Overlapping gestural zones and modulation on the fifteen-tone guitar

William R. Ayers
University of Central Florida, USA

Overlapping gestural zones and modulation on the fifteen-tone guitar

Abstract

With its unconventional tuning, notation, and performance requirements, Easley Blackwood's Suite for Guitar in 15- Note Equal Tuning serves as a reappraisal of both tonality (through its application of a microtonal equal temperament) and guitar performance practice (with a modified fretboard and note layout). Using concepts from the fields of transformational theory and gestural music theory, this study considers modulatory and sequential passages in two movements from Blackwood's Suite. This paper demonstrates how the fifteen-tone tuning and fretboard provide a unique opportunity to recontextualize the diatonic scale and its generative interval cycles in a consistent transformational space that allows the performer to conceptualize the novel guitar fretboard in three overlapping gestural zones. By considering the perspective of the performer, this paper illustrates Blackwood's multilayered compositional approach for the fifteen-tone guitar and his attention to the gestural potential of this new instrument.

Keywords

guitar, microtonality, equal temperament, performance, gesture

Cover Page Footnote

Lecture given at The 21st Century Guitar Conference 2019.

Overlapping gestural zones and modulation on the fifteen-tone guitar[1]

William R. Ayers
University of Central Florida

With its unconventional tuning, notation, and performance requirements, Easley Blackwood's *Suite for Guitar in 15-Note Equal Tuning* serves as a reappraisal of both tonality (through its application of a microtonal equal temperament) and guitar performance practice (with a modified fretboard and note layout). Using concepts from the fields of transformational theory and gestural music theory, this study considers modulatory and sequential passages in two movements from Blackwood's *Suite*. This paper demonstrates how the fifteen-tone tuning and fretboard provide a unique opportunity to recontextualize the diatonic scale and its generative interval cycles in a consistent transformational space that allows the performer to conceptualize the novel guitar fretboard in three overlapping gestural zones. By considering the perspective of the performer, this paper illustrates Blackwood's multilayered compositional approach for the fifteen-tone guitar and his attention to the gestural potential of this new instrument.

Easley Blackwood's *Suite for Guitar in 15-Note Equal Tuning* (ca. 1987–1990) poses a number of problems for contemporary analysts and performers.[2] With an unconventional tuning (fifteen-tone equal temperament), a nonstandard fretboard construction, and unfamiliar notation, the suite seems relatively daunting at first glance. These problems are especially noteworthy when considering the financial investment it takes to even obtain a fifteen-tone guitar, an instrument for which there is little written music and only a small community of devotees. All of these elements combine to push performers and analysts away from these works, an unfortunate but understandable result of the *Suite*'s novelty. However, the *sound* of these pieces, originally recorded by Jeffrey Kust, continually draws interest from listeners in the microtonal community.[3] The music employs diatonic scales, triads, and somewhat traditional harmonic progressions while still sounding compelling to modern listeners.

Blackwood's fondness for tonal functions and diatonicism allows him to strike a fine balance between familiarity and foreignness in his fifteen-tone compositions. The composer was so taken with fifteen-tone equal temperament (what he calls "fifteen-note equal tuning") that he used the closing paragraph in his final published article on microtonality to proclaim its merits:

> Earlier theorists have generally held that fifteen-note equal tuning is of little or no practical use; with this opinion, I am in complete disagreement. On the basis of my now extensive practical experience, I am persuaded that fifteen-note equal tuning is likely to bring about a considerable enrichment of both classical and popular repertoire in a wide variety of styles. (Blackwood, 1991, p. 199)

The application of tonal structures in fifteen-tone equal temperament requires significant alteration to diatonic scales, major/minor harmonies, and common notation schemes present in the music of twelve-tone equal temperament. Further, the guitarist has to conform to a different fretboard layout and new

[1] Lecture given at The 21st Century Guitar Conference 2019.

[2] Two reproductions of the unpublished manuscript score for Blackwood's *Suite* are accessible, one at the University of Chicago Library and another in the Elmer Holmes Bobst Library at New York University. This research relies on the version at NYU.

[3] A recording of Blackwood's *Suite* (along with his *Twelve Microtonal Etudes for Electronic Music Media*) is available on the album *Easley Blackwood: Microtonal* (1994, Cedille Records).

performance gestures. Some recent studies have shed light on the pitch systems that are available in this tuning (Hook, 2007; Weigel, 2018), but there has not yet been a detailed examination of Blackwood's attitude toward physical performance on the fifteen-tone guitar. A new interest in the relationship between performance gestures of fretted instruments and their related musical outcomes (De Souza, 2018; Koozin, 2011; Rockwell, 2009) encourages further consideration of the tuning and physical design of the fifteen-tone guitar.

This paper considers some modulatory and sequential passages in the Sarabande and the Gavotte from Blackwood's *Suite* and demonstrates that the fifteen-tone tuning provides a unique opportunity to recontextualize the diatonic scale as a product of overlapping interval cycles. Additionally, the analysis will show that these musical elements coincide with a consistent transformational space that allows the performer to conceptualize the fifteen-tone guitar fretboard in three overlapping gestural zones. The paper will begin by examining the peculiarities of the fifteen-tone tuning before discussing some resulting musical elements from this tuning. Focus will then turn to an application of this information to the physical layout of the fifteen-tone guitar to discuss gesture and spatialization on this instrument. The paper will conclude with some analytical remarks on the *Suite*, taking the performer's perspective into account to illustrate Blackwood's multilayered compositional approach to the fifteen-tone guitar.

Musical outcomes of fifteen-tone equal temperament

Fifteen-tone equal temperament differs from the common tuning of twelve-tone equal temperament in terms of intervallic qualities and resulting scalar structures. To represent these differences, this section will consider the common twelve-tone tuning as a point of reference. Twelve-tone equal temperament divides the octave into twelve logarithmically equal unit intervals. To discuss tuning measurements and compare this tuning with other systems, we can break down each semitone into even smaller divisions called cents. Each semitone has 100 cents, making each octave 1200 cents in total and providing a fine-grained system for comparing tunings. Dividing this 1200-cent octave into *fifteen* equal parts results in a slightly smaller unit interval, measuring 80 cents.[4] The small difference in the size of the unit interval creates the familiar-yet-foreign quality that Blackwood prizes in the fifteen-tone tuning. A comparison of the twelve-tone and fifteen tone tunings is given in Figure 1.

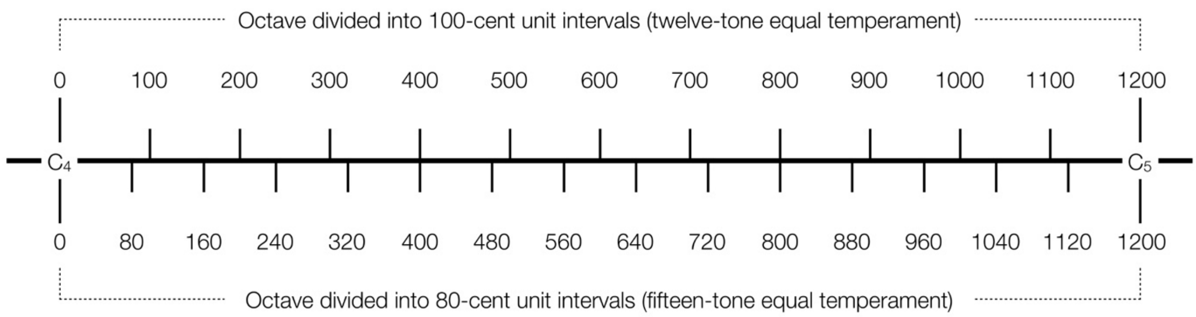

Figure 1 Twelve-tone and fifteen-tone divisions of the octave with unit intervals measured in cents.

[4] Cent calculations for intervals are calculated using the formula $c=1200\times\log_2(f_2/f_1)$, where c represents the number of cents between two notes with frequencies f_1 and f_2, calculated in hertz (Hz).

Some intervals in the fifteen-tone system are quite similar to our twelve-tone system. For instance, the major third (400 cents) has a precise analog in fifteen-tone equal temperament, now composed of five unit intervals instead of four. While the twelve-tone equal-tempered major third deviates significantly from the purely tuned just major third (at around 386 cents), the 400-cent interval is the most common rendering of the major third, and its variance (of about 14 cents) from just intonation is a regularly accepted acoustical compromise. Further, retaining the familiarity of the 400-cent major third from twelve-tone equal temperament allows a perceptual connection to traditional harmonic structures when using fifteen-tone equal temperament. Other intervals, however, are not precisely the same as their counterparts in twelve-tone tuning. The approximated perfect fifth in fifteen-tone equal temperament (720 cents) is 20 cents higher than the comparable 700-cent interval in the twelve-tone tuning and about 18 cents higher than the purely tuned just perfect fifth (at around 702 cents). While this is a significant difference at face value, 20 cents is the *smallest* possible alteration to a tuned interval without perfectly replicating those intervals of twelve-tone equal temperament, and the difference of about 18 cents between the just perfect fifth and its fifteen-tone approximation is comparable to the acoustical compromise that is commonly accepted for major thirds. Combining these relatively well approximated intervals, the major third and the perfect fifth, produces recognizable major triads, supporting Blackwood's application of a tonal idiom for his *Suite*, but the slightly altered perfect fifth has a dramatic effect on the structure of the fifteen-tone tuning. To examine this effect, consider one of Blackwood's own examples, recreated in Figure 2.

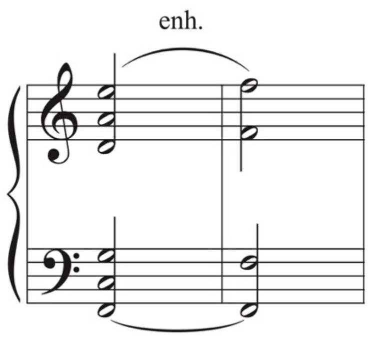

Figure 2 Blackwood's demonstration of the enharmonic equivalence of diatonic semitones in fifteen-tone equal temperament. Five 720-cent perfect fifths (5×9 unit intervals, on the left) are equivalent to three 1200-cent octaves (3×15 unit intervals, on the right). Adapted with permission from "Modes and chord progressions in equal tunings," by E. Blackwood, 1991, *Perspectives of New Music*, *29*(2), p. 188.

About this figure Blackwood (1991) writes:

> [T]he sum of five 720-cent fifths is exactly equal to three octaves, as is evident from the relation (5)(720) = (3)(1200) = 3600 ⋯ This shows that any interval that appears to be a diatonic minor second is actually an enharmonic unison—a state of affairs that takes some getting used to. The ascending succession F, C, G, D, A, E thus represents a closed circle of five perfect fifths. Hence if the pitches forming the circle are rearranged by octave transposition into an ascending succession within one octave, the result is a division of the octave into five equal parts. (p. 188)

As Blackwood states, ascending by approximated (720-cent) perfect fifths sends us back to the same pitch class after only five iterations. An odd enharmonic equivalence results from this cycle, namely that E is the same pitch class as F, but as a byproduct of this property, B is also the same pitch class as C, F-sharp is the same pitch class as G, and so forth. All written diatonic semitones sound like unisons in this tuning; as Myles Skinner notes: "For a musician familiar with the enharmonic pitches of the standard piano keyboard, the unusual enharmonic equivalences of Blackwood's 15-note notation are difficult to accommodate" (Skinner, 2006, p. 59).

The difficulties with fifteen-tone notation do not end here. There are three of these closed perfect-fifth cycles in fifteen-tone equal temperament, each with similarly unfamiliar enharmonicisms. To differentiate between these cycles, Blackwood assigns an additional accidental, either an upward or downward arrow with a circle, to the other ten notes not shown in Figure 2. See Table 1 for a listing of the note names that Blackwood uses in this system, the enharmonicisms the system produces, and the pitch-class numbers associated with the fifteen notes. It should be noted here that the accidentals are not consistent transformations of commonly tuned notes in twelve-tone equal temperament; rather they represent a completely different enharmonic structure. The pitch-class circle in Figure 3 shows the chromatic layout of these notes. While the use of two interacting systems of accidentals (sharps, flats, and naturals along with what we'll call ups, downs, and neutrals) may seem complicated, a 2007 study of enharmonic systems by Jay Hook actually confirms that, while it is still vastly more complex than our traditional notation system, Blackwood's notation system is the least cumbersome way to express diatonic functions in fifteen-tone equal temperament (Hook, 2007, pp. 116–117). It allows for recognizable diatonic scales and harmonies and supports Blackwood's desire to represent tonality in this otherworldly tuning. By giving meaningful names to these notes, Blackwood allows us to examine the scales that result from this system with reference to our traditional system of tonality. During the following discussion, keep the elements of Table 1 and Figure 3 in mind to help construct scales and harmonies in fifteen-tone equal temperament using Blackwood's novel notation.

Table 1 Blackwood's notation for fifteen-tone equal temperament with pitch-class numbers and tuning in cents.

Pitch class	Note name	Cents above C
0	B/C	0
1	B↑/C↑	80
2	C♯↓/D↓	160
3	D	240
4	D↑/E♭↑	320
5	E↓	400
6	E/F	480
7	E↑/F↑	560
8	F♯↓/G↓	640
9	F♯/G	720
10	G↑/A♭↑	800
11	A↓	880
12	A/B♭	960
13	A↑/B♭↑	1040
14	B↓/C↓	1120

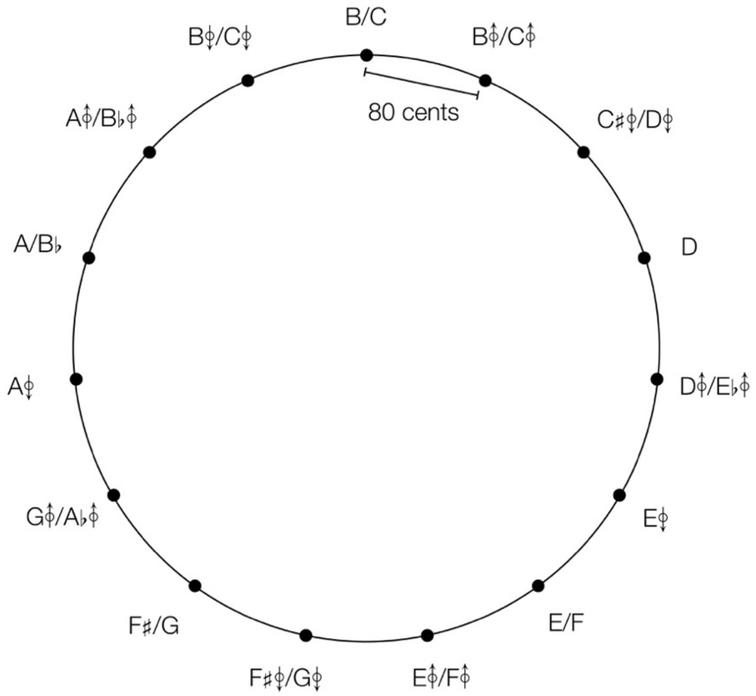

Figure 3 Fifteen-tone pitch-class circle using Blackwood's notation. Connecting perfect fifths (720-cent intervals) produces three different five-note cycles that contain notes with either up, down, or neutral accidentals.

As mentioned above, Blackwood is interested in using diatonic scales in the fifteen-tone tuning. If we attempt to make a diatonic scale in this tuning based upon the best approximations of intervals from a given tonic, we can examine how Blackwood's notation works in practice. The scale given in Table 2 approximates the C-major diatonic collection. Most of the values are 20 cents removed from their counterparts in twelve-tone equal temperament, not an insignificant difference but at least a manageable one in this context. However, one note in this scale is difficult to pin down. The supertonic, scale-degree 2, has two possible values at 160 cents and 240 cents above the tonic note, both of which are removed from the usual position of this note by 40 cents (either up or down), a relatively poor approximation of this scale degree. This diatonic scale seems to draw notes from two different strings of perfect fifths, shown in Figure 4. The note D is an approximated perfect fifth above the note G while the note D-down is an approximated perfect fifth below the note A-down. Choosing between these two options for scale-degree 2 has serious repercussions. For instance, when trying to relate this diatonic key area with the closely related keys of F major (Table 3) and G major (Table 4) in the same piece, both versions of scale-degree 2 would be required, D as scale-degree 5 in G major and D-down as scale-degree 6 in F major.

Table 2 Approximated C-major diatonic collection with two potential supertonic scale degrees.

Scale degree	1	2		3	4	5	6	7
Note name	C	Dϕ	D	Eϕ	F	G	Aϕ	Bϕ
Pitch class	0	2	3	5	6	9	11	14
Cents above tonic	0	160	240	400	480	720	880	1120

Table 3 Approximated F-major diatonic collection with two potential supertonic scale degrees.

Scale degree	1	2		3	4	5	6	7
Note name	F	Gϕ	G	Aϕ	B♭	C	Dϕ	Eϕ
Pitch class	6	8	9	11	12	0	2	5
Cents above tonic	0	160	240	400	480	720	880	1120

Table 4 Approximated G-major diatonic collection with two potential supertonic scale degrees.

Scale degree	1	2		3	4	5	6	7
Note name	G	Aϕ	A	Bϕ	C	D	Eϕ	F♯ϕ
Pitch class	9	11	12	14	0	3	5	8
Cents above tonic	0	160	240	400	480	720	880	1120

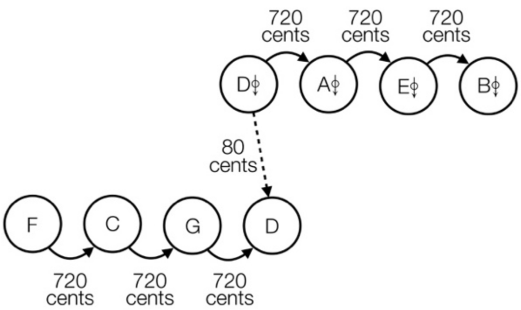

Figure 4 Two strings of perfect fifths, one from the down cycle and one from the neutral cycle that combine to produce the C-major diatonic collection in fifteen-tone equal temperament.

You may notice that each of the diatonic collections in Tables 2, 3, and 4 uses notes from only two cycles. This is true of every approximated diatonic collection in fifteen-tone equal temperament; each diatonic draws from precisely two of the three cycles (up, down, or neutral), as shown in the list of all fifteen approximated diatonic collections in Table 5. For the sake of simplicity, this table presents all of the major scales using the higher scale-degree 2 since Blackwood generally uses this version in his approximations, but this note can be traded out for its lower version when the music dictates (e.g., when modulating down a perfect fifth). The diatonic scales can be divided into three categories based on the cycles they are pulling from: down/neutral, neutral/up, and up/down.

Table 5 All diatonic collections in fifteen-tone equal temperament, given in Blackwood's notation, each using the higher form of the approximated scale-degree 2. Each diatonic collection draws from exactly two of the approximated perfect-fifth cycles: down and neutral, neutral and up, or up and down.

C major	C	D	E↓	F	G	A↓	B↓
C↑ major	C↑	D↑	E	F↑	G↑	A	B
D↓ major	D↓	E↓	F↑	G↓	A↓	B♭↑	C↑
D major	D	E	F♯↓	G	A	B↓	C♯↓
E♭↑ major	E♭↑	F↑	G	A♭↑	B♭↑	C	D
E↓ major	E↓	F♯↓	G↑	A↓	B↓	C↑	D↑
F major	F	G	A↓	B♭	C	D↓	E↓
F↑ major	F↑	G↑	A	B♭↑	C↑	D	E
G↓ major	G↓	A↓	B♭↑	C↓	D↓	E♭↑	F↑
G major	G	A	B↓	C	D	E↓	F♯↓
G↑ major	G↑	A↑	B	C↑	D↑	E	F♯
A↓ major	A↓	B↓	C↑	D↓	E↓	F↑	G↑
A major	A	B	C♯↓	D	E	F♯↓	A↓
B♭↑ major	B♭↑	C↑	D	E♭↑	F↑	G	A
B↓ major	B↓	C♯↓	D↑	E↓	F♯↓	G↑	A↑

The combination of any two of the five-note cycles generates a ten-note symmetric scale similar to the traditional octatonic scale in twelve-tone equal temperament; for instance, combining the neutral and up cycles creates a scale that alternates 80-cent and 160-cent intervals, including pitch classes 0, 1, 3, 4, 6, 7, 9, 10, 12, and 13. Analyst Stephen Weigel (2018) notes the importance of this scale type in another of Blackwood's works, his fifteen-tone piece from the *Twelve Microtonal Etudes* (1980). Weigel names these symmetric scales the "Blackwood[10]" scales, and since each major diatonic scale pulls notes from only two cycles, a single diatonic collection will always be a subset of one of the ten-note symmetric scales. The content of these ten-note scales is displayed in Figure 5. Each five-note cycle takes part in two different ten-note scales, similar to how each distinct fully diminished seventh chord takes part in two separate octatonic scales in twelve-tone equal temperament. The section that follows demonstrates the structural ramifications that this system has on guitar performance using a modified fretboard that tunes to fifteen-tone equal temperament.

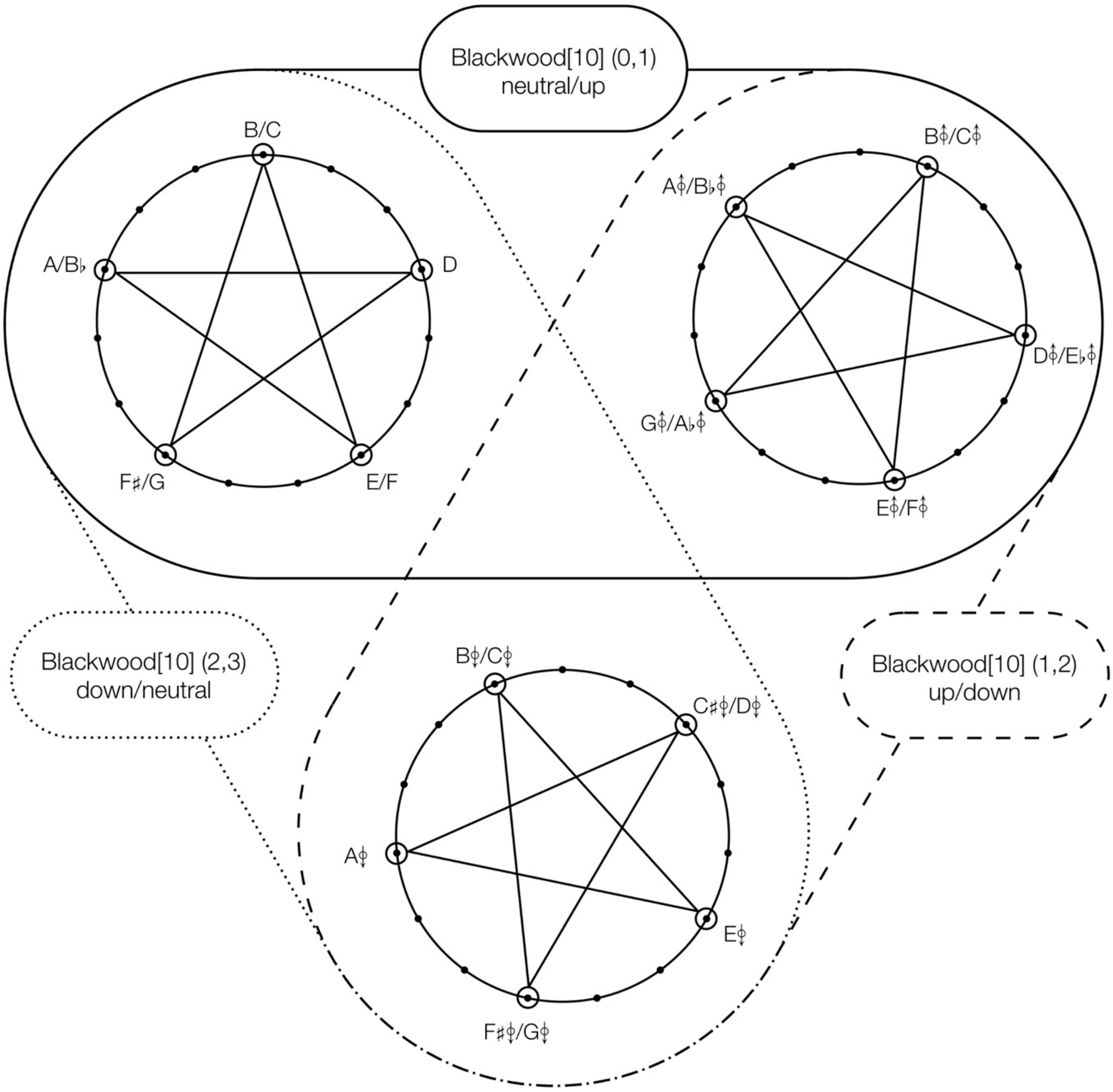

Figure 5 The three perfect-fifth cycles in fifteen-tone equal temperament and the symmetrical ten-note collections resulting from their combination (separately enclosed in solid, dashed, or dotted lines).

Physical layout of the fifteen-tone guitar and resulting performance gestures

Thus far we have considered the fifteen-tone tuning from an abstract point of view, but this system has real physical consequences that manifest themselves on the fifteen-tone guitar fretboard. Not only does Blackwood's fifteen-tone guitar shrink the distance between frets to accommodate the smaller unit interval, but its tuning also aligns each fret with one of the five-note cycles (up, down or neutral), creating a mapping between the underlying pitch structure and the physical layout of the instrument. This means that the ten-note symmetric scales will be associated with specific zones on the fretboard, what I will call *gestural zones*, that pair two of these five-note cycles and their related frets (down and neutral frets, neutral and up frets, or up and down frets). There are three overlapping gestural zones on the fifteen-tone guitar that map to the three ten-note symmetric scales; each of these contains exactly five of the diatonic collections listed in Table 5.

The adjacent strings of Blackwood's fifteen-tone guitar are all tuned 480 cents apart, equivalent to the approximated perfect fourth in this tuning. This organization is similar to some common twelve-tone guitar tunings, specifically the all-fourths tuning in which the strings are all 500 cents (or a traditional perfect fourth) apart. However, tuning a twelve-tone guitar completely in fourths does not produce the same note for the lowest and highest strings; the traditional guitar tuning shown on the left side of Figure 6 has to include a single major third between adjacent strings to accomplish this. The fifteen-tone tuning accomplishes this feat using a consistent 480-cent interval between strings. As shown to the right in Figure 6, this results in a more even structure to the guitar fretboard.

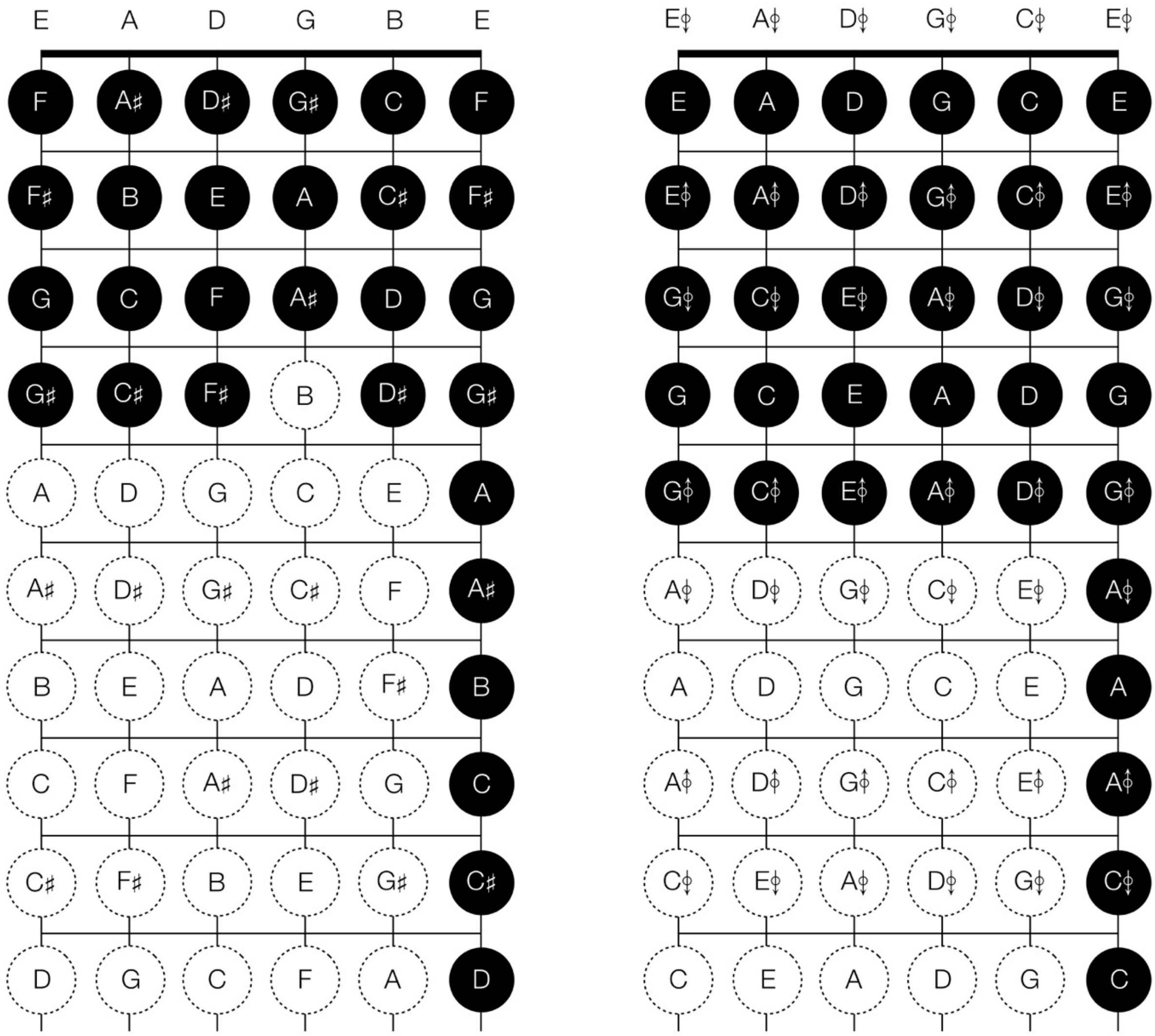

Figure 6 Fretboard layouts for the traditional twelve-tone guitar (left) and the fifteen-tone guitar (right), displaying the isomorphic structure inherent in Blackwood's note layout. Repeated notes appear in white circles on the figure. Note that the distances between frets shown in the figure do not accurately depict distances on the two fretboards.

Weigel relates this structure to the so-called "isomorphic" keyboards; specifically, he mentions the Jankó keyboard conceived by Paul von Jankó (Weigel, 2018, p. 17). Chord shapes on these keyboards are easily transposable since intervals with the same physical distance and direction will have the same magnitude from every starting note. Holding a chord shape and shifting it around the fifteen-tone fretboard (with only small adjustments for changing distances between frets) will similarly produce a transposed version of the original chord. Despite its unfamiliarity, the isomorphic structure of this guitar fretboard produces a relatively simple space for a performer to navigate. The brief analysis that follows will consider the performer's gestures and their navigation of this isomorphic fretboard to examine Blackwood's application of tonality in fifteen-tone equal temperament.

Analysis of Easley Blackwood's *Suite for Guitar in 15-Note Equal Tuning*

The short third movement of Easley Blackwood's *Suite for Guitar in 15-Note Equal Tuning*, the Gavotte, demonstrates a basic organizational principle that carries over into many other sections of the work, the idea that the performer will generally only use *one* of the ten-note symmetric scales at a time, keeping them in a defined gestural zone on the guitar fretboard. This means that harmonies including notes from all three cycles (up, down, and neutral) will be rare and that the performer will often have to skip over every third fret to remain in a single ten-note scale and its associated gestural zone. The opening measures of the Gavotte, given in Figure 7, and the slightly altered recap beginning in measure 24 (not shown) only use notes from the down cycle and the neutral cycle, restricting the guitarist to frets with down and neutral notes (as shown in Fig. 6) and yielding the down/neutral gestural zone or the Blackwood[10] (2,3) scale (see Fig. 5). Even when using secondary functions and other chromaticism in the opening passage, Blackwood sticks to the down and neutral frets, only shifting to the up accidentals halfway through measure 8 as a new idea enters and the music starts to slip away from the F pitch center. As the opening section moves into new material, the gestural zone drifts toward the neutral and up cycles and their associated frets and scale, the Blackwood[10] (0,1) scale. As with all modulations between these ten-note scales, the zones overlap by one cycle; here notes from the neutral cycle (and the neutral frets) persist through measure 16, alternating between using notes from the up and down cycles as the piece shifts through different key references and between the two ten-note symmetric scales shown in Figure 7.

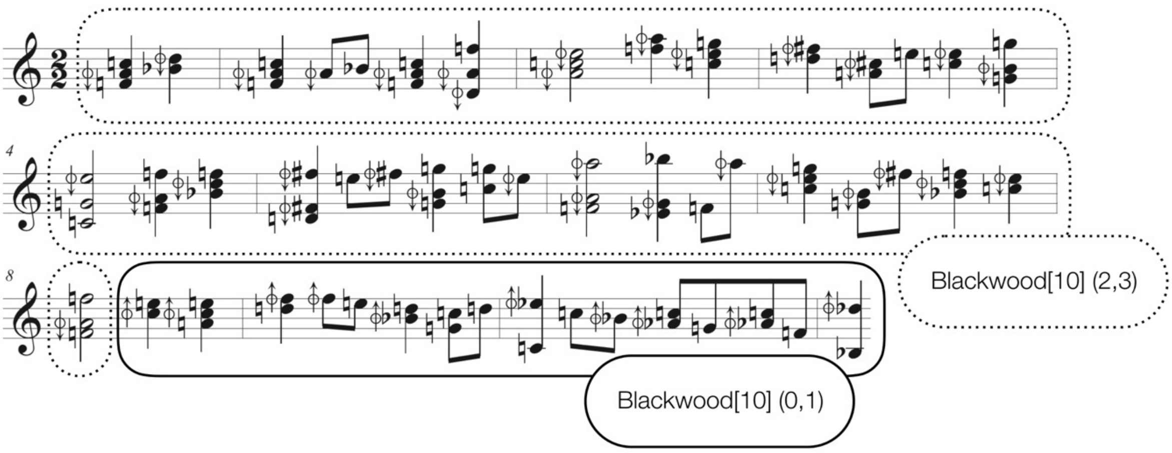

Figure 7 Distinct symmetric scales in the third movement (Gavotte) of Easley Blackwood's *Suite*. Adapted with permission from a reproduction of *Suite for Guitar in 15-Note Equal Tuning* (p. 7), by E. Blackwood, ca. 1987–1990 (Unpublished manuscript) [Accessed through the Elmer Holmes Bobst Library, New York University, New York, NY, United States].

Blackwood's notation is the key to understanding his compositional philosophy for this piece; the association of accidentals (ups, downs, and neutrals) with specific frets and the preservation of strict gestural zones to project diatonic and ten-note symmetric scales align the underlying musical structure with the physical space of the guitar fretboard. This alignment also allows us to map the musical space on a modified *Tonnetz*, a tool popular in transformational music theory, and retain some aspects of the physical performance space. The *Tonnetz* in Figure 8 uses numbers 0–14 to represent the fifteen pitch classes available in this tuning (see Table 1 for the association of pitch classes to note names). Each axis is constructed by repeating a single interval (major third, minor third, or perfect fifth) and could be presented as a torus (by looping the structure at repeated nodes along the edges) or expanded infinitely (to maximize possible visualizations). The small triangles represent triads; in this case upward pointing triangles are major triads and downward pointing triangles are minor triads, so the entire structure of this network is built on only three intervals, the major third, the minor third, and the perfect fifth. Since the perfect fifth creates a closed five-note cycle in this tuning, there are three distinct perfect-fifth lines on this *Tonnetz* that, if continued on either side, would simply repeat the same five pitch-class numbers. These perfect-fifth lines map to their respective up, down, and neutral frets, implying that all major and minor triads would take part in precisely two of these cycles, just like the seven-note diatonic and the ten-note symmetric scales examined earlier. Maps like these can help to visualize pathways through musical passages that prioritize common-tone relationships between adjacent major/minor harmonies, and due to its connection to the physical guitar fretboard layout, this specific map will assist in analyzing the gestural practices underlying the Sarabande movement from Blackwood's *Suite*.

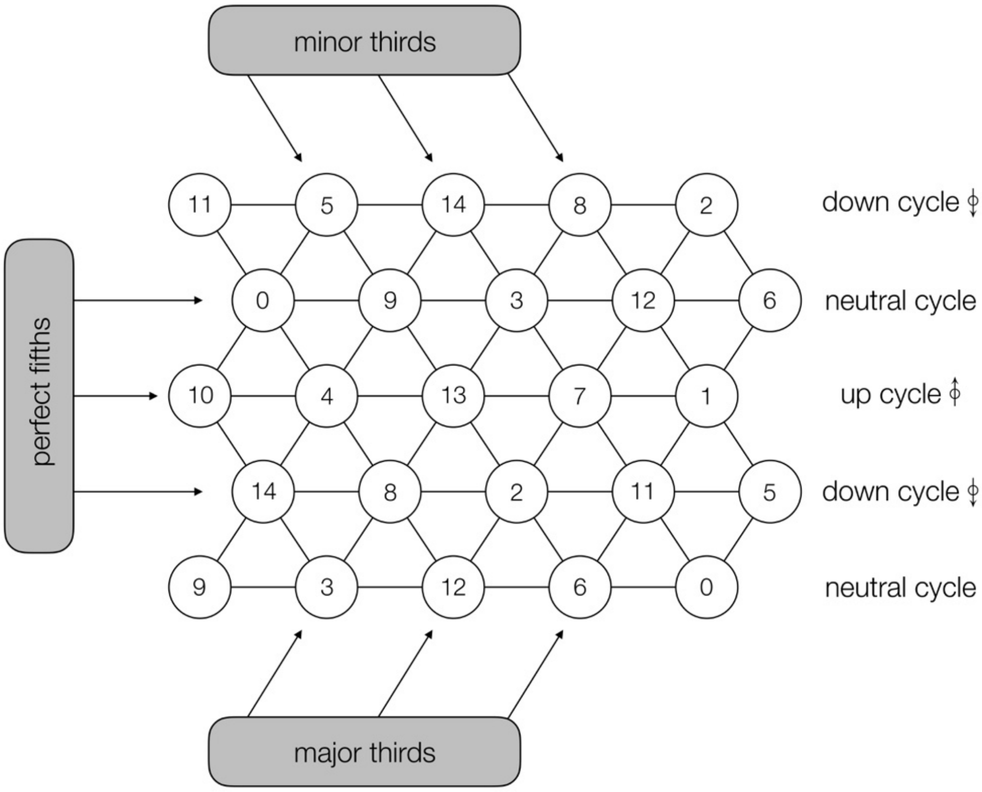

Figure 8 A *Tonnetz* representation of the fifteen-tone triadic space. Nodes in the *Tonnetz* are given as fifteen-tone pitch-class integers 0–14. Triangles represent the major and minor triads resulting from the combination of the three intervallic axes. The perfect-fifth cycles align with fret groupings on the fifteen-tone guitar (see Fig. 6).

Figure 9 provides an excerpt from Blackwood's Sarabande (the *Suite*'s second movement) that includes two sequences similar in thematic material but different in terms of their harmonic and gestural outcomes. The first pass through this thematic sequence (mm. 49–54) is similar to the chromatic sequences of tonal music, smoothly shifting through the different cycles represented on the *Tonnetz* of Figure 10 and the different gestural zones associated with them. The second pass through the sequence (mm. 57–62) strives for diatonicism, remaining in a single gestural zone, down/neutral, for a few measures shortly after the sequence begins (mm. 58–61).

Figure 9 Excerpt of the second movement (Sarabande) of Easley Blackwood's *Suite*. Adapted with permission from a reproduction of *Suite for Guitar in 15-Note Equal Tuning* (p. 6), by E. Blackwood, ca. 1987–1990 (Unpublished manuscript) [Accessed through the Elmer Holmes Bobst Library, New York University, New York, NY, United States].

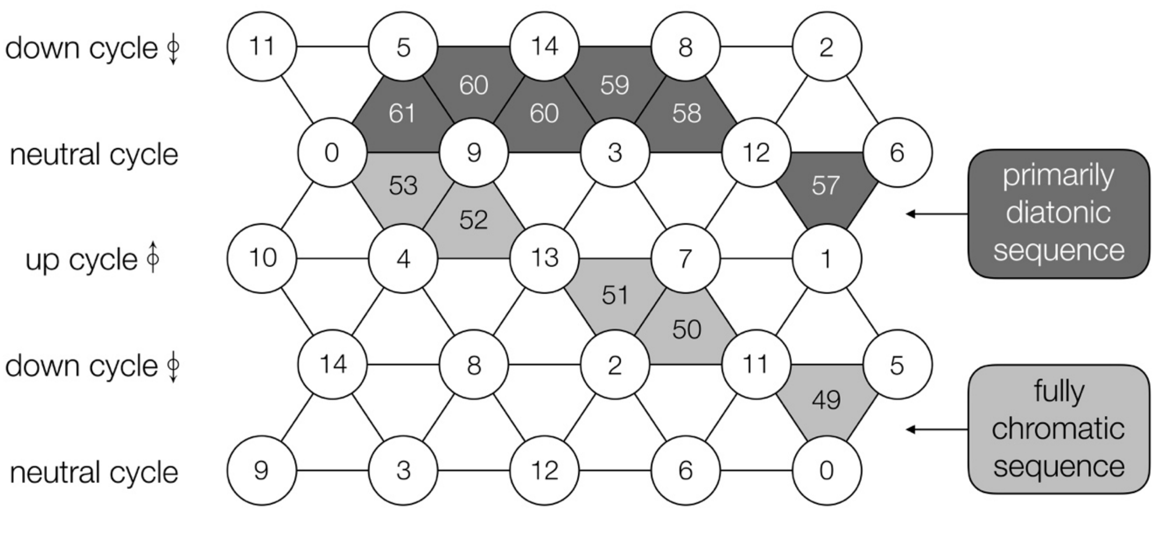

Figure 10 A *Tonnetz* representation of two passages from the second movement (Sarabande) of Easley Blackwood's *Suite for Guitar in 15-Note Equal Tuning*. Triangles are assigned measure numbers mapping to score locations (see Fig. 9) and primarily represent downbeat harmonies.

The two gestural/harmonic pathways displayed in Figure 10 imply different interactions that the guitarist is having with the fretboard in these passages, one that shifts through different gestural zones and another that, after getting started, remains locked in a single gestural zone until it disintegrates into a wash of augmented triads (mm. 61–63), which disturb the gestural zones that these sequences kept intact by using one note from each of the five-note cycles. The end of this excerpt leads into a recap of the opening motive and a return to the down/neutral gestural zone. The sequences of Figure 9 represent a formal climax of both harmonic and gestural interest that dissolves and returns to stasis, and the pathways of Figure 10 generally display how this narrative plays out on the fifteen-tone guitar fretboard.

Conclusion

This analysis treats Blackwood's music as a reappraisal of some elements of tonality through the novel microtonal tuning of fifteen-tone equal temperament and as a reconsideration of guitar performance practice through the modified fretboard layout, resulting in a combined gestural-musical space for artistic engagement. With its unique fretboard layout and idiosyncratic musical outcomes, the fifteen-tone guitar presents an opportunity to change our common ways of thinking about guitar performance. My hope with this paper is that Blackwood's unique interpretation of guitar practice through a microtonal space inspires further experiments in this area and encourages performers to take on performances of these works.

References

Blackwood, E. (1991). Modes and chord progressions in equal tunings. *Perspectives of New Music*, *29*(2), 166–200. https://doi.org/10.2307/833437

De Souza, J. (2018). Fretboard transformations. *Journal of Music Theory*, *62*(1), 1–39. https://doi.org/10.1215/00222909-4450624

Hook, J. (2007). Enharmonic systems: A theory of key signatures, enharmonic equivalence and diatonicism. *Journal of Mathematics and Music*, *1*(2), 99–120. https://doi.org/10.1080/17459730701374805

Koozin, T. (2011). Guitar voicing in pop-rock music: A performance-based analytical approach. *Music Theory Online*, *17*(3). https://mtosmt.org/issues/mto.11.17.3/mto.11.17.3.koozin.html

Rockwell, J. (2009). Banjo transformations and bluegrass rhythm. *Journal of Music Theory*, *53*(1), 137–162. https://doi.org/10.1215/00222909-2009-023

Skinner, M. L. (2006). *Toward a quarter-tone syntax: Analyses of selected works by Blackwood, Hába, Ives, and Wyschnegradsky* (Publication no. 3244260) [Doctoral thesis, State University of New York at Buffalo]. ProQuest.

Weigel, S. (2018). *Six macrotonal etudes for electronic music media* [Master's dissertation, Ball State University]. Cardinal Scholar.

William R. Ayers is Assistant Professor of Music Theory at the University of Central Florida. He completed his PhD at the University of Cincinnati, College-Conservatory of Music in 2018, writing a dissertation on microtonal music. His research considers the topics of microtonality, transformational theory, video game music, film music, and twentieth-century American music. His introduction to music came when he began learning guitar while growing up in Jackson, Tennessee.

Email: william.ayers@ucf.edu