic schemes presented in this article, as well as demonstrating Nadel's writing

³ Yasser, Joseph, “Review of *The Diatonic Modes in Modern Music*, by John Vincent,” *The Musical Quarterly*, 38(3) (1952): 468-477.

⁴ Zvi Harry Nadel, “Relationship theory of the diatonic tone series and further developments,” *Tatzlil*, 1 (1960): 5-12 (in Hebrew).

⁵ Zvi Harry Nadel, “Theoretical foundations of Jewish ethnomusicology: a. Sephardic Jewish hazanuth,” *Tatzlil*, 18 (1978): 40-53 (in Hebrew).

⁶ Goral, “One of three.”

⁷ Josef Tal, “Introduction to ‘Relationship theory of the diatonic tone series,’” *Tatzlil*, 1 (1960): 5 (in Hebrew).

⁸ In subsequent manuscripts, Nadel demonstrated a preference for the term “dodecaphonic” over “dodecatonic.” This change was likely made in order to establish a connection between his work and the theories of Arnold Schoenberg.

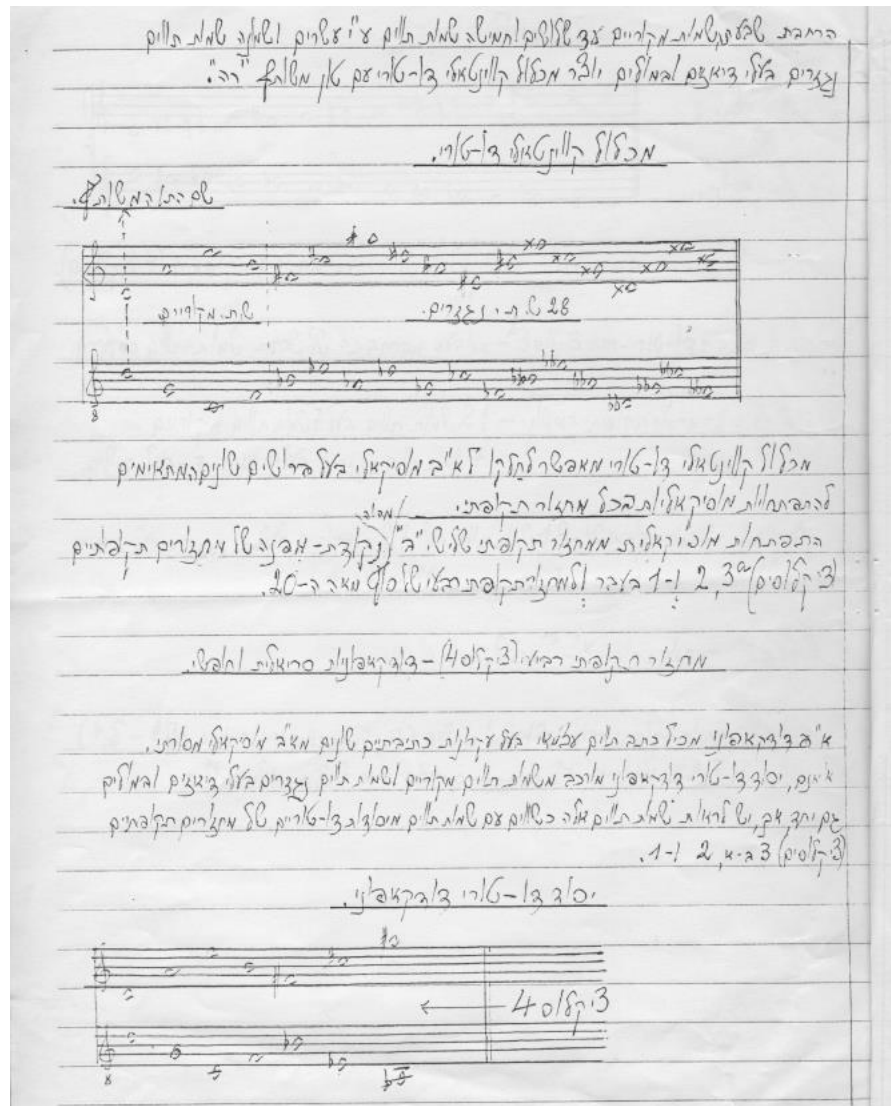
⁹ The quotation is translated by the author of this paper from page 9 of Nadel's paper, “Relationship theory of the diatonic tone series.” In this section, Nadel discusses the necessary coordination between the sound of the musical tones and their orthographic notation, which is a point that he develops further in subsequent articles.

¹⁰ Additional copies and original materials exist with other Nadel's students. In particular, his estate is in the hands of his student Avi Goldblit in Haifa. In addition, the article draws on the author's study notes and personal recollections to provide an authentic and concise interpretation.

style. In particular, Nadel’s central term “Musical Alphabet,” used to indicate both the collection of tones in a particular context and its appropriate and coordinated notation,¹¹ in similarity to spoken language, is mentioned on this page.

Nadel’s theory provides a unique perspective on the relationship between musical notation and the large-scale historical evolution of music. Furthermore, it introduces some original contemporary composition techniques developed based on this theory.

Figure 2 Nadel’s handwritten page from a manuscript



The tone multiplicity theory in relation to the symmetry relative to note D

A central and consistent element in Nadel’s works is the discovery of the note D as the symmetry pivot of the Western musical notation system and the emphasis on its role in the

¹¹ Not to be confused with other terms, such as “alfabeto” used in early music, or the number alphabet which has Bachian connotations.

tonal system and encompasses all thirty-five note-names used in Western music. Notably, the note D functions as the axis of symmetry in this complex.

The pursuit of symmetry is a fundamental aspect of human aesthetics, and in music, it is common to find symmetrical elements in forms, pitch structures, and scales. In this case, however, it is the structural symmetry of the music notation system itself that is of particular significance. An additional manifestation of this symmetry is found in the fixed-mirror inversions, where the pivot of inversion is fixed on note D, which distinguishes them from mirror inversions relative to any note, typically the first note in a series. In fixed-mirror inversions, each note in the top row has a symmetrical partner in the bottom row, such as A-G, E-C, B-F, F \sharp -B \flat , and so forth (see Example 2). These fixed-mirror inversions play a significant formal role in Nadel's method, such as in his serial approach, as well as a melodic and aesthetic role in free dodecaphonic music. The symmetry around the note D is also evident in the natural inversion of modes, which will be discussed in the context of Nadel's modal system.

Example 2 Fifth-based double-row thirty-five note complex

common note

7 original notes | 28 derived notes

8 Tritonic
Pentatonic
Heptatonic - diatonic
Dodecaphonic

Dodecaphony and its coordinated notation

Dodecaphony, also known as twelve-tone serialism, is a composition technique largely associated with Arnold Schoenberg, who described it as a “Method of composing with twelve tones which are related only with one another.”¹⁵ While having some similarities with the Schoenbergian dodecaphony, Nadel’s dodecaphonic principles and musical methods had different objectives. In particular, he aimed to create a coordinated balance between notation principles, which he called dodecaphonic orthography, and the concept of twelve independent tones. Another goal was to present compositional principles for general and extended dodecaphony, which could constitute an important development in musical language beyond serial techniques alone.

The traditional note alphabet contains a significant amount of duplication, with thirty-five note-names for only twelve tones in the octave (see Example 2). Most tones have three enharmonic names, except for G \sharp -A \flat , which has two. This duplication is a consequence of the transpositions of the diatonic major-minor system. To create an orthography that conforms to the dodecaphonic principles, Nadel proposed that a thirteen-note set would suffice, including up to three flats and three sharps (see Example 1).¹⁶ This

¹⁵ Arnold Schoenberg, *Style and Idea*, ed. Leonard Stein with trans. Leo Black (Berkeley & Los Angeles: University of California Press, 1975), p. 218.

¹⁶ This proposition deviates from the earlier suggestion of 19 notes, which was abandoned.

set constitutes the complete dodecaphonic alphabet, allowing all tones (except G \sharp -A \flat) to have unique names. Traditional enharmonic spelling, such as D \flat instead of C \sharp , is not allowed in this dodecaphonic context. This alphabet results in a maximal reduction of note names (thirteen out of thirty-five), providing a perfect correspondence with the concept of twelve independent tones. Accidentals are no longer considered alterations of natural tones but instead are part of the tone names. Additionally, this notation methodology provides an aesthetic advantage by preventing arbitrariness in dodecaphonic music.¹⁷

Nadel argued that, like spoken languages, a musical language must have a well-defined orthography adapted to the audible nature of the sounds. Consistent musical notation allows the projection of sound characteristics through the visual score. Without it, musical analysis such as harmonic analysis becomes impractical.

Tension and dodecaphonic harmony and techniques

In addition to the orthography, Nadel also presented a harmony method that is suitable for the dodecaphonic era. Since the traditional classification of intervals as consonant and dissonant does not comply with the concept of twelve independent tones, he suggested a new classification, based on tension degrees, as follows:¹⁸

- 1) Neutral tension: All consonant-sounding intervals, including augmented and diminished intervals that sound like regular consonants, such as the diminished fourth between F \sharp and B \flat .
- 2) Soft tension: Dissonances such as major second (M2) or minor seventh (m7).
- 3) Sharp tension: Dissonances such as minor second (m2) or major seventh (M7).
- 4) Intensive tension: Only the tritone melodic interval. The harmonic tritone interval is considered a soft interval.¹⁹

¹⁷ In his book "Style and Idea" (p. 225), Schoenberg provided an example of a series using traditional notation. However, while naming the tones in the series, he diverged from the traditional rules of inversion (formula "9") and used enharmonic spellings at his discretion. This deviation stands in stark contrast to traditional musical theory, which emphasizes precise enharmonic choice derived from scale and harmonic function and does not allow for arbitrary substitution of notes. Furthermore, Nadel cites a personal letter from Luciano Berio as an example of how contemporary composers who use twelve independent tones do not attach any meaning to the precise notation, but only to the pitch: "I read your articles with great interest, although I have a certain difficulty in accepting the dodecaphonic experience as a system. The ordering and the naming of pitches is meaningful to me only for the functions produced at another musical level." (Paris, 1978). For Nadel, a precise notation that is adapted to the musical framework, in this case, dodecaphony, is a necessary guideline. Without such rules the notation becomes merely a record of pitches, lacking context.

¹⁸ The tension classification presented here bears resemblance to Helmholtz's concept of "roughness", which is defined based on the acoustical beats between the overtones and is widely regarded as the most prominent explanation for dissonance in the literature of psychoacoustics. (James Tenney, *A History of 'Consonance' and 'Dissonance'* [New York: Excelsior Music Publishing Company, 1988]). In traditional harmony, both scale/tonal functionality and roughness jointly contribute to the consonance/dissonance quality of the interval. However, in dodecaphony, where tonal functionality is absent, a dissonance classification based solely on roughness is most logical. See also Pantelis N. Vassilakis, "Auditory Roughness as a Means of Musical Expression," *Selected Reports in Ethnomusicology Perspective in Systematic Musicology*, 12 (2005): 119-144.

¹⁹ The complete interval classification list, in short notation: Neutral tension: p1, a2, m3, M3, a3, d4, p4, p5, m6, M6, d7, p8; Soft tension: M2, d3, a6, m7, M9, [a4, d5 as harmonic intervals only]; Sharp tension: a1, d1, m2, M7, d8, a8, m9; Intensive tension: a4, d5, as melodic intervals only.

Following the classification of intervals, chords were also categorized based on tension as I to IV⁺, with each chord category containing different combinations of neutral, soft, and sharp intervals, ranging from only neutral intervals in I to four to seven notes containing three sharp intervals in IV⁺. Intermediate chord categories include I⁺, II, II⁺, III, III⁺, and IV. By analogy with tonal chord progressions, Nadel defined dodecaphonic harmonic cadences, including harmonic functions such as opening, transition and closing chords, based on the tension differences between the chords and the melodic tension in the bass line, but without direct reference to any scale or tonal center.

Example 3 shows a short piano piece based on a sharp dodecaphonic cadence. The final two chords of the piece demonstrate a release of tension from class IV (with two sharp intervals F#-G and Ab-G) to class II (no sharp intervals) and a sharp progression by a semitone in the bass line. The piece has an almost romantic aesthetic, with similarities to traditional tonal music, including points of reference that could be interpreted tonally, such as the B \flat root in the opening chord. However, it is also clearly distinct from traditional tonal frameworks, and its musical logic is derived entirely from the cadence. The piece exemplifies a dodecaphonic aesthetic that is an organic continuation of traditional tonal aesthetics, while also utilizing tone structures that were previously impossible under the traditional system and are only possible within the framework of the twelve independent tones.²⁰

Nadel was well-aware of the contrasting trends between dodecaphony or the “atonal” music in general and traditional tonality, prevalent at his time. While striving for continuity, he also aimed to introduce innovation and stylistic contrast. To this end, he proposed extending his dodecaphonic style beyond harmonic structures to encompass rhythmic and melodic techniques, including rhythmic irregularity and melodic avoidance of traditional harmonic cells and scales. One specific melodic technique he proposed, with a strict dodecaphonic nature, involved constructing a melody from fixed-mirror inversions only. Another technique he explored, referred to as the “central chord,” involved systematically deriving motives from a single chord comprising 7-9 notes.

In order to establish the extended-dodecaphonic character he sought, Nadel incorporated various techniques from his contemporaries. These included Boris Blacher's “variable metres,” John Cage's “aleatoric mobiles,”²¹ and Luciano Berio's self-retrograde-inverted series of thirteen notes as used in *Nones* (1954). In addition, Nadel encouraged his students to explore large-scale contrapuntal techniques, such as inversion and retrograde, as a means of developing and establishing musical form, as inspired by Schoenberg's serialism. Through this approach, Nadel exposed his students to a wide range of techniques that allowed for the development of a personal style within the stylistic framework of the twelve independent tones, while following his original thirteen-note notation scheme.

²⁰ This miniature was recorded as part of pianist Hagai Yodan's “60-seconds” project, to be published on <https://soundcloud.com/hagai-yodan/sets/60-seconds>.

²¹ Nadel mentions Josef Tal's “Dodecaphonic Episodes for piano” (1962) as an Israeli example of the latter two techniques.

Example 3 A sharp dodecaphonic cadence and a piece for piano

A piece for piano

Op. 121 No. 1

Zvi Harry Nadel

Tritonality

In comparison to the widely recognized and influential genre of dodecaphony in twentieth-century art music, tritonality stands out as an original invention by Nadel, who connected the ethnomusicological concept to creative composition. Nadel's research drew heavily from his personal collection of books, including “The Rise of Music in the Ancient World, East and West” by Curt Sachs. In this book, Nadel identified remnants of tritonic melodies in the songs of primitive tribes from places as diverse as Oceania, Tibet, and North America in support of his theory (see Example 4).²²

Unlike the pentatonic scale, which is well-known for its role in pre-diatonic folk music, the existence of a pre-pentatonic musical era characterized by only three notes in the octave range is historically unknown. As a result, Nadel proposed the tritonal concept

²² Curt Sachs, *The Rise of Music in the Ancient World, East and West* (New York: Norton and Company, 1943), pp. 38-39.

as a theoretical retrospective proposal in the field of ethnomusicology. Furthermore, he suggested that by applying modern notation, the tritonic character could be developed in a two-dimensional (melodic and harmonic) manner, resulting in a new musical style that is suitable for contemporary music but is inspired by an archaic style.

Example 4 Tritonic early tribal songs, following Sachs

Solomon Islands, after Frizzi



Tibet, transcribed by Sachs



Hopi Native Americans, after Stumpf



The first aspect of the tritonic concept is the basic pure tritonic tone group D-G-A and its corresponding tritonic scale, which can be transposed to neighboring regions up to 7 \sharp and 7 \flat , as demonstrated in Example 5a. The second aspect of the tritonic concept is the appropriate harmony, which is not tertial, but rather secundal-quartal, based on the intervals between the notes of the scale. More complex chords are formed by adding notes from adjacent regions, as shown in Example 5b, which includes Roman numerals I, II, and III notations for the three scale steps, as well as figured-bass symbols for added notes.

An alternative way to expand harmony is by using bitonal combinations, which is a natural choice for chords of this type. This approach is illustrated in the miniature by Rachel Haim, who was one of Nadel's students (see Example 5c). Nadel frequently collaborated with his students in his research, often featuring examples created by them, including this one.

Quartal harmony has been used by several composers, including Debussy, Scriabin, Schoenberg, and others, and has become a favored technique among jazz pianists, particularly McCoy Tyner.²³ The primary objective of using quartal harmony is to produce a coloristic effect and introduce harmonic ambiguity, in contrast to the expectations typically associated with traditional tertian harmony (i.e., harmony built on thirds). With Nadel, however, the use of this harmony and associated scales is structurally integrated into a unified method aimed at creating a distinct sound character, within a broad cultural and historical context.

²³ Andy LaVerne, "Quartal Chords," In *1000 Keyboard Ideas*, ed. Ronald Herder (Bedford Hills, NY: Ekay Music, 1999), p. 78. Tritonic scales are mentioned in relation to jazz improvisation in Hal Crook, *How to Improvise, An Approach to Practicing Improvisation* (Rottenburg N., Germany: Advance Music, 1991), pp. 170-175.

Example 5 Tritonic theoretical principles and examples

a) Tritonic scale complex

b) Tritonic extended chords formation

c) Tritonic miniature

Heptatonic Modality

Nadel's general theory consists of several sub-theories, each representing a separate unit in the musical world with unique stylistic characteristics. These units function as individual tonal systems or musical languages, each with its own theoretical basis, orthographic rules, matching harmonies, melodic methods, and compositional techniques. The tonal systems are organized primarily within the framework of the “tone multiplicity” theory, with systems based on 3 (tritonic), 5 (pentatonic), 7 (heptatonic), and 12 (dodecaponic) tones. The diatonic heptatonic system, based on scales and modes of seven tones, holds a middle ground among these systems. It forms the primary basis for Western musical development, with some parallels to Eastern musical systems.

Like other theorists, Nadel divided the diatonic period into two parts: modality and major-minor tonality.²⁴ He paid little attention to traditional major-minor tonality, directing students and readers to the extensive literature available in the field. Along with many composers and researchers of his time, he saw modality as a way out of the traditional

²⁴ For a historical review on the transition from modality to tonality, see Lukas Perry, “From Modality to Tonality: The Reformulation of Harmony and Structure in Seventeenth-Century Music,” University of Puget Sound, *Sound Ideas Summer Research* no. 78 (2011). https://soundideas.pugetsound.edu/summer_research/78, accessed 10 March 2023.

major-minor tonal language that had become stagnant.²⁵ However, his modal theory has several unique features that distinguish it from others in the field, as follows.

From his early articles, Nadel emphasized mirror inversion as an organic structural basis in the modal system.²⁶ The seven diatonic modes have inversion relationships among themselves, and each major mode (Ionian, Mixolydian, Lydian) has a corresponding minor mode (Phrygian, Aeolian, Locrian) obtained by inverting their scale intervals. In the pure modality, which is based only on the seven “white” notes (see Example 1), the principal notes of the inverted modes are themselves fixed-mirror inversions (i.e., inversions relative to D). Specifically, C-Ionian is inverted to E-Phrygian, G-Mixolydian to A-Aeolian, F-Lydian to B-Locrian, and D-Dorian is the inversion of itself.

Example 6 Advanced modality

a) Ionian-Phrygian advanced modal group

The image shows two musical staves. The first staff is labeled "Ionian authentic (major)" and contains the notes C, D, E, F, G, A, B with Roman numerals I through VII below them. The second staff is labeled "Phrygian authentic (minor)" and contains the notes E, F, G, A, B, C, D with Roman numerals I through VII below them. Below the first staff is the text "Ionian plagal = Phrygian" and below the second staff is "Phrygian plagal = Ionian".

b) Viennese Waltz in Ionian-Phrygian modes (Op. 40 , No. 1), bars 1-19

Viennese Waltz
Op. 40 No. 1 Zvi Harry Nadel

Tempo di Valse

The image shows a piano score for "Viennese Waltz" in 3/4 time. The score is divided into two systems. The first system covers bars 1-19 and the second system covers bars 10-19. The music is in a 3/4 time signature and starts with a piano (*p*) dynamic. The score includes various mode labels: I, VI.plagal, I, VI.plagal, I.parralel.plagal, V, I. Dynamics include *p*, *ff*, *f*, and *p*. The piece ends with a "Fine" marking.

Nadel's concept of “advanced modality” involves extending the relationships between modes by adding their inverted counterparts, relative to the principal tones, which are referred to as plagal modes. For instance, combining C-Ionian authentic and its plagal C-Phrygian, as well as E-Phrygian authentic and its plagal E-Ionian, results in the Ionian-

²⁵ For a review on the modal practice in the 20th century composition, see Leon Dallin, *Techniques of Twentieth Century Composition, A Guide to the Materials of Modern Music, Third edition* (Dubuque: WM. C. Brown Company, 1974), pp. 19-28.

²⁶ Nadel, “Relationship theory of the diatonic tone series.”

Phrygian mode family. This mode family has a distinct audible character that can be employed in composition, as demonstrated in Example 6. Other mode families formed similarly are the Mixolydian-Aeolian and the Lydian-Locrian. Nadel maintained that these inversion relationships are natural to the tonal system, but they are not commonly used in music because they do not follow the expected tonal relationship, such as dominant relationships in the major-minor system. In support of his theory, Nadel identified rare examples from composers such as Mozart, Bartók, Grieg, and Ravel, which suggest that these modal connections arising from inversion symmetry may have been subconsciously utilized by composers.²⁷ Moreover, Nadel encouraged bitonal combinations of related modes as a further enhancement of the advanced modality.²⁸

Another subchapter of the modality framework, referred to as “neo-modality,” encompasses modes with mixed accidentals, including the harmonic minor, Phrygian dominant scale (also known as Ahava Rabba in the Jewish musical tradition), Gypsy scales, and others. Nadel proposed a systematic method for constructing these scales, centered around a zero-sum symmetry axis of flats and sharps, as seen in D harmonic minor, which has one flat (B \flat) and one sharp (C \sharp). Some of the resulting neo-modal scales are familiar, while others are worth exploring, and some may be considered artificial. Nadel gathered examples of melodies utilizing these scales from notable composers, such as Bartók, Grieg, Saint-Saëns, Liszt, Enescu, and Ben-Haim, as well as identifying these scales in Jewish traditional melodies documented by anthologies from Idelsohn²⁹ and Yitzhak Levy.³⁰ His main focus was on the abstract systematicity of the scale structure and notation, rather than on cultural contexts.

As an innovative music theorist, Nadel put forward several new modal approaches with titles such as “super-modality” and “tonal modality,” which opened the door for further exploration of tonal relationships in composition. His theoretical methods have provided a foundation for the creation of new musical genres through composition.

Other tonal theories by Nadel include pentatonicity, based on the pentatonic scale, hexatonicity based on the whole-tone scale as inspired by Debussy, and semi-tonality (also referred to as hyper-harmony), which is an alternative approach to breaking away from traditional tonal principles while still maintaining the tertial principle in chord construction.³¹

²⁷ See in Nadel, “Relationship theory of the diatonic tone series.”

²⁸ Nadel’s method of bitonal combinations can be found in the music of other composers. For instance, Darius Milhaud’s “Copacabana” from “Saudades Do Brasil” features bitonality between G-major (Ionian) and B-major bitonality (transposed from C-E advanced Ionian-Phrygian modal relationship) in bars 1-36, or between the mirror inversions of A-Aeolian and G-Mixolydian in bars 41-42, and C-Ionian versus C-Phrygian in bars 43-44.

²⁹ A.Z. Idelsohn, *Jewish Music in its Historical Development* (New York: Schocken Books, 1967), 535 pp.

³⁰ See analysis in Nadel, “Theoretical foundations of Jewish ethnomusicology,” relating to: Yitzhak Levy, *Anthology of Sephardic Hazanuth, vol. 3* (Jerusalem, self-publishing, 1965) (in Hebrew).

³¹ Sonata-Fantasia No. 2 (1985) by Yuval Shay-El is based on a chord cadence according to the semi-tonality method. A recording is available on *SoundCloud* (<https://soundcloud.com/hagai-yodan/yuval-shay-el-sonata-fantasia-no-2-hagai-yodan-piano>), accessed 10 March 2023.

Nadel and his school

Even forty years after studying under him, Zvi Harry Nadel remained a significant and lasting source of inspiration for his students. This fact is exemplified by the ongoing impact of his teachings on the recent compositions of his former students.

The first movement of Moshe Rasiuk's "String Quartet No. 1" (2015) features a poignant tribute to Zvi Harry Nadel, to whom the composition is dedicated. The final bars of the movement, depicted in Example 7, effectively convey several of Nadel's central concepts. The notation adheres strictly to the 13-note dodecapronic scheme, and fixed-mirror inversion relationships exist between violin I and viola, and between violin II and cello, in bars 98-102. The last chords are hexachords (whole-tone chords), and the septuplet motive in unison, in bars 103-105, strongly emphasize the note D, which is the central tone of symmetry according to Nadel's theory. Additionally, this motive is the inversion of the corresponding motive in the movement's opening (in bars 1-3, not shown here). Rasiuk's work serves as both an homage to and a representation of Nadel's esthetic.³²

Example 7 String Quartet No. 1 (2015) by Moshe Rasiuk, first movement, bars 95-105

The musical score for Example 7 consists of two systems of staves for Violin I, Violin II, Viola, and Cello. The first system begins at bar 95 with a tempo marking of quarter note = 60. It features dynamic markings of *f* and *mf*, and a *cresc.* marking. The second system begins at bar 101 with a tempo marking of quarter note = 80 (Maestoso). It features dynamic markings of *f* and *cresc.*, and includes septuplet markings (7) over the notes. The score is written in a key signature of one sharp (F#) and a 4/4 time signature.

Ya'aqov Ziso's "Virus on the Wall" (2022) is an example of free dodecapronic composition (see Example 8). The melodic and harmonic content contains numerous minor-seconds/major-sevenths intervals and thus falls within the sharper degrees of Nadel's dodecapronic tension classification, which were introduced previously. The piece

³² A recording of Rasiuk's "String Quartet No. 1" is available on *YouTube* (<https://youtu.be/BTxgUfFDgM?t=257>), accessed 10 March 2023. Example starts on time 4:17.

features an array of extended techniques for the musical instruments, such as playing with a saxophone mouthpiece on the tuba, playing behind the bridge on the double bass, and other innovative techniques. These techniques enhance the distinctive modernistic qualities of the composition. Moreover, the composition utilizes the 13-note scheme exclusively, providing a lucid and clear visual representation of the music. Though it has a unique personal style, “Virus on the Wall” shares the same dodecapronic framework defined by Nadel as other works, such as Rasiuk's, that are contained in this compositional style.

Example 8 Virus on the Wall (2022) by Ya'aqov Ziso, bars 1-8

The musical score for "Virus on the Wall" by Ya'aqov Ziso, bars 1-8, is presented for three instruments: Tuba, Double Bass, and Marimba. The score includes various performance instructions and dynamics. The Tuba part features a saxophone mouthpiece and a range from middle high to low. The Double Bass part includes instructions for playing behind the bridge and using ord. (order) techniques. The Marimba part uses hard rubber mallets. The score is marked with dynamics such as *mf*, *f*, *mp*, *ff*, and *p*. The tempo is indicated as quarter note = 50. The score is by Y. Ziso.

The tritonality is featured in Shulamit Rubinovich's “Abir Halayla” from 2018 (see Example 9), including both melodic and harmonic tritonic textures, carefully selected to complement the lyrics.³³ Rubinovich, a composer and poet, wrote both the music and the text. She also dedicated another poem titled “If time permits...,” which quotes a typical phrase coined by Nadel and reflects memories of his study room, in honor of Nadel's memory.³⁴

Nadel was not a purist; rather, he encouraged his students to explore combinations of different music styles. One example of such experimentation is Yuval Shay-El's “A Common Concern,” which is the third movement of his 2022 composition “Ruach.” This movement is based on a text from the “1992 United Nations Framework Convention on Climate Change.” A few bars are shown in Example 9, which include markings of tritonic and pentatonic motives. The declarative text is conveyed through the use of melodic pentatonic and tritonic motives, while the broader discussion is represented by a polyphonic free dodecapphony. The other movements of “Ruach” also incorporates Nadel's

³³ A recording of Rubinovich's “Abir Halayla” is available on YouTube (https://youtu.be/4_DcRzU1B4U), accessed 10 March 2023.

³⁴ Shulamit Rubinovich, *The Sea Speaks to Me, Poems* (Israel: Hotsaa Atsmit – Hotsaa Laor, 2019), p. 91.

techniques, such as Mixolydian-Aeolian modes in the first movement, and Ionian-Phrygian modes in the second and fourth movements.³⁵

Example 9 Abir Halayla (2018) by Shulamit Rubinovich, bars 1-9

Allegretto Music & Lyrics : Shulamit Rubinovich

Im bo he-a-viv po-re - ach a-bir ha-lay - la bim-lo ha-da - ro
tzchor ko-ch- vim mar-hiv a - in be - yo-fyo

Example 10 Ruach (2022) by Yuval Shay-El, third movement, bars 8-19

The Par-ties to this Con-ven-tion, Ac-know-ledg-ing that change in the Earth's cli-mate and its ad-verse ef-fects are a
com-mon con-cern of hu-man-kind, Con-cerned that hu-man ac-ti-vities have been sub-*p*
Earth's cli-mate are a com-mon con-cern of hu-man-kind, Con-cerned that hu-man ac-ti-vities have been sub-stan-tial-ly in-
are a com-mon con-cern of hu-man-kind, Con-cerned that hu-man ac-ti-vities have been sub-stan-tial-ly in-
com-mon con-cern of hu-man-kind, Con-cerned that hu-man ac-ti-vities have been sub-stan-tial-ly in-creas-ing.

³⁵ A recording of Shay-El’s “Ruach” is available on YouTube (<https://youtu.be/6cCFtILRdTM?t=458>), accessed on 10 March 2023. Example starts on time 7:38.

Concluding remarks

Zvi Harry Nadel, born in 1908, was a contemporary of the founding generation of Israeli art music, including renowned composers such as Paul Ben-Haim (1897–1984), Alexander Boskovich (1907–1964), Ödön Pártos (1907–1977), and Josef Tal (1910–2008). Like his colleagues, Nadel arrived in the Land of Israel prior to the establishment of the state and brought with him a wealth of European music heritage.

Influenced by prevalent trends among Mediterranean-style composers,³⁶ such as nationalism,³⁷ modality, and a universal approach, Nadel focused on establishing the theoretical basis for these trends. Notably, Nadel's approach included a comprehensive view of seemingly conflicting trends,³⁸ such as dodecaphony, modes, and folk scales, which he synthesized into a single scheme he called the “tone multiplicity” theory. Moreover, he used the theory as a basis and inspiration to create new music.

In an introduction to Nadel's article, Josef Tal wrote in 1960:

The research work of the theoretician, which follows the interesting idea, is not satisfied with the systematic sorting; It crosses the boundaries of the visible and expands the sights to the depth of thought. The author of this work, Harry Nadel, is to be congratulated for making the essential combination between the invention of the musical idea and its theoretical investigation. Great importance should be attached to this work, which will serve as a guide for us in the obscure roads and the jumble of styles of today.³⁹

More than sixty years later, this claim is still true, as evident from the compositions of Nadel's former students.

While this article focused on Nadel's theories and their influence on his students, his contribution to Israeli art music as a composer warrants further investigation.

³⁶ Ronit Seter, “The Israeli Mediterranean Style: Origins, 1930s—1950s,” *The Hebrew University of Jerusalem, Jewish Music Research Center* (2013), <https://jewish-music.huji.ac.il/sites/default/files/Seter%20Ronit%20Med%20Style.pdf>, accessed 10 March 2023.

³⁷ Traces of nationalism can be observed in early recordings, such as Nadel's 1958 medley arrangement “Miyemey Maavak Vekomemiyut” (Days of struggle and independence), which was performed by the Kol Israel orchestra under the direction of Jan Zeimer. The medley includes popular Israeli and Jewish tunes, including “Artsenu haktantonet,” “Berale roked balet,” “Zemer zemer lach,” “Haruach noshevet krira,” “Bearvot hanegev,” and others, which are arranged in diverse styles, including klezmer, cabaret, hora, march, and jazz. The recording can be accessed at https://www.nli.org.il/he/items/NNL_MUSIC_AL990002466250205171/NLI (accessed 10 March 2023). Additional examples of Nadel's nationalistic arrangements in Israeli music are listed on the Hebrew Wikipedia article on “Zvi Harry Nadel.”

³⁸ Hanoeh Ron remarks on Josef Tal as a representative of the “universal approach” opposing the nationalistic trends, which are inspired by folk music. See Hanoeh Ron, “The Israeli musical creation: in search of personal identity,” *The Center for Educational Technology*, <https://lib.cet.ac.il/pages/item.asp?item=2370>, accessed 10 March, 2023.

³⁹ Tal, “Introduction.” (Translated from Hebrew by Y. Shay-El).

Acknowledgement: I would like to thank composer and researcher Dr. Tsippi Fleischer for her support towards the publication of this work. Fleischer knew Nadel as a child and they reconnected later as neighbors in the same building. Despite the passage of time, Fleischer remained committed to the value of Nadel's work and provided invaluable encouragement and support towards this publication.

About the Author

Yuval Shay-El holds a PhD in Meteorology from Tel Aviv University (1998), and a Master's in Music (M.Mus) in composition from Boston University (1993). Currently: A composer, jazz pianist, and acoustic engineer. Author of academic publications in leading scientific journals.