Paul Hindemith's Symphony in B flat: Exploring the Harmonic Wedge

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ABSTRACT

This research provides a conductor's analysis of the harmonic structure of Paul Hindemith's Symphony in B flat. The author's methodological approach uses the harmonic guidelines as outlined by Hindemith in his *Craft of Musical Composition, Book 1* to assess the structure of the symphony's harmonies. Beginning with the overtone series, Hindemith's harmonic guidelines establish the basis for Series I and Series II. The first series displays the melodic relationship between pitches, while the second while the second series outlines the harmonic relationship between pitches. These two series are used in combination to create the framework for Hindemith's harmonic language throughout his Symphony in B flat. This paper presents Hindemith's use of the harmonic language through a harmonic wedge, integrated throughout the composition at micro and macro levels. The author argues that the harmonic wedge, a device used throughout the composition, functions as a unifying element within each movement of the symphony.

KEYWORDS

Paul Hindemith,
Harmonic Wedge,
Symphony,
Analysis,
Symphony in B flat.

Part I: Introduction

Paul Hindemith established a unique, often misunderstood, harmonic language which makes his music distinct. When I first heard Hindemith as an undergraduate student I considered the dissonance of his harmonies to sound dark or angry, while wondering if his music was tonal. Chromatic but tonal, Hindemith's compositions are carefully crafted to bring the listener on a musical journey, often in an unpredictable but purposeful way. We can see Hindemith's skill both at a micro-level—with the intricacies of his voice-leading and timbral changes—to the large-scale formal construction of his works. Hindemith creates this musical journey through the use of his harmonic language—a language that ebbs and flows from the beginning to the end of each musical phrase. Although a complete harmonic analysis would provide its own set of insights, the goal of this article is to apply the framework outlined below to the harmonic structure of Hindemith's Symphony in B flat from which conductors, performers, and listeners can make more informed artistic decisions about the piece.

Composed for the United States Army Band "Pershing's Own" in 1951, Paul Hindemith's Symphony in B flat was initially rarely performed. This was in large part because university bands of the time were still playing arrangements, marches, and other popular music, rather than original works for band. It would be another two years before the creation of Frederick Fennell's Eastman Wind Ensemble, and later still before the idea of programming original works for band would become common place.

Wind band historian David Whitwell outlines a number of reasons to explain why this symphony initially received a rather cold reception (Whitwell 2013, 67-68). To begin with, the score diverged from the usual scores that band conductors were used to working with. Most early- and mid-century band music was presented in a condensed form, with all parts transposed to concert pitch. Upon opening the score to Hindemith's symphony, a conductor finds no less than thirty individual lines, many requiring transposition. This would have been quite daunting to the university band leader who was unaccustomed to dealing with so much information. Secondly, Whitwell believes that the notated articulations, in particular the heavy use of accents and staccatos, may have inadvertently caused conductors to misinterpret the quality of sound that Hindemith intended. According to Whitwell, it was not uncommon for European composers to write accents with the intention of a fuller, richer sound (Whitwell 2013, 67-68). Contemporary American university conductors would ask ensembles to play these accents akin to in a march—with space and weight. This misinterpretation greatly changes the sound quality of the piece, often creating an altogether new aesthetic that the composer did not intend. The work now receives the attention it deserves and conductors across the globe regularly include it in their programs.

Like many of his contemporaries in the 20th century, Hindemith was keen to find a new harmonic voice (Boatwright 1964, 280). While Schoenberg and his pupils, the

Second Viennese School, established their 12-tone system, and composers such as Claude Debussy, Béla Bartók, and Igor Stravinsky explored techniques involving non-diatonic scales, Hindemith's compositional method has its roots in physics—creating a hierarchy of pitches based largely on overtones and calculating vibrations per second of individual pitches. [1] One of his students at Yale, Howard Boatwright, noted that Hindemith was "never one to surround himself or music in any sort of mystique, he felt, as he often said, that a direct question deserves a direct answer" (Boatwright 1964, 280). Hindemith's writings discuss in depth the scientific acoustic relationship between pitches which is beyond the scope of this article, however the relevant specifics of his compositional approach are explored in greater detail below.

This paper examines Hindemith's unique harmonic language and, using the compositional framework established in his text *Craft of Musical Composition, Book 1* (hereafter *Craft I*), explores his 1951 composition, Symphony in B flat. This study will also apply a device referred to as a wedge to musical examples from throughout the symphony. This device is an illustration that changes shape to reflect the density of the harmony in question, as outlined by Hindemith in his *Craft 1* (Hindemith 1937, 117). In this section of Hindemith's text, he discusses chordal tension, or lack thereof, by displaying a chord progression on a staff while illustrating a wedge-like diagram that corresponds with the chords above it (Ibid). Hindemith does not himself describe this illustration as a wedge—it is rather a term that I will use throughout this paper to help create a visual representation of the harmonic movement.

The term wedge has been applied sparingly in the realm of music theory. Two examples which do utilize the term include *Introduction to Post-tonal Harmony* by Joseph Straus and an article titled *The Theory and Practice of Chromatic Wedge Progressions in Romantic Music* by Robert Gauldin. Straus uses the terms *expanding wedge* and *contracting wedge* to describe the movement away from or towards a given pitch (Straus 2006, 134-35). Whereas Straus's application is less relevant to my examination of Hindemith, I will elaborate upon Gauldin's usage. [2] Gauldin uses the term as a means to describe the introduction to John Phillip Sousa's *The Thunderer*, in which

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[1] Compositional techniques of the 20th Century, and beyond, focus in large part on the use of symmetrical scales—pitches organized in a manner that make their construction the same forwards, as well as backwards. This includes the use of chromatic, whole-tone and octatonic scales, as well as the use of modes of limited transposition. This symmetry can also be seen in Hindemith's harmonic language, as outlined in the sub-section titled The Wedge: Creating Harmonic Phrases.

[2] Although Straus uses the term wedge to describe expanding and contrasting pitch collections, it is less relevant to this discussion as this paper will not reference an inversional axis as Straus does. This type of analysis is applied specifically to musical examples by Béla Bartók in chapter five.

the outer voices move in contrary motion to create a "divergent wedge progression prolonging the dominant" (Gauldin 2004, 2). Gauldin more concisely defines this use of the wedge device as a compositional technique to expand specific harmonies (often tonic or dominant) through contrary chromatic motion displayed in the outer voices. Gauldin identifies examples in the works of Wagner and Tchaikovsky, commenting that these two composers use this technique within smaller structural sections. In relation to Hindemith, the wedge device will highlight both smaller, micro-level sections, as well as larger, macro-level sections. Another important distinction is that Hindemith does not use ascending or descending chromatic lines to prolong harmonic structures.

There exists ample research on Hindemith's compositional technique and analysis of the symphony—including a scathing review by Edwin Franko Goldman (Goldman 1958, 126-28). Much of the research analyzes structural elements of the symphony in the traditional way of identifying form and themes.[3] Thomas Ferguson's dissertation provides an in-depth and comprehensive thematic analysis (Ferguson 1971). Jason Curley's dissertation creates a visual representation of each movement by mapping out dynamics and formal sections with color coding, allowing the listener to "see the music" (Curley 2010, 38). Others have used Hindemith's compositional texts to analyze pieces including his *Clarinet Concerto* (Bedell, 1985). Vaught applies elements of Hindemith's *The Craft of Musical Composition* to the Symphony in B flat and provides a detailed explanation of Hindemith's compositional techniques (Vaught, 1993), forging strong connections between the text and the symphony. Although analysis provides insights into the piece, the research outlined in this paper is designed to provide the reader with a specific understanding of the techniques used by Hindemith viewed through the use of a harmonic wedge (explained below), providing examples at both the micro- and macro-level.

As a wind ensemble conductor, I am constantly seeking clarity of line and to better understand the role that harmony plays in a piece's progression. David Whitwell continues in his essay that performances of this symphony in particular suffers from the conductor's focus on vertical alignment (Whitwell 2013, 5). This, in conjunction with the incorrect approach to articulation, creates a musical performance that lacks forward direction and motion. I hope that this paper will provide new insights into how Hindemith uses harmony to create tension and release in the symphony, which can then be translated into informed artistic decisions when preparing the composition for

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[3] N.B. Due to the Covid-19 pandemic library services in the United States have been reduced. Interlibrary loan services for some requested sources have been canceled or were not able to be filled. This includes requests for Charles Gallagher's article in The Journal of Band Research titled "Hindemith's Symphony for Band" which is focused on form, tempi, and other elements related to conducting the piece and Barry Kopetz's article in The Instrumentalist titled "Hindemith's Symphony for Band: An Interpretive Analysis."

performance. Therefore, this paper does not provide a complete harmonic analysis of his symphony in a traditional sense; rather, the paper provides a detailed analysis of main thematic ideas found within the symphony, using the specific context of Hindemith's self-developed harmonic language.

Part II: Theoretical Framework & The Wedge

The Craft of Musical Composition

Paul Hindemith wrote *Craft 1* in 1937 to outline his philosophy of composition and to create a textbook for future generations of composers. This book is one component of a comprehensive pedagogical approach to composition and serves as the basis on which the key elements are established in the following discussion. *Craft I* provides "the strictly theoretical foundations; the second volume (1939) gives the first part of the practical curriculum, two-part writing" (Neumeyer 1986, 21). The third and final volume, published after Hindemith's death in 1970, discusses three-part writing. In *Craft I*, we see Hindemith's attempts to provide a context in which all twelve pitches of a chromatic scale can be used in a tonal framework. This idea, emblematic of Hindemith, can be found throughout his oeuvre, especially in his Symphony in B flat.

Understanding Hindemith's Harmony

Hindemith discussed the structure in which he created harmony, outlining its importance in each of his compositions (Hindemith 1937, 87):

> Every tonal movement arises from the combined working of harmonic and melodic forces—to ignore the rhythmic element for the moment. Harmony is the more robust of the two elements. It has its own tendencies and it is hard to force. There are many possible harmonic combinations, and the gradations between them are innumerable. The very quantity of the material commands the composer's thorough consideration, and "inspiration" and "invention" can be effective only on the basis of adequate technical knowledge. The novice will hardly succeed in traversing the harmonic territory, which abounds in a wealth of the most manifold phenomena.

While Hindemith acknowledges the importance of melody, he concludes with the caveat that harmony "connects and organizes the waves of melody" (Hindemith 1937, 87). Such emphasis establishes harmonic language as his foremost stylistic trait. It is therefore paramount for conductors to familiarize themselves with Hindemith's harmonic language, and how this language can be used to inform artistic decisions related to performance.

As mentioned earlier, Hindemith places great value on the twelve notes of the chromatic scale. He argues that the chromatic scale, rather than the seven-note major/minor scale, should form the basis for composition. Acknowledging that the chromatic scale is not new, Hindemith notes that composers have traditionally used it only to enhance or alter the seven-note diatonic scale, rather than on its own merit (Hindemith 1937, 47). Hindemith believed that composers should move past the limitations of the diatonic scale (Hindemith 1937, 107):

> …the key and its body of chords is not the natural basis of tonal activity. What Nature provides is the intervals. The juxtaposition of intervals, or of chords, which are the extensions of intervals, *gives rise to the key*. We are no longer the prisoners of the key. Rather, we now have a free hand to give the tonal relations whatever aspect we deem fitting.

How does Hindemith connect these tonal relationships? What guidelines or limitations, if any, are in place? Are there guiding principles that influence Hindemith's compositional processes? The subsequent discussion addresses these questions.

Intervals and the relationships between them found within the Western classical tradition are an essential component to Hindemith's harmony. The Hindemith school also distinguishes intervals as consonant or dissonant; however, the perspective, or the ways in which pitches relate to one another, diverges. This is explained throughout the introduction of Hindemith's *Series I* and *Series II*, which he describes as building stones (Hindemith 1937, 53), derived from the overtone series. *Craft I* discusses the physical acoustic properties, and a broad literature dedicated to the mathematical details exists.[4] In relation to Hindemith's symphony, this study considers the general concept and components of the overtone series.

The overtone series begins on a fundamental pitch, which can be any pitch, but for demonstrative purposes in relation to the corresponding analysis of the Symphony in B flat, we will use B-flat. The second overtone, and most important interval after the fundamental pitch, is the octave (doubling the vibration frequency or if using a string, splitting the string in half). After the octave is the fifth, in this case F, as the third overtone. The figure one (see the following page) shows the continuation of the overtone series based on B-flat through the 16th overtone.

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[4] Aside from texts by the composer, readers interested in an in-depth study of the mathematical relationships between pitches established by Hindemith should look to the work of Dr. Jon Turner and David Neumeyer; "Easy Guide to Intervals and Trichords," access January 11, 2021, https://www-pub.naz.edu/~jturner9/EZGuideExpSyl.html.

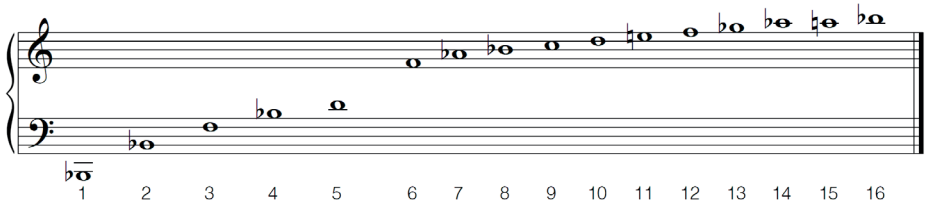

Figure 1. Overtone Series built on B-flat fundamental

Series I

Series I is a collection of pitches that have a specific relationship to, and start from, a fundamental pitch. One can deduce that Hindemith named this collection, and derived the order that they are in, based off the pitches' close relationship to pitch order in the overtone series. In relation to the starting pitch, beginning at the left and progressing to the right, is a perfect fifth, perfect fourth, major sixth, major third, minor third, minor sixth, major second, minor seventh, minor second, major seventh, and finally the tritone (an interval consisting of three whole steps). Hindemith accounts for all twelve pitches of the chromatic scale and organizes them in a way that indicates, as the pitches move further away from the fundamental pitch, an increasingly dissonant relationship.

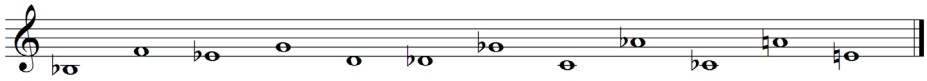

Figure 2. *Series I* based on B-flat

Hindemith refers to this progression away from the fundamental pitch in celestial terms: "Series 1 shows us the distance of the planets from the central star. As the distance increases, the warmth, light and power of the sun diminish, as the tones lose their closeness of relationship" (Hindemith 1937, 57). Siglind Bruhn, musicologist and interdisciplinary scholar, continues by describing Series I in this way: "The planets, orbiting in speeds related to their distance from the sun, compare to the ever remoter tones or tonal centers that Hindemith envisaged circling around their tonic in correspondence to ever weaker degrees of consonance" (Bruhn 2005, 50).

This illustration of Series I, with the fundamental pitch of C in a spiral setting,[5] shows the progression of consonance moving to dissonance as the pitches move further away from the tonal center and spiral outwards in a clockwise direction. As demonstrated both by the illustration above and from the last pitch of *Series I*, the tritone is the final and furthest pitch from the fundamental. Bruhn provides the following explanation: "The tritone stands out as an interval that occurs naturally only very late in the series, at more than five octaves' remove from the fundamental. This may be one reason why it was long considered suspect - diabolus in musica" (Bruhn 2005, 50).

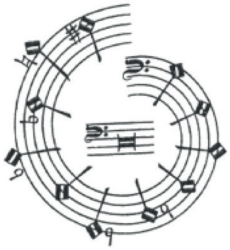

Figure 3. *Series I* Spiral with C fundamental

Series II

Series I represents pitches and their relationships on a horizontal plain, or in a melodic setting. *Series II* illustrates how these pitches relate to one another in a harmonic, or vertical setting. As with *Series I*, pitches on the left create consonant intervals, while pitches on the right become increasingly dissonant. This progression from consonant to dissonant will become a guiding principle for the construction of phrases in Hindemith's Symphony in B flat.

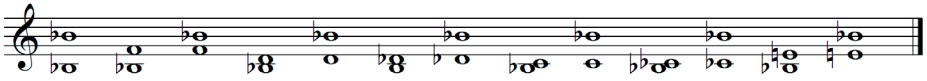

Figure 4. *Series II* based on B-flat

David Neumeyer summarizes the construction of *Series I* and *Series II* with the following commentary: "*Series I*, derived from a manipulation of the overtone series, charts the relative strength of relationship to a tonic for all chromatic degrees… *Series II*,

[5] Marco Padovani, "The Resounding Universe"; accessed July 30, 2020, http://eu-topias.org/en/the-resounding-universe/.

derived from *Series I* and from a comparison of combination tones, shows (left to right) the relative harmonic force of intervals and (right to left) the relative melodic force of intervals" (Neumeyer 1986).

Subdivision of the Chord-Groups

Hindemith goes on to classify chords based on the level of consonance or dissonance within the chord. He establishes two groups: Group A, chords without tritones and Group B, chords with tritones. Each group has three distinct sub-groups, with an increasing amount of dissonance based on *Series I* and *II* as described above. This paper will not transgress into further detail regarding these groups or sub-groups, beyond observing that Hindemith places great value on the distinction between chords containing a tritone or tritones versus chords without tritones. This establishes the theoretical framework for the analysis of Symphony in B flat later presented.

The Wedge: Creating Harmonic Phrases

Hindemith uses the principals outlined above to create tension and release within a given phrase. Notably, he does not discuss the basic phrase model that one would learn in a rudimentary music theory class—tonic, predominant, dominant, tonic. Although the basic phrase model moves in and out of tension and release, and Hindemith does use the words tonic and dominant to describe function, his concern is focused on how pitches relate to the starting note(s) of *Series I* or *Series II*, and less about the tension and release of chords typically found in the basic model. Tension found within the latter is generally concentrated towards the end of the phrase—the release from dominant to tonic. Theorists use the term harmonic rhythm to describe the rate at which harmony moves.[6] As we will see in the figures below, the tension in Hindemith's model is found within the middle of the phrase. The dominant to tonic relationship at the end of the phrase is still a release, but it is weaker due to the preceding chromaticism. In many ways, the harmonic rhythm of Hindemith is similar to the use of symmetrical systems such as whole-tone and octatonic scales of other 20th century composers. Hindemith's harmonic phrase model begins and ends with consonance, with the dissonance concentrated in the center of the phrase, creating harmonic rhythm that is symmetrical.

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[6] Harmonic rhythm describes the rate at which harmony within a given phrase changes. For example, an eight-measure phrase that begins with tonic expansion may not contain a functioning dominant chord until the penultimate measure of the phrase. The harmonic rhythm is static until that functional dominant chord is reached—upon which time the harmonic rhythm increases.

To create a wedge, the journey must begin with consonance, move to dissonance, and return to consonance. Hindemith acknowledges that the tritone acts like a dominant, pulling one's ear to the tonic. But he also states that instead of resolving outwards to the tonic, the tritone can resolve inwards by half-step (Hindemith 1937, 82). This assists in prolonging the harmonic progression, or wedge. Hindemith provides an example of a simple phrase that begins and ends with C major triads. He states (Hindemith 1937, 117):

> The first and last of these chords…are the best and most satisfying, while between them a harmonic development takes place… Thus there is an increase of tension from the first chord to the fourth, which is then resolved… There is a harmonic crescendo and diminuendo that is indissolubly connected with the nature of this progression; it cannot be altered by the performer. It is thus different from purely dynamic increases and decrease, the control of which always rests with the singer or player.

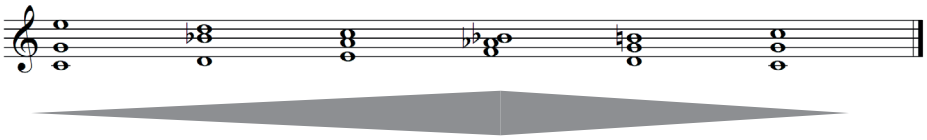

Figure 5. Degree of Tension showing harmoni wedge crescendo and decrescendo

Figure 5 contains six chords that belong to Group A, as they do not contain any tritones. Nevertheless, increasing dissonance presents itself between the first and fourth chords. Major thirds move to minor thirds, and the fourth chord contains a minor third and a major second. As this progression moves from consonance to increasing dissonance, the harmonic crescendo reaches its climax on the fourth chord.[7] The grey wedge illustration below the staff is designed to show this visually. Following the fourth chord to the final chord is a harmonic decrescendo, ending with a consonant sounding C and G. Structural elements of the traditional basic phrase model are evident within this progression—the first, third, fifth, and last chords outline a progression of tonic, predominant, dominant, and tonic. As stated previously, Hindemith's framework places the strongest amount of tension at the center of the progression with the transition from the fifth to sixths chords easing the listener back to the tonic. Hindemith describes Group A chords (consonant triads with tonics doubled) as the building blocks of large formal

[7] Hindemith uses the terms crescendo and decrescendo, terms typically used to describe dynamics, to illustrate the growth and release of tension within a given phrase. The wedge image used throughout this paper serves as a visual representation of this growth and release, or crescendo and decrescedo.

structures that allow movement to other tonal centers within a given phrase. Hindemith says the following: "These noblest of all chords constitute a section in themselves. They alone are completely independent, capable of being used for conclusions, and of being connected with any other chord" (Hindemith 1937, 102). The analysis section of this paper demonstrates how Hindemith uses Group A chords as important departure and arrival points throughout the three movements of his Symphony in B flat. Group A chords are also used as resting points from which phrases move to dissonance, becoming more active, before returning to rests (Hindemith 1937, 160). This idea of moving from consonance to dissonance and back to consonance –the harmonic crescendo and decrescendo– will be referred to as a wedge and illustrate this harmonic movement, but without reference to changes in dynamics, texture change, or other elements.

Hindemith provides us with additional guidelines regarding how to effectively construct a harmonic crescendo/decrescendo (Hindemith 1949, 42; 1937, 119; 1986, 34):

> Chords of high tension should not occur merely as the result of following the path of least resistance in the voice-leading; and a sudden relaxation of tension after progressions of chords of high tension is advisable only when one considers the resulting harmonic shock aesthetically justified.

> … a progression consisting exclusively of uncertain chords is always of poor effect.

> If the tonality is well thought through and clearly presented by means of several harmonic pillars placed in wisely calculated positions, then the harmonic construction in-between can be somewhat looser.

Considering Hindemith's lack of concern with the basic phrase model, we can assume that his philosophy of harmonic phrase construction is designed to create a new type of harmonic motion –one in which the greatest amount of tension is found in the middle of a phrase, not towards the end. The contrast of consonant chords with dissonant chords provides direction and purpose within a phrase. The placement of the tritone plays an important role in creating an effective wedge (Scott 2017, 3). Hindemith stipulated that tritones should be placed at the planned climax, generally in the middle of the phrase; traditional voice-leading techniques will help the composer place these chords in the appropriate positions. A phrase with too many dissonant chords, although perhaps creating a unique sound, does not necessarily move in a forward direction and would be counter to Hindemith's theories.

Figure 6. *Image illustrates harmonic crescendo and diminuendo creating wedge effect*

Part III: Analysis of Symphony in B flat

A monumental work for winds, Paul Hindemith's Symphony in B flat has received ample analysis and commentary. The goal of this research is to use the framework established above to identify how Hindemith constructs specific phrases through using the harmonic wedge. This analysis will closely examine how tritones function within phrases and how Hindemith establishes tension and release through his harmonic language. Examples will be presented from all three movements, and the device will be applied to micro-level musical ideas, multi-measure phrases, and macro-level structural events found within each movement.[8]

Movement I: Moderately fast, with vigor: Measure 1

The first example of the harmonic wedge is found in the first beat of the opening low brass/bassoon statement. A musical moment which lasts for less than one second contains all the elements discussed above. In this example, we see a clear crescendo of harmonic activity and a dramatic diminuendo returning to the initial chord and tonality.

The phrase begins with a B-flat minor triad (a consonant, Group A chord), moves to a collection of pitches rooted on A containing B-flat, C, E, G, and F which is a dissonant Group B chord, then to a collection of dissonant pitches rooted on G-flat containing B-flat, D-flat, F, and A-flat , before the penultimate chord with a D-flat root, containing B-flat, C-flat, E-flat, G-flat, A-flat, and F. This phrase is completed by a return to the first

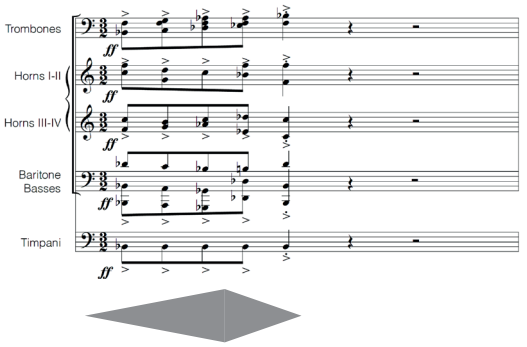

Figure 7. Hindemith, Symphony in B flat, first movement, m. 1, low brass excerpt with wedge illustration.

[8] Examples from Paul Hindemith, Symphony in B-flat for Concert Band Copyright © 1951 Schott Music GmbH & Co. KG, Mainz, Germany, Copyright © renewed, All Rights Reserved, Used by permission

chord of B-flat minor. Significantly, Hindemith maintains the interval of a perfect fifth (B-flat and F) as a pedal, or a kind of harmonic casing, in which the phrase moves. Such use of perfect fifths is also found in examples discussed below. The second and forth chords of this progression contain tritones which assist in the swift progression from a resting point towards dissonance, which then returns to a consonant resting point (Hindemith 1937, 160). This phrase, or motivic idea, is a building block for the entire symphony; returning and expanded upon in the first movement.

Movement I: Measures 1 through 11

A similar pattern to the motive analyzed above is evident in the first theme. The phrase begins in B-flat minor, shifts through a number of more complicated harmonies (discussed below), and cadences in measure 11 (analyzed as a phrase elision –the downbeat of this measure ends one phrase while also starting the next) with B-flat in full ensemble, with the exception of the first flute which plays a concert F. Closer scrutiny to the arch of the phrase reveals the complexity of the counterpoint in the upper woodwinds. This constant line of moving eighth notes, in both duple and triple subdivision, would best be described as a sound screen (a rhythmically constant and persistent background of sound) that outlines the chordal structure supporting the melody played by the cornets and trumpets. The harmonic rhythm of these eleven measures moves quickly, often changing with every half note (with a time signature of 3/2). Analysis of this phrase will include harmonies that support arrival points or sustained sounds in the melody.

The aforementioned first measure beginning with the consonant harmony of B-flat minor quickly moves to E-flat major on beat two of measure two. Applying the concept of a harmonic crescendo, the first two measures should be analyzed as at rest without crescendo since both measures contain Group A chords. A more drastic change begins in measure 3, with the introduction of a C 7, flat-5 chord, with the flat-5 sustained in the melody –a far stretch from the initial tonality of B-flat. This measure also contains the tritone B-flat to E. The crescendo continues to build further at measure 4, where a B-flat augmented chord is outlined in the upper woodwinds against a concert C in the cornets and trumpets. Although the B-flat is reminiscent of the opening tonality, the augmented fifth and a major second between the root of the chord and the melody provides a strong sense of dissonance and tension. Measure 5 provides an example of part-writing harmonic accompaniment: despite moving seamlessly from an E-flat augmented triad to an E major tonality, the melodic chromaticism ensures the effect does not sound consonant.

The most complex harmonic language so far encountered begins in the following measures, as the crescendo/wedge progresses faster. Measure 6 concludes with a B half-diminished seventh chord and we find the primary tonalities of measure 7

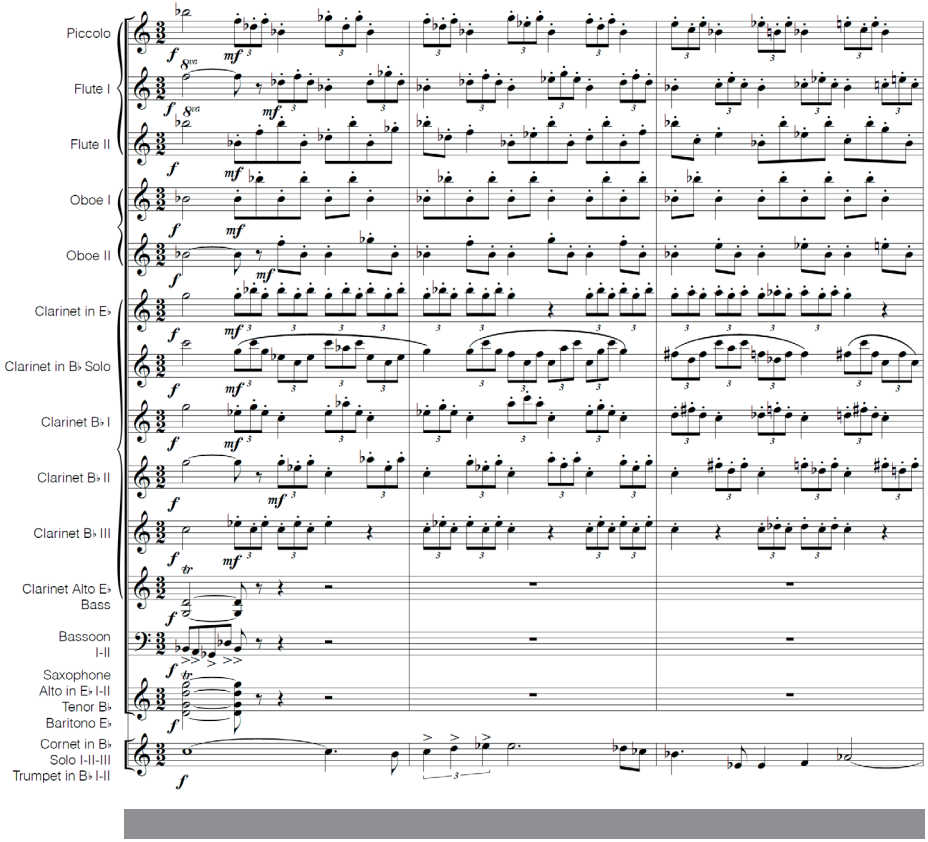

Figure 8. Hindemith, Symphony in B flat, first movement, mm. 1-3, woodwind sound screen and cornet/trumpet melody with static wedge.

moving from an A half-diminished seventh chord to a B-flat half-diminished seventh, add-9. At this moment, the melody has reached its longest sustained note, a high concert E which, accompanied by a dynamic crescendo, reaches even further to the highest point of the phrase: a concert F. The following two measures (measures 8 and 9) are supported by the complex, and extremely dissonant, A, flat-5, 7, 9 chord, which contains two tritones. That this chord is reiterated throughout these two measures makes this the climactic moment of the first theme phrase. Measure 10 maintains the harmonic tension with a chord based on F-sharp on the first half of the measure and an enharmonically spelled E-flat augmented, add-4 chord found in the second half of the

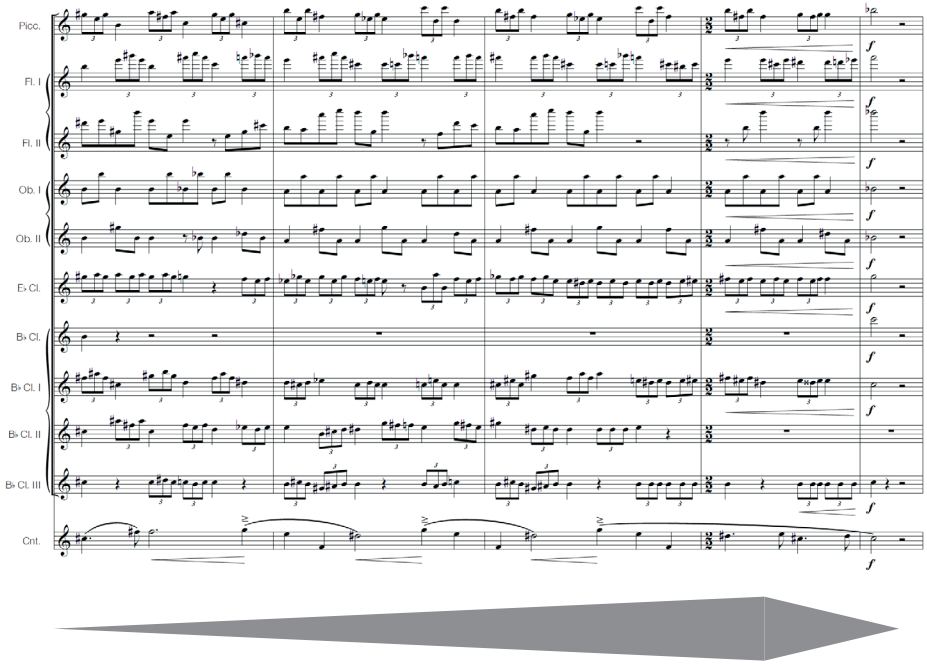

Figure 9. Hindemith, Symphony in B flat, first movement, mm. 4-11, growing harmonic crescendo with dramatic dimunuendo at end of phrase

measure. The first phrase ends with a fast harmonic diminuendo in measure 11 where the perfect consonant B-flat root is played by the majority of the ensemble, and F by the first flute –a connection to the B-flat/F fifth found in the first beat of the movement analyzed previously. The harmonic wedge begins with a rather slow incline, but with a progression which moves from a consonant beginning, increasing dissonance, and reaching a point of sustained dissonance which then quickly resolves to consonance at the cadence point (a consonance with a similar tonality to that of the opening of the phrase). The first theme clearly illustrates the harmonic wedge.

Movement I: Measures 11 through 23

With similar melodic content to the previous section, this phrase begins with a Group A interval of B-flat and F. This is telling, as the entire phrase (and the following phrase) provides direction to F at the downbeat of measure 26. Chromaticism builds rapidly in the cornet and trumpet accompaniment. As the phrase continues through

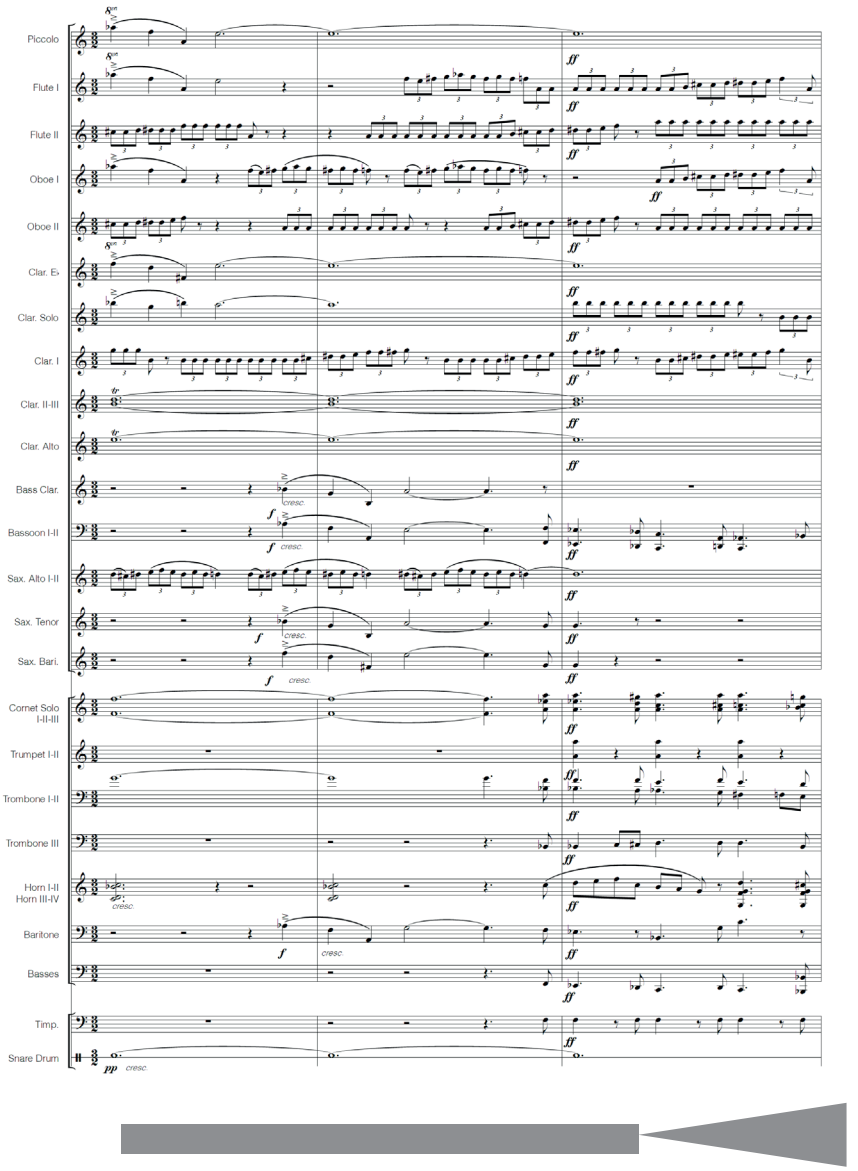

Figure 10. Hindemith, Symphony in B flat, first movement, mm. 22-24, static wedge and begining of crescendo.

measure 13, the dissonance increases drastically. Measures 13 through 17 all contain tritones. This example illustrated Hindemith's assertion that the harmonic language itself creates volume, as these measures have no dynamic markings, yet the phrase growth is conspicuous.

A sequence of brass and woodwind entrances begins at measure 18, initially against an F pedal in the horns. The most prolonged wedge climax occurs following measure 20. Here, first cornet sustains an E-flat against a trilled A in 3rd clarinet and a continued C-sharp trill in second clarinets, while other melodic instruments reiterate a four-note motive –A-flat, F, A, G. The sustained G, the last note of the motive, creates an additional tritone with the C-sharp in the clarinets. These four measures increase the harmonic tension to an extreme, continued until the downbeat of measure 24, where Hindemith immediately diminishes the tension before rebuilding it once again.

Movement I: Measures 24 and 25

Measures 24 and 25 serve primarily as transition material, moving away from the first theme and into the second theme. Nevertheless, these are two of the most powerful measures in the composition until this point. The upper woodwind continue to produce a sound screen effect, but now as repeated pitches and outlining scalic patterns instead of outlining chords (as previously). The harmonic rhythm is now outlined by forceful fanfare-like figures in brass, bassoons, and percussion.

The two-measure phrase begins with a pickup note with a root of F. The chord could best be described as a B-flat minor, add-G in second inversion. Because of its inversion and added tone, the phrase initiates a strong sense of motion. The down beat of measure 24 contains six primary pitches, best described as E-flat in the bass and B-flat minor triad with an added G and A. Beat two contains eight pitches, with C in the bass and a cluster chord containing B-flat, C-sharp, D, E, G, A-flat, and A. The diminished seventh is conspicuous, contributing significantly to the dissonance here. The final beat of this measure maintains the C in the bass and contains a total of eight pitches, as in the previous beat. Above the C bass is a D major triad with an E diminished triad, add A-flat: Hindemith maintains the strong dissonance which continues through the next measure and enhanced through triplet quarter notes alongside the beginning of a dynamic crescendo.

The longest sustained pitch of these two measures follows, beginning on beat two of measure twenty-five, an augmented C7 chord in first inversion. Although dissonant, in comparison to the prior material, a harmonic diminuendo has nevertheless begun. The final two eighth notes of this measure, which could also be interpreted as pickups into the down beat of the following measure, decrease the harmonic tension and bring the phrase back to a resting point, even though dynamically we have reached a climax. These eighths are moving in parallel fourths—E-flat and A-flat moving to D-flat and G-flat.

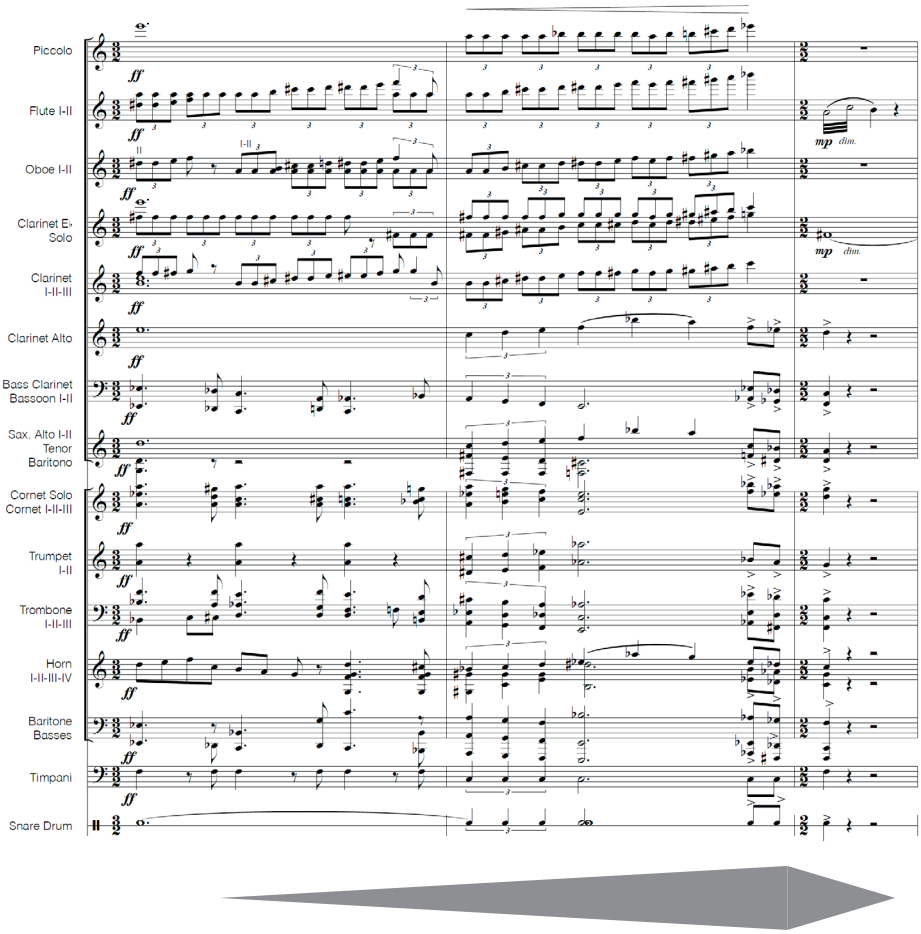

Figure 11. Hindemith, Symphony in B flat, first movement, mm. 24-26, static wedge and beginning of crescendo.

Significantly, there is a sustained B-flat pedal throughout these eighth notes, perhaps a reference to the tonality found at the beginning of the movement.

The downbeat of measure 26 finally brings a cadence, with an open fifth interval based on F in the bass. This open fifth is similar to that found at the ending of the previously discussed first phrase. Tonally, Hindemith has moved to the dominant, which will be explored in the following measures of the composition. Horns and alto saxophones add a melodic component to these two measures which contribute to the phrase's harmonic

build-up and resolution. The role of the timpani during these measures are simple, yet effective. Rhythmically, the timpani enhance the winds by outlining the primary rhythm of their part. Tonally, the drums begin on F, move to C, and return to F –a simple dominant, secondary-dominant, dominant outline– using the language associated with the wedge: consonant, dissonant, consonant. The harmonic wedge can be found at this micro-level.

Movement I: Measures 26 and 27

The effect created in measures 26 and 27, although transitional and containing only three instruments, also demonstrate the harmonic wedge. The first clarinet sustains an A, while first and second flute alternate tremolos. First flute begins with a tremolo between A and C and arrives at B on beat two. Second flute continues with an A and B tremolo, concluding on the downbeat of measure 27 on an A, where first flute, and subsequently second flute, tremolo between A and C. Applying Series I, using A as the fundamental, Hindemith moves from a consonant C (a minor third) to a less consonant B (major second) before returning. This is yet another example of the wedge at play. This back and forth continues in the flutes through measure thirty-five.

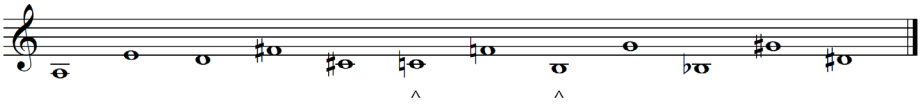

Figure 12. *Series I* with A fundamental

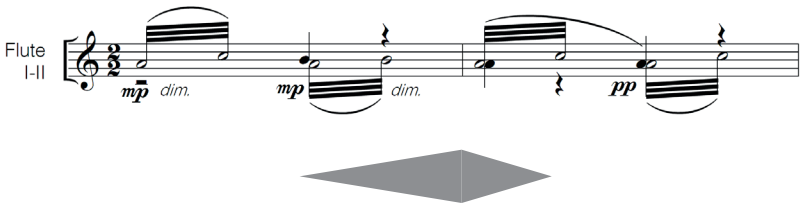

Figure 13. Hindemith, Symphony in B flat, first movement, mm. 26-27, flutes I and II creating harmonic wedge

Movement I: Measure 28, Theme B

Theme B begins in measure 28, in first oboe, where the hint of a tritone is immediately apparent between the primary pitch of this theme, F, and the second flute's B. This

appears to function as a textural element rather than a harmonic device. Nevertheless, it prepares the listener for melodic tritones: a tritone created between two pitches (often between different instruments). Here presented horizontally, melodic tritones become increasingly prominent between the bassoon's G in measure 32 and the tenor saxophone's C-sharp on the downbeat of measure thirty-three. Such tritone relations continue as instruments enter sequentially, beginning in measure thirty-six.

Movement I: Measures 41 through 50

Clarinets clearly state the B theme in the tonal center of C, while the second alto saxophone sustains a C pedal. The phrase begins with consonance, albeit with elements of bitonality in the glockenspiel. Nonetheless, as the phrase progresses, harmonies become more dissonant with tritones found in the horn accompaniment in measures 44 and 45, and then between basses/glockenspiel and horn/alto saxophone in measure forty-six. As anticipated, harmonies become more consonant, the phrase—and the formal B theme section—concludes with a Gb major triad.

Movement I: Measure 51, Theme C

The C theme, with its Brahms-like meandering melody, will be analyzed based on the pitch center of E-flat (a pitch center allows us to establish a starting note for the *Series I* progression). As all eight instrument voices are moving in unison, and no harmony is evident vertically, this phrase is analyzed in relation to the collection of pitches in *Series I* –with E-flat as the fundamental pitch. Hindemith outlines E-flat with its upper neighbor F, and quickly moves to the middle of the *Series I* collection with G-flat and C-flat quarter notes. The phrase begins with a level of tension; the unstable character immediately captures the listener's attention. The phrase continues to wander, reaching its most dissonant point, the pitch furthest to the right in the Series I collection at nearly the exact middle point of the phrase. Hindemith pivots through A at the end of the eight-quarter note of the phrase, comprised of sixteen quarter note beats. It may not be coincidental that the tritone is found at nearly the exact center of the phrase. This climax does not coincide with the phrases' dynamic climax, which occurs in the following half note.

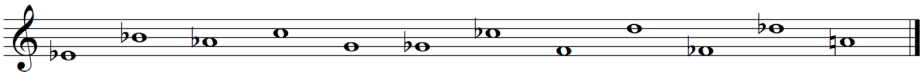

Figure 14. *Series I* with E-flat fundamental

As the eight-note phrase continues in the woodwinds, a slower moving horn theme begins in measure fifty-seven. Beginning with consonant intervals, the phrase moves to a tritone, again at the middle point of the phrase. The tritone, created between the horns and woodwinds, coincides with the horn line's highest point. As the line descends, woodwinds and horns share a brief moment of unison on the downbeat of measure 63. The phrase ends consonantly, and the E-flat unison serves as one of the movement's harmonic pillars.

High brass take over the horn melody in measure 63, while horns move to a supportive harmonic role, with the original C theme in the woodwinds. With this third statement of the theme, Hindemith drastically increased the harmonic rhythm—creating a complete harmonic wedge in measures 63 and 64, and across measures 67 and 68.

Measure 69 marks the high point of the first half of the first movement. Interestingly, Hindemith's harmonies are mainly triadic, with energy deriving rather from the sheer number of instruments and fortissimo dynamic. An immediate arrival of tritones leads into measure seventy-four, via the downbeat. This begins the wedge as Hindemith quickly builds tension which is sustained until the end of measure seventy-seven, with much of the dissonance found between timpani, basses, euphonium, horns, and trombones. In addition to the harmonic crescendo, all instruments have a dynamic crescendo. The combination of the harmonic and dynamic crescendos creates a dramatic extreme.

Movement I: Measure 78, Molto agitato

Hindemith begins this development section with a dotted-eighth/sixteenth rhythm in canonic entrances. As more instruments enter and the texture becomes thicker, the harmony becomes increasingly complex. Harmonic rhythm moves quickly throughout this section, but nearly every phrase ends or resolves to consonant, Group A, tonalities. Examples include measure 89, with a perfect 5th created between G and D, measure 92, with an E-flat minor triad, and measure 99, again ending the phrase with the pitches G and D.

Measure 99, which begins in unison, becomes increasingly dissonant as the ensemble encompasses more instruments and the dynamic increases. This dissonance subsides, and consonant intervals prevail throughout measures 110 to 113. Before a drastic change of instrumentation and dynamics, Hindemith builds harmonic tension in measure 114. Here the harmonic tension lies between the pitches B and E. As the texture changes in measure 115, Hindemith reverts to a more relaxed harmonic state, before once again building the harmonic wedge. Tension is found between the tuba and woodwinds in measure 121, before a decrescendo into measure 123.

Movement I: Measure 123

In addition to the dotted-eighth/sixteenth note rhythmic motive, saxophones have an important countermelody line, first heard in the horns two measures prior. Here, Hindemith creates dissonance on the third note of the countermelody. This dissonance repeats, again on the third note as the saxophones reiterate, but tension continues to build as nearly every note played creates a tritone with other voices. This tension resolves on the downbeat of measure 129, where a nearly-complete ensemble plays an F minor triad. The consistent wedge technique continues through measures 129 and 139.

Extreme dissonance is always prepared and followed by consonant harmony. The downbeat of measure 139 is a D minor triad. Energy builds in the following phrase, approaching the main theme statement in measure 147. As with the previous tutti statement at measure 69, at measure 147 the ensuing four bars contain mainly major and minor triads. Hindemith reaches the climax of the phrase in measure 157, with a chord that contains four tritones. Although the phrase continues to build dynamic intensity, Hindemith ends the phrase with a sustained trill in the woodwinds, while brass play a unison descending line moving to E-flat, beginning the recapitulation.

Movement I: Measure 155, Recapitulation

Reaching the recapitulation, the thematic material from the beginning of the movement returns with consonant harmonies and Group A chords. The initial tonality of E-flat is established, with an omitted third, by the clarinet sound screen in measure 161. Instead of the harmony changing every beat, as in the beginning of the movement, it now remains static in E-flat for over six measures. E-flat is also supported in the accompaniment, with the tuba outlining the same pitch. The wedge can be found here at a micro-level, as the tuba moves from E-flat to C-flat and returns to E-flat. Hindemith continues to reinforce E-flat when flutes and oboes enter in measure 157 with a sustained E-flat/B-flat perfect 5th, before moving to present the A theme. The B theme enters in measure 158 beginning on E-flat. Considering that the terms predominant, dominant, and tonic are seldom used in Hindemith's discussion of harmony, it should be noted that this strong presentation of E-flat is only two pitches removed from the fundamental B-flat in the *Series I* collection of pitches.

As the first movement comes to a close, Hindemith employs a similar approach to harmonic phrase structure as discussed in the previous sections. Before the C theme is reintroduced in measure 185, Hindemith concludes the previous phrase with two tritones sustained by solo clarinet, 2nd & 3rd clarinets, tenor saxophone, 1st horn, and basses. It is interesting to note that these sustained pitches are notated pianissimo. This is a stark contrast to the phrase before the C theme in measure 50. Hindemith resolves this quiet tension by presenting the C theme in unison.

Movement I: Measure 209

Hindemith concludes the first movement with a series of three chords, with each statement of the three chords progressing to the final B-flat major chord. Within these four separate statements, we find chords that reflect the intricacies of the framework discussed above. One might expect the ending of an opening movement of a symphonic work to outline a tonic pedal, or to find a harmonic progression that moves from dominant to tonic. Instead, we find a continuation of the harmonic wedge until the final chord of the movement. The first statement uses Group A chords, the second and third using Group A and a tritone, the final statement using one chord with tritones and the last two with Group A chords. We can see the wedge used in the second and third set of chords and across the entire phrase, beginning and ending with consonant chords and moving to dissonance within the phrase.

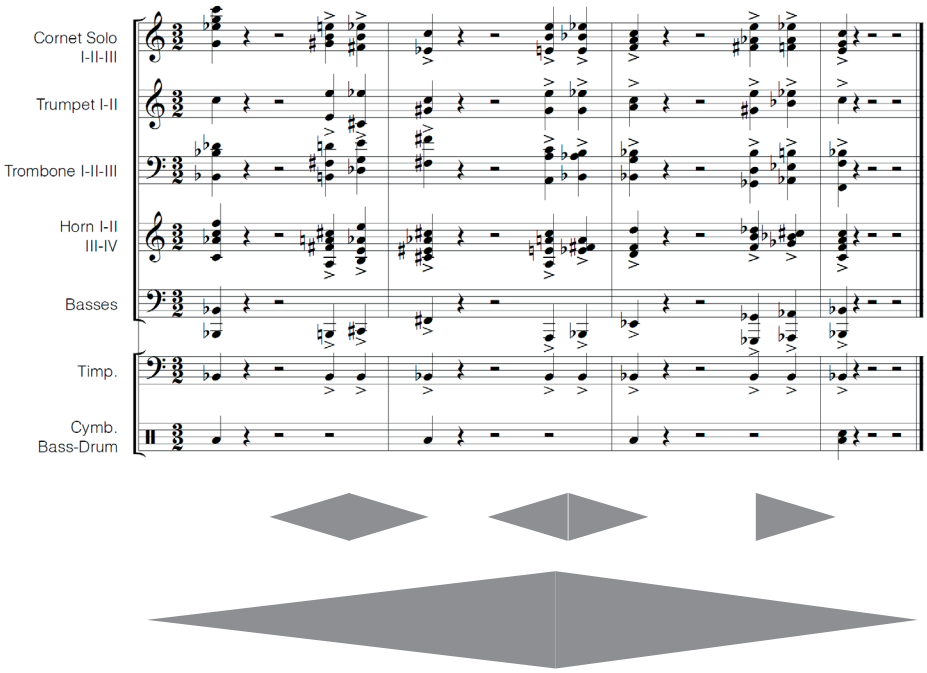

Figure 15. Hindemith, Symphony in B-flat, first movement, mm. 209-12, with micro –and macro– level wedge

Movement II: Andantino grazioso, Measure one

The first phrase of the second movement contains the harmonic wedge at both the micro- and macro-level. In the clarinet/bassoon accompaniment, Hindemith moves from a consonant B-flat major triad on beat one to an A dominant seventh chord on the second quarter beat. This second chord, with a missing 5th, contains a tritone between the C-sharp and G. Hindemith returns to B-flat major on beat four as the pattern repeats. This harmonic moment between beats one and two provides direction underneath the solo cornet line as it sustains a G before rising a 5th to D. The solo cornet line is answered by the alto saxophone which begins on the same pitch of G, but instead of ascending a fifth, it moves to C-sharp –a tritone from G. In measure three, the solo cornet repeats its initial statement of G to D. Hindemith's wedge functions melodically in these three measures –the melodic interval of a perfect 5th moving to an augmented 4th and back to a perfect 5th.

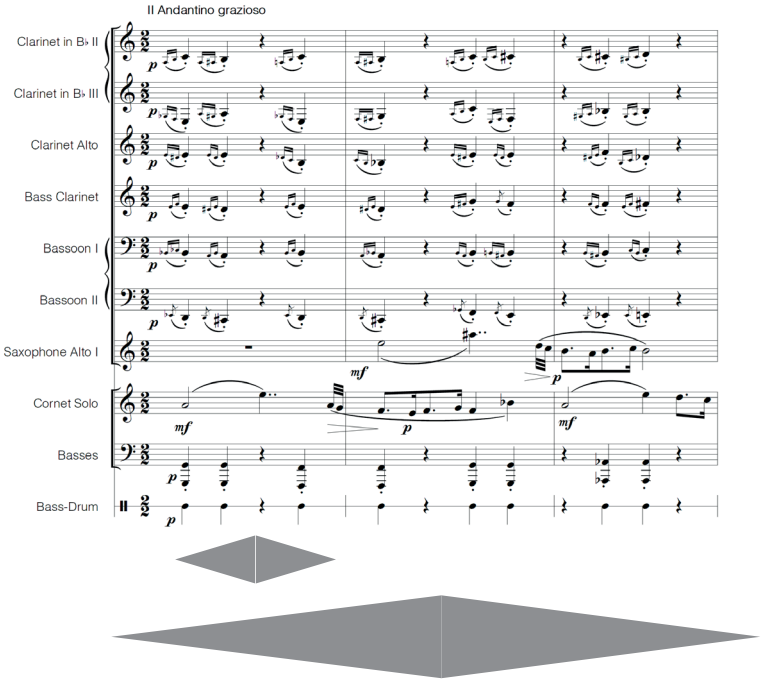

Figure 16. Hindemith, Symphony in B-flat, second movement, mm. 1-3, showing melodic wedge found both in measure one and between the solo cornet and alto saxophone parts

Movement II: Measure 21

Cornets and trumpets demonstrate the harmonic wedge in measures 21 through 23. Beginning with a unison G, additional trumpets and cornets build chords with increased complexity until reaching the phrase's climax on beat three of measure 22. This sustained half-note contains a tritone between the lowest trumpet note, E-flat, and the highest solo cornet note, A. The arc of the phrase concludes with descending pitches which, although containing elements of bitonality, move away from tritones.

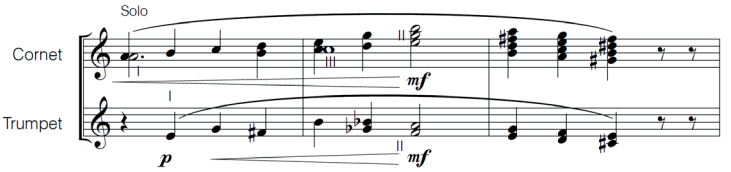

Figure 17. Hindemith, Symphony in B-flat, second movement, mm. 21-23

Movement II: Measure 49, Fast and gay

In the second formal section of this movement, in addition to a shift in rhythmic subdivision of the beat, Hindemith moves to the tonal center of F minor. As anticipated, Hindemith begins this section with a harmonic wedge that starts in F minor and moves a tritone to B minor in measure 53.

Hindemith establishes pillars of tonality throughout the remainder of the movement. These pillars provide a harmonic framework for thematic material and are structured to build tension. Figure 18 (below) illustrates where these harmonic pillars are located and the tonal centers that they represent.

Measure	49	53	59	62	65	71	76	77	80	84	87	91
Tonal Center	F	B	B♭	F	C	F	E♭-B♭	F	D♭	A♭	G	G

Figure 18. Tonal Pillars of movement II

An additional tritone relationship is found between the tonality in measure 80 and 87. In measure 80, Hindemith adds a layer of brass fanfare which helps build energy to the tutti section at measure 84. From here, Hindemith resolves tension by arriving at measure 87 with a consonant interval of G and D in the brass with low woodwinds sustaining G while upper woodwinds navigate to G.

As the movement progresses, in addition to unfolding thematic ideas, the harmonic wedge continues to create tension and release within phrases. Tonal pillars also continue, but from measure 91 onwards G minor predominates: the tonal center in which the movement began. The arrival at measure 121 represents a harmonic shift away from G to its tritone, C-sharp. This coda section eventually brings a harmonic release, arriving in the second to last measure at G major.

Movement III: Fugue, Rather broad

Hindemith's third movement continues to outline the compositional elements found throughout the previous two movements. There are prominent examples of the harmonic wedge in the nine-measure introduction, as well as strategically placed consonant perfect fourth intervals. The first measure, much like the initial measure of the first movement, contains elements that serve as building blocks for the rest of the movement. The melody line with F moving to B-flat between the downbeat of the measure and the last eighth note of beat one comprise the perfect fourth. This interval is found harmonically throughout the entire measure in the 3rd and 4th horn part, bassoons, 2nd and 3rd clarinets, 1st and solo clarinet, and 1st and 2nd flutes. Finally, the baritone saxophone and timpani parts outline a perfect fourth as they move from F to B-flat, and B-flat to E-flat respectively.

The phrase continues, and Hindemith repeats a three-note rhythmic motive—eighth, eighth, quarter –a total of three times. The wedge is evident here, as the phrase moves from consonance to dissonance, and back to consonance. Measure two begins with a fifth, G and D. The dissonance, on the 'and' of beat two of measure two, is found between the melody line and the slurred accompanying line played by cornets, trombone, and horns, as well as with the trilled clarinet and bassoon parts. This dissonance resolves to a perfect forth, A and D on beat two of measure three. Hindemith repeats the harmonic tension and release in measure four, again moving from a major third to a tritone, returning to A in unison on the downbeat of measure five.

Measure nine is an example of pitches moving back to the tonal center of B-flat. These pitches move in a way that brings B-flat back into focus, as the tonal center of this movement—and the entire symphony. The fermata in measure eight, comprised of the pitches A, F, D-flat, E, and A-flat, prepares the listener for the return of B-flat. Hindemith prolongs the resolution by scoring wandering descending quarter notes for nearly the entire ensemble in unison, in measure nine. We eventually reach B-flat by the downbeat of measure 10, at which point trumpets and cornets begin the fugue's subject on B-flat.

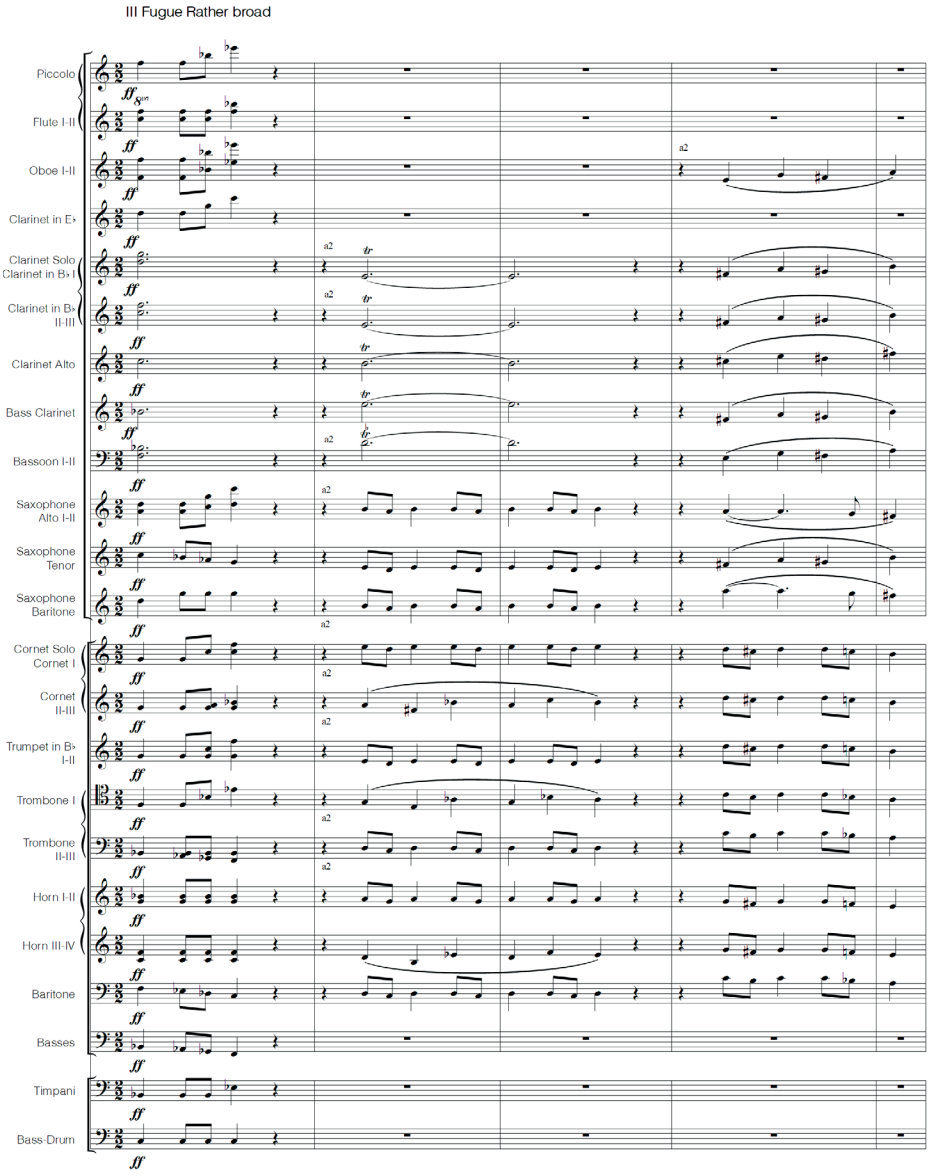

Figure 19. Hindemith, *Symphony in B-flat*, third movement, mm. 1-5

Movement III: Tonal Pillars

As in the previous movements, tonal pillars show the harmonic movement from B-flat to distant tonal centers which then return to B-flat (outlined in Figure 20; the illustration shows the use of the macro-level harmonic wedge). These tonal centers do not necessarily reflect the tonal center for the duration of a particular phrase, but rather tonal landmarks that guide the listener from areas of stable harmonies, to more ambiguous sections.

Measure	10	26	41	45	54	66	77	11	12	13	14	16	17	20
Tonal Center	B♭	A	F	A♭	C	C♯	D♭	E	E	B	B	E♭	B♭	B♭

Figure 20. Movement III tonal center and wedge

Part IV: Conclusion

There is no doubt that the harmonic wedge plays an integral role in the phrase construction of Paul Hindemith's Symphony in B-flat. From micro-level harmonic movement to macro-level, large-scale formal structures, the wedge is a prominent component of Hindemith's harmonic language within this symphony. A casual observer of the score may wonder how, and why, so many accidentals can be included in a composition that bears a key signature in its title. Without further study, a conductor or performer may assume that phrases lack a concrete pattern or that the harmonies are based wholly on chromaticism. In actuality, the entire symphony is firmly based in B flat, and the harmonic shifts away from B flat are calculated and navigated in a methodical and systematic manner. Further study is needed to determine if the harmonic wedge can be found across Hindemith's compositions, and whether the year 1937, the year in which *Craft I* was written, serves as a delineating moment in Hindemith's compositional approach. Wind conductors may be especially interested in applying this analytical technique to Hindemith's Septet written in 1948. Additionally, further research is needed to understand what effect Hindemith's compositional techniques would have on future composers, in particular Hindemith's former students Samuel Adler, Norman Dello Joio and Lukas Foss.

Understanding Hindemith's wedge is beneficial to conductors, performers, listeners, as well as composers. Considering Hindemith's belief that composers should no longer be bound by a key signature, his writings and compositions demonstrate the tonal destinations he explores. This study has demonstrated how modulations which may otherwise be classified as distant in a traditional theoretical framework are related in

the contexts discussed. The tritone functions in a deliberate and purposeful manner, creating the most dissonance and placed firmly in the center of a phrase. This is followed by a return to consonance in which phrases generally end with the harmony with which they began. By analyzing the symphony through the lens of pitch relations found in *Series I* and *Series II*, we have greater insight into Hindemith's methodology of harmonic and melodic construction.

Hindemith's approach to composition is strongly rooted in the physics of sound and the progression of pitches outlined in the overtone series. By establishing *Series I* and *Series II*, the compositional approach found in Symphony in B flat focuses on creating natural tension and release by starting with consonance, moving to dissonance, and returning to consonance.

The research in this paper can be applied in a number of practical ways. Dynamics are used throughout the symphony, but conductors can use this research to inform how musical phrasing should be implemented. For example, the opening low brass and low woodwind gesture found in measure 1 (see Figure 7) is marked fortissimo. A conductor may be tempted to request their ensemble to crescendo through this line to the quarter note. This would add direction but would negate the harmonic intention of the line in which the wedge can clearly be heard. Consonant chords act as bookends to the dissonance found within the five-note motif. By recognizing this wedge, the ensemble should simply let the harmony progress—there is no need to add extra emphasis through dynamics.

This research can also be used to better inform balancing instruments—especially in large ensemble sections in which the printed dynamic may be too strong for the given instrumentation or tessitura. Figure 9 illustrates a section where all woodwind parts are marked crescendo, leading into rehearsal letter A. The harmonic wedge decreases in intensity one measure prior, and rehearsal A is an arrival on a unison B-flat (with the exception of 1st flute). This will be overblown if the dynamics are played literally. By understanding the decreasing wedge at this moment, a conductor could guide their ensemble to modify the dynamics appropriately to create the desired balance. These are just a few sections in which understanding the function of the harmonic wedge can lead to a more informed interpretation of the piece.

As mentioned in the introduction, David Whitwell attributes the symphony's early struggles in gaining popularity to a combination of two major factors: the initial hesitation on behalf of university band leaders to program a piece whose score appeared more complex than what these directors were familiar with, and the misinterpretation of accents that inadvertently made the music sound heavy. This latter issue can be of particular concern given the density of many of the tutti passages found within the symphony. Viewing this composition through the theoretical framework established in this paper is particularly beneficial when applied to these densest of sections. Instead of letting these sections (many of which were given as examples above) be over played—both in terms of dynamics and in a style that is too heavy—attention should instead be focused

on allowing the harmony to speak for itself. By understanding the use of Hindemith's harmonic language, a conductor can inform their ensemble to trust their ears and to let the harmony do the heavy lifting.

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