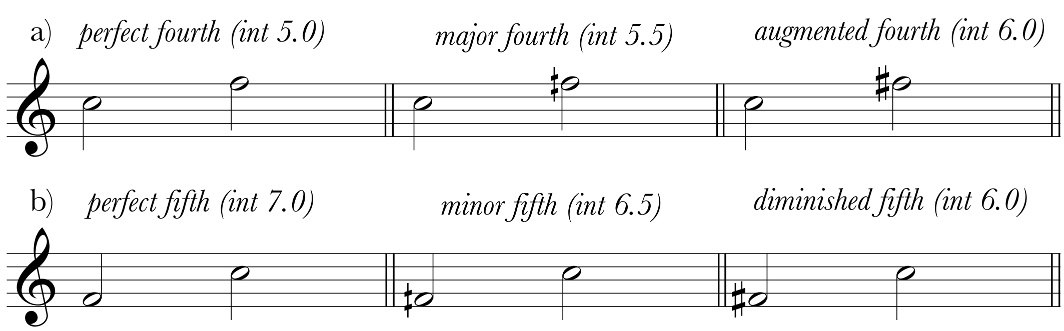
Chapter Five

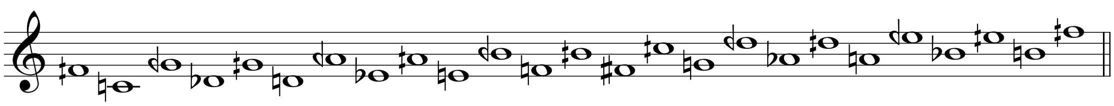
Ivan Wyschnegradsky's *24 Preludes*

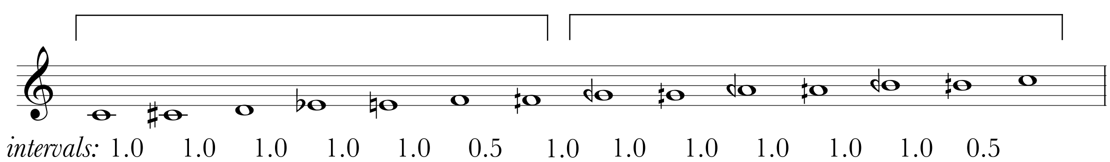
Ivan Wyschnegradsky (1893-1979) was a microtonal composer known primarily for his quarter-tone compositions, although he wrote a dozen works for conventional tuning, and several works for third-, sixth-, eighth-, and twelfth-tone, as well as one work using Fokker's thirty-one equal divisions of the octave. Over the course of his career, Wyschnegradsky invented many systems to organize pitch in his compositions, and he eventually settled upon a system that he called "ultrachromatic" in which microtonal interval cycles generate sets that do not repeat their pitch content at octave transpositions.[1]

Wyschnegradsky's *24 Préludes dans l'échelle chromatique diatonisée à 13 sons, Op. 22* (1934, rev. 1960 and 1970) does not use the ultrachromatic system, but is based on a quarter-tone scale generated by a cycle of ic 5.5. There are 24 unique transpositions of Wyschnegradsky's scale, and the set of *24 Preludes* is a cycle in which each of the 24 transpositions forms the basis of the pitch material for a single prelude, recalling such earlier works as Chopin's *Preludes*

[1] Ivan Wyschnegradsky, "Ultrachromatisme et éspaces non-octaviants," *Revue Musicale* vol. 290-291 (1972), 73-141.

or Bach's *Well-Tempered Clavier* that cycle through all available keys. In this chapter, I first demonstrate that Wyschnegradsky's scale shares several properties with the conventional major scale. Next, I offer evidence that argues for a structurally significant chord composed of the interval of three scale-steps. I then offer numerous examples that demonstrate surface prolongations of this chord, such as passing tones, neighbour notes, and voice-exchanges. I then demonstrate a chord progression based on a root succession of ic 5.5 that resembles the tonal diatonic "circle of fifths." Finally, I demonstrate how multiple arpeggiations of a single tonic chord govern the pitch material for Prelude No. 1.

Example 5.1: Wyschnegradsky's major fourth and minor fifth

As described in Chapter 1, Wyschnegradsky calls the interval a "major fourth" that lies halfway between the perfect fourth and the augmented fourth (Example 5.1a); he calls the interval between the perfect fifth and diminished fifth a "minor fifth" (Example 5.1b). As Example 5.1 shows, inverting the major fourth C♮–F𝄲 produces the minor fifth F𝄲–C♮. Wyschnegradsky considers the major fourth (int 5.5) to be an important harmonic interval, because the equal-tempered int 5.5 (550 cents) approximates the ratio of 11:8 (551.28 cents) found in the harmonic series.

Example 5.2a: Cycle of ic 5.5; "circle of fourths"



Example 5.2b: Wyschnegradsky's diatonicized chromatic scale (DC-scale) starting on pitch C

The cycle of ic 5.5 (Example 5.2a) exhausts all 24 quarter-tone pitch classes before returning to its starting point. Throughout this chapter, I refer to the ic 5.5 cycle as the "circle of fourths" even though in any given instance of the cycle, some ic 5.5s are spelled as major fourths, and others are spelled as minor fifths.[2] From this circle of fourths, Wyschnegradsky takes the first thirteen pitches and arranges them as a scale. (The first thirteen pitches of Example 5.2a make up the scale in Example 5.2b.) Wyschnegradsky decribes the scale in Example 5.2b as "*chromatique diatonisée*" (diatonicized chromaticism) because the abundance of semitonal scale-steps reminds one of the conventional chromatic scale, but the scale itself shares additional properties with the diatonic major scale. Although there are many similarities between the diatonicized chromatic scale (hereafter the "DC-scale") and the major scale, he observes only two: (1) the DC-scale can be generated by the cycle of ic 5.5, similar to the way the major scale can be generated by the cycle of ic 5; and (2) the DC-scale can be partitioned into two transpositionally equivalent heptachords (bracketed in Example 5.2) in much the same way that the major scale can be partitioned into two transpositionally equivalent tetrachords.

The ordering of the Preludes is based on the circle of fourths. For example, Prelude No. 1 uses the DC-scale starting on C♮ (the first pitch of the cycle

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[2] I use the label "circle of fourths" since Wyschnegradsky referred to ic 5.5 as a major fourth. Unlike the conventional ic 5 cycle, which can be written out as a complete circle of perfect fourths, it is impossible to write out an ic 5.5 cycle as a complete circle of major fourths. For example, if we start with the pitch B𝄫 and try to write a series of major fourths, the result is: B𝄫, E𝄳♭, A♭, D𝄳, G♮, C𝄲, F♯, B𝄲, E♯, A𝄰, D𝄪 and the next pitch in the series would be G five-quarters sharp, a pitch name not supported by my notation. As far as I know, no composer has ever invented an accidental sign to represent a note five-quarters sharp.

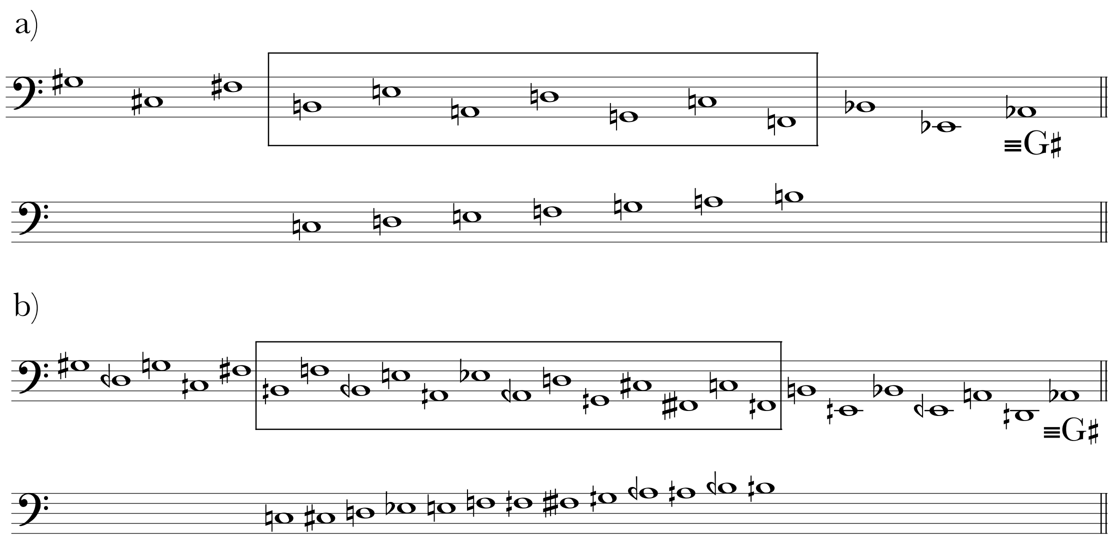
shown in Example 5.2a), Prelude No. 2 uses the DC-scale starting on F𝄲 (the second pitch in Example 5.2a), and so on. Wyschnegradsky uses the French pitch names to identify the transpositions of his modes. For example, he uses the label “position Re𝄳” to identify the transposition of the mode starting on the pitch D𝄳. In this chapter, I use standard pitch names to identify the transpositions of the modes, so that I refer to “position Re𝄳” as the “DC–scale on D𝄳” or as “the D𝄳 mode.”

Properties of Wyschnegradsky’s Diatonicized Chromatic Scale

In “Scales, Sets, and Interval Cycles: A Taxonomy,” John Clough, Nora Engebretsen, and Jonathan Kochavi propose a taxonomy of eight properties for classifying scales.[3] Scales may be generated, well-formed, distributionally even, maximally even, deep, diatonic, and they may possess the Myhill property or the Balzano property. The authors demonstrate that the major scale is unique because it is the only scale that possesses all eight of these properties. In this section, I show how each property is exhibited by the major scale and then show how the same property is exhibited by the DC-

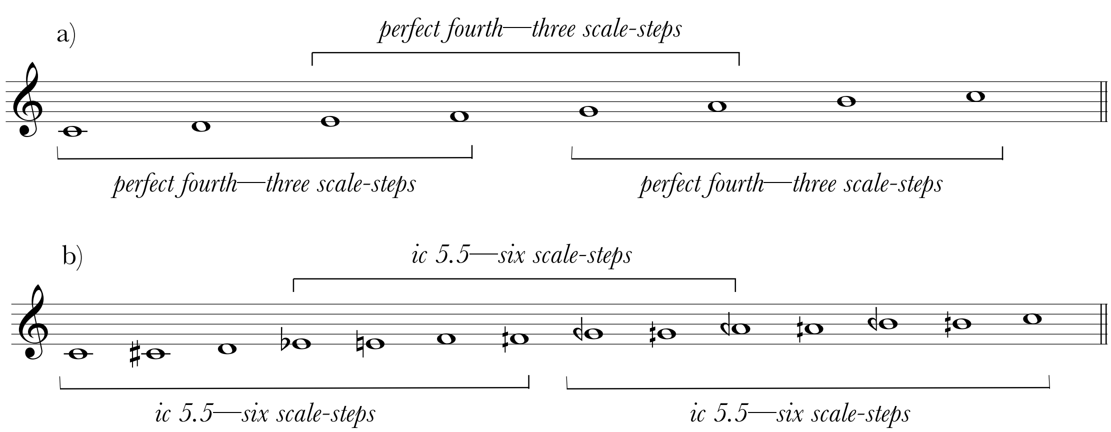
[3] John Clough, Nora Engebretsen, and Jonathan Kochavi, “Scales, Sets, and Interval Cycles: A Taxonomy,” *Music Theory Spectrum* 21/1 (1999), 74-104.

scale. The DC-scale possesses seven of the eight properties identified by Clough, Engebretsen, and Kochavi—the only property excluded is the Balzano property, which is undefined for twenty-four divisions of the octave.



Example 5.3: a) cycle of ic 5 generating major scale; b) cycle of ic 5.5 generating Wychnegradsky's DC-scale

The major scale has the "generated" property because it can be generated by a cycle of ic 5. This cycle (commonly known as the "circle of fifths") exhausts all twelve pitches before returning to its starting point. If we take any seven-note segment of consecutive pitches from this cycle and arrange the notes in scalar order, the result is the familiar major scale. In Example 5.3a, I show a seven-note segment (surrounded by a box) on the upper staff that can be rearranged to form the C–major scale on the staff beneath it. In Example 5.3b, I show the cycle of ic 5.5, which exhausts all 24 available pitch classes before returning to its starting point. Just as the major scale can be regarded as a seven-note slice of the circle of fifths, the DC-scale can be thought of as a thirteen-note slice of the ic 5.5 cycle. If I take the boxed set of thirteen pitches from the cycle on the upper staff of Example 5.3b and arrange them in ascending order, I obtain the scale on the lower staff. The scale on the lower staff of Example 5.3b is the same transposition—starting on C—as the scale in Example 5.2 above.



**Example 5.4: a) each perfect fourth spans 3 scale steps;
b) each ic 5.5 spans 6 scale-steps**

Well-formed scales are scales in which each generating interval spans a constant number of scale-steps. The major scale is well-formed because int 5 (the generating interval) always spans three scale steps. In the major scale, each instance of int 5 will be spelled as a conventional perfect fourth. Example 5.4a demonstrates that the perfect fourths C–F, E–A, and G–C all span three scale-steps; this property holds true for the remaining perfect fourths not labelled on the example. In the DC-scale, the generating interval, ic 5.5, will always span six scale-steps. Example 5.4b demonstrates that the major fourths C–F𝄲, E♭–A𝄳, and G𝄳–C all span six scale-steps; this property holds for all the remaining ic 5.5s present in the scale, although some ic 5.5s, such as C♯–G𝄳 and A𝄲–E♭, are spelled not as major fourths, but as enharmonically equivalent minor fifths.

Scale-Steps	Intervals	Common Names
1 step	int 1, int 2	minor second, major second
2 steps	int 3, int 4	minor third, major third
3 steps	int 5, int 6	perfect fourth, augmented fourth

Table 5.1: Step-interval sizes in the major scale

Scale-Steps	Intervals	Intervals mod 24
1 step	int 0.5, int 1.0	int_{24} 1, int_{24} 2
2 steps	int 1.5, int 2.0	int_{24} 3, int_{24} 4
3 steps	int 2.5, int 3.0	int_{24} 5, int_{24} 6
4 steps	int 3.5, int 4.0	int_{24} 7, int_{24} 8
5 steps	int 4.5, int 5.0	int_{24} 9, int_{24} 10
6 steps	int 5.5, int 6.0	int_{24} 11, int_{24} 12

Table 5.2: Step-interval sizes in DC-scale

In scales that possess the Myhill property, each generic interval occurs in exactly two specific sizes. In the major scale, each second is either minor or major, each third is either minor or major, and each fourth is either perfect or augmented. The inversions of these intervals (fifths, sixths, and sevenths) also occur in exactly two specific sizes. A more general definition of the Myhill property states that each interval that spans a given number of scale-steps (that I refer to as a "step-interval") will occur in exactly two sizes. As shown in Table 5.1, each single scale-step in the major scale will be an instance of either int 1 or int 2, each interval spanning two scale-steps will be either int 3 or int 4, and each interval spanning three scale-steps will be an instance of either int 5 or int 6. The DC-scale possesses the Myhill property because each step-interval occurs in one of two specific interval sizes (Table 5.2).

A scale is distributionally even if each step-interval occurs in either one specific size or two specific sizes. If these two specific sizes are consecutive integers within the modular space the scale belongs to, then the scale is maximally even. Maximal evenness is a specific type of distributional evenness; the logical consequence is that scales that are maximally even are automatically distributionally even. Because both the major scale and the DC-scale are maximally even, these two scales are also distributionally even. As shown by Table 5.1, the major scale is maximally even because each step-interval occurs in two specific, consecutive integer sizes. For example, in the major scale, the interval spanning two scale-steps occurs in sizes of 3 semitones and 4 semitones, and 3 and 4 are consecutive integers. There are no step-intervals in the major scale that occur in only one specific size. The DC-scale is also maximally even, although my decimal notation for integers makes it difficult to see this property. If I convert the interval sizes to integers mod 24 as in Table 5.2, it is easier to see that each step-interval occurs in two specific sizes represented by consecutive integers. As with the major scale, there are no step-intervals in the DC-scale that occur in only one specific size.

Interval	Occurrences	Scale steps
ic 1	2	1 step
ic 2	5	1 step
ic 3	4	2 steps
ic 4	3	2 steps
ic 5	6	3 steps
ic 6	1	3 steps

Table 5.3: Interval content of the diatonic major scale

Interval	Occurrences	Scale steps
ic 0.5	2	1 step
ic 1.0	11	1 step
ic 1.5	4	2 steps
ic 2.0	9	2 steps
ic 2.5	6	3 steps
ic 3.0	7	3 steps
ic 3.5	8	4 steps
ic 4.0	5	4 steps
ic 4.5	10	5 steps
ic 5.0	3	5 steps
ic 5.5	12	6 steps
ic 6.0	1	6 steps

Table 5.4: Interval content of the DC-scale

A scale is deep if every interval class found within the scale occurs a unique number of times. The major scale is deep because the scale contains two ic 1s, five ic 2s, four ic 3s, three ic 4s, six ic 5s, and 1 ic 6 (Table 5.3). Likewise, the DC-scale is deep because each interval class occurs a unique number of times, ranging from a single instance of ic 6.0 to twelve ic 5.5s. The deep property is easily inferred from a set's interval vector. The interval vector for

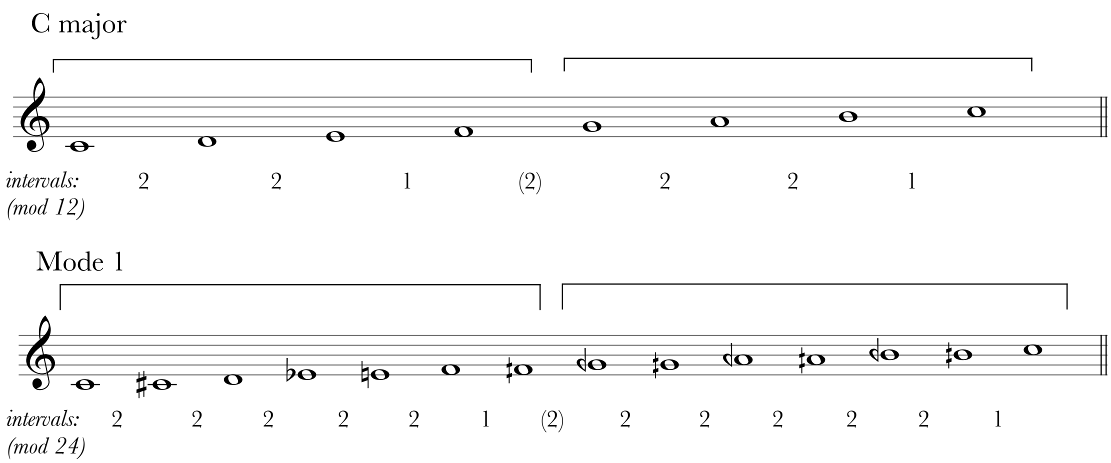
7-35, the pitch-class set corresponding to the major scale, is [254361], and each entry in the interval vector is a unique integer. The quarter-tone interval vector for the DC-scale is [2,11,4,9,6,7,8,5,10,3,12,1] and each entry is a unique integer.

A diatonic scale is defined in terms of the size of the chromatic universe, represented by *c,* and the number of scale steps, represented by *d.* A scale is diatonic if it is a maximally even set where $c=2(d-1)$ and $c \equiv 0$, mod 4.[4] The major scale has seven steps, so if $d=7$ then $c=2(7-1)=12$, the size of the chromatic universe in which the conventional major scale resides. Since 12 is evenly divisible by 4, and the major scale is maximally even, therefore the major scale is diatonic under this definition. The DC-scale has thirteen steps. If $d=13$, then $c=2(13-1)=24$. Since 24 is evenly divisible by 4, and the DC-scale is maximally even, therefore the DC-scale is diatonic.

The major scale possesses one further property, the Balzano property, that is not possessed by the DC-scale. The Balzano property is defined for chromatic universes in which $\{c=n(n+1) \mid n \geq 3, n \in I\}$. The major scale is a candidate for the Balzano property because when $n=3$, $c=3(3+1)=12$, but

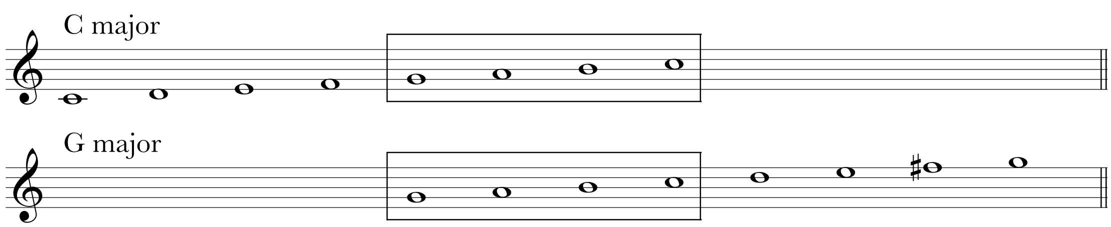
[4] "$c \equiv 0$, mod 4" is read "c is congruent to 0, modulo 4" and means that c is evenly divisible by 4 with no remainder.

there are no integer solutions for n in which c=24, and so it is impossible for any quarter-tone scale to possess the Balzano property.

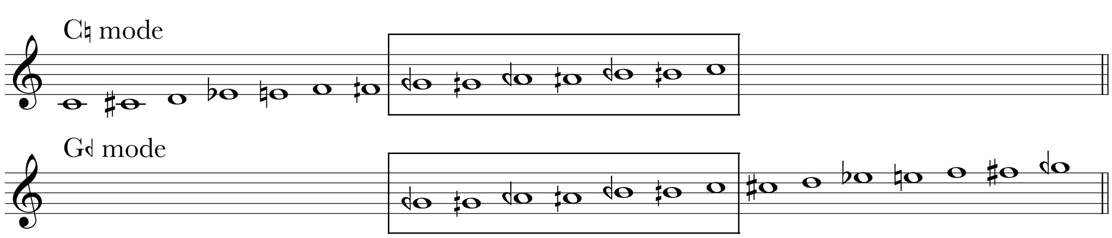


Example 5.5: Interval structure of major scale and DC-scale

Wyschnegradsky observes that the major scale can be partitioned into two transpositionally equivalent tetrachords. The structure of the major tetrachord is a succession of two whole tones (int 2), followed by one semitone (int 1). The two tetrachords, as they are located in the scale, are separated by one whole tone (int 2). The DC-scale can be partitioned into two transpositionally equivalent heptachords, each composed of a succession of five int_{24} 2s, followed by one int_{24} 1. The two heptachords are separated by int_{24} 2. Wyschnegradsky calls his scale "diatonicized chromaticism" because the scale recalls both the diatonic major scale and the conventional chromatic scale: the similarities in the interval structures between the two scales suggests a diatonic structure, and the 11 semitonal steps mimic the conventional chromatic scale. A consequence of this parallel structure is that each transposition of the major tetrachord belongs to two distinct major scales and each transposition of Wyschnegradsky's heptachord belongs to two distinct transpositions of the DC-scale. For example, the tetrachord {G, A, B, C} is both the upper tetrachord of C major and the lower tetrachord of G major (Example 5.6), and the heptachord {G𝄳, G𝄲, A𝄳, A𝄲, B𝄳, B𝄲, C} is both the upper heptachord of the DC-scale on C♮ and the lower heptachord of the DC-scale on G𝄳 (Example 5.7).



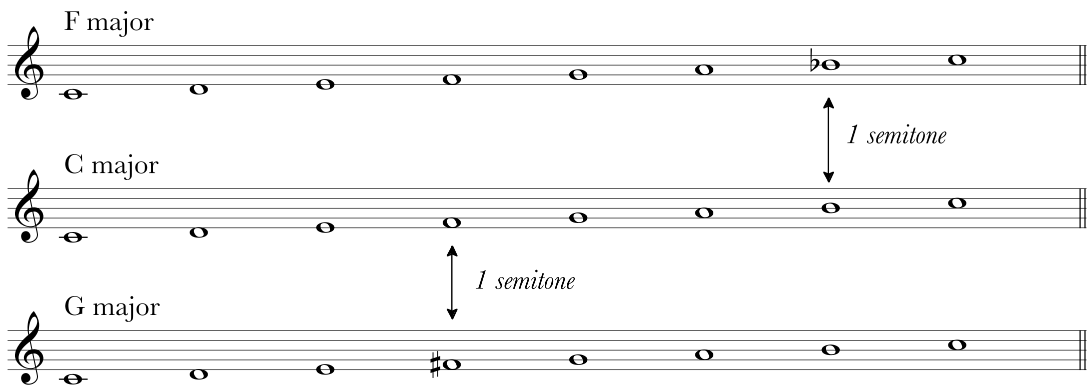
Example 5.6: Common tetrachord between C major and G major



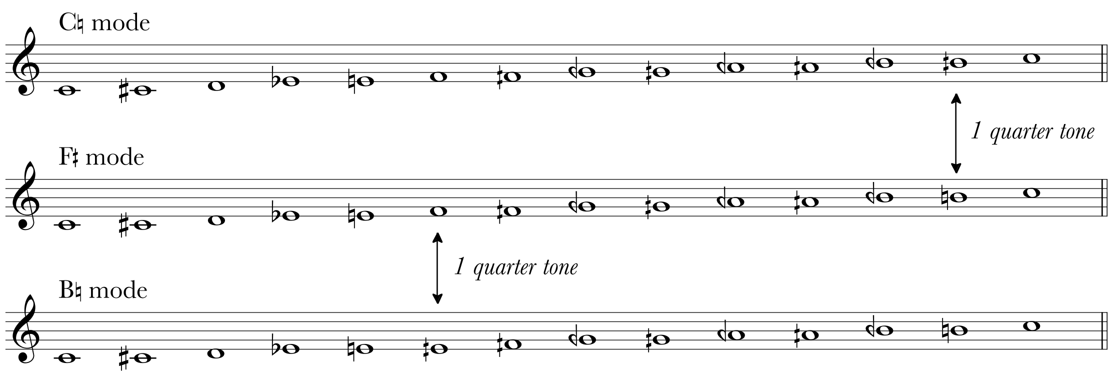
Example 5.7: Common heptachord between DC-scales on C♮ and G𝄳

The DC-scale, like the major scale, is capable of participating in what Richard Cohn describes as a “maximally smooth cycle.”[5] In such a cycle, a single set-class is subjected to a transformation in which a single pitch-class is changed by the smallest interval possible, and all other members of the set-class are retained as common tones. The well-known “circle of fifths” arrangement of the twelve transpositions of the major scale forms a maximally smooth cycle because adjacent scales in the cycle differ by only one semitone, the smallest interval in c=12. For example, to transform F major into C major (the next scale in the cycle) requires changing a single pitch by one semitone, from B♭ to B♮ (Example 5.8). The “circle of fourths” ordering of the 24 transpositions of the DC-scale forms a maximally smooth cycle. To transform the C♮ mode into the F𝄲 mode requires changing one note by a single quarter-tone, from B𝄲 to B♮; to transform the F𝄲 mode into the B♮ mode requires changing F♮ into E𝄲, and so on (Example 5.9).

[5] Richard Cohn, “Maximally Smooth Cycles, Hexatonic Systems, and the Analysis of Late-Romantic Triadic Progressions,” *Music Analysis* 15/1 (March, 1996), 9-40.



Example 5.8: Maximally smooth cycle of major scales (circle of fifths)



Example 5.9: Maximally smooth cycle of DC-scales (circle of fourths)

Wyschnegradsky's first version of the *24 Preludes* uses scale-tones exclusively, but in later revisions, he adds non-scale-tones to each prelude.[6] In order to determine whether non-scale-tones might act as auxiliary notes to scale tones, I began my analyses of these Preludes by first considering the disposition of the scale-tones. However, after sketching several of the

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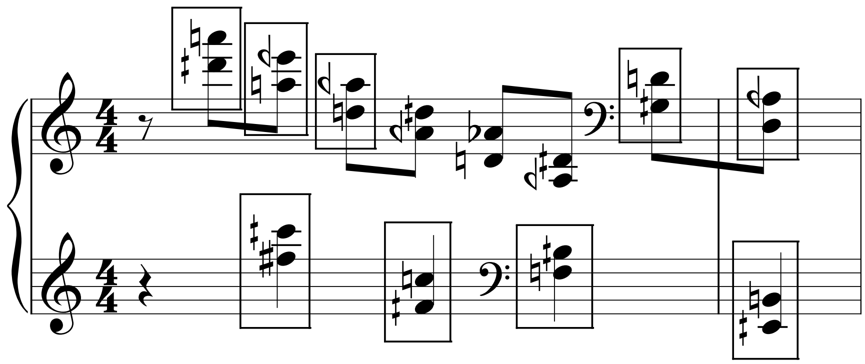
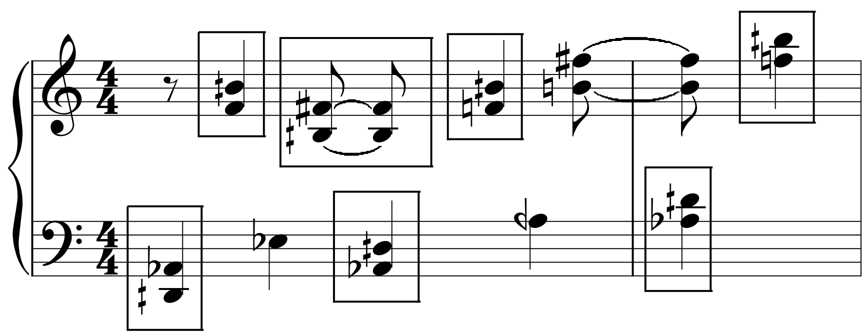
[6] Ivan Wyschnegradsky, preface to *24 Préludes en quarts de ton dans l'échelle chromatique diatonisée à 13 sons, Op. 22* (Frankfurt: M. P. Belaieff, 1979).

Preludes, and separating chord-tones from non-chord-tones, I discovered recurring intervals among the scale-tones that suggest that some of the Preludes use chords made up of scale-tones as structural harmonies. In these cases, not only can we differentiate between scale-tones and non-scale-tones, but we can also differentiate between chord-tones and non-chord-tones. Moreover, once we establish criteria for recognizing chord tones as members of a structurally significant harmonic entity, we can begin to look at the way non-chord-tones prolong chord-tones on both foreground and middleground levels. There are two important intervals that work together to create harmony: (1) ic 5.5, realized as a major fourth, or more often as its inversion, a minor fifth; and (2) a step-interval derived from interval cycles of three scale-steps. In the examples that follow, I first show ic 5.5s featured as a prominent motive, and large chords built up from cycles of three scale-steps. I next show how these two intervals work together in the formation of a tonic chord. I then demonstrate how this tonic chord is prolonged using a variety of techniques familiar from tonal harmony, including passing-tones, neighbour notes, arpeggiations, voice-exchanges, and unfoldings. My final examples show how strings of chords form chord progressions based on the circle of fourths, and how an entire prelude exhibits a large-scale expression of its tonic chord.

Derivation of a Tonic Tetrachord in *24 Preludes*



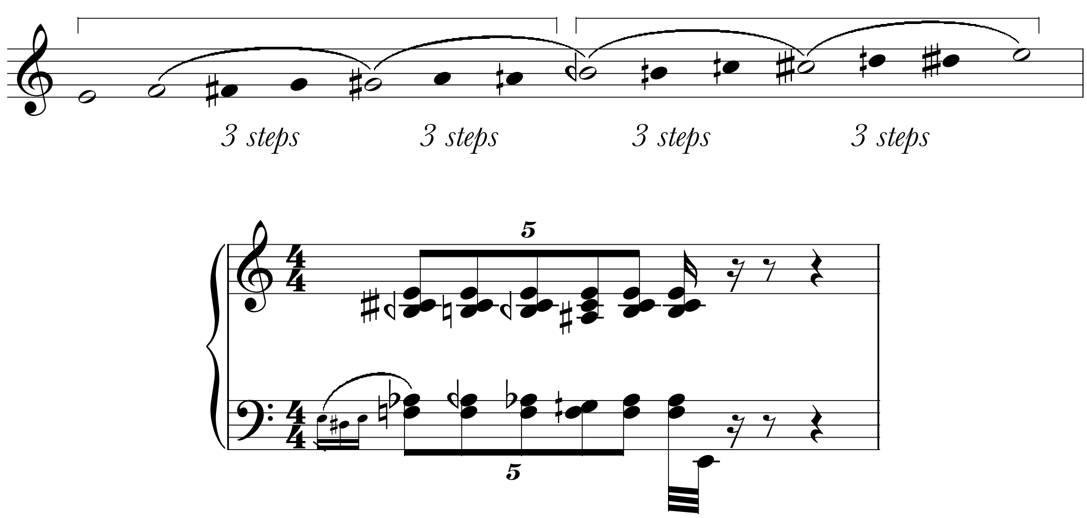
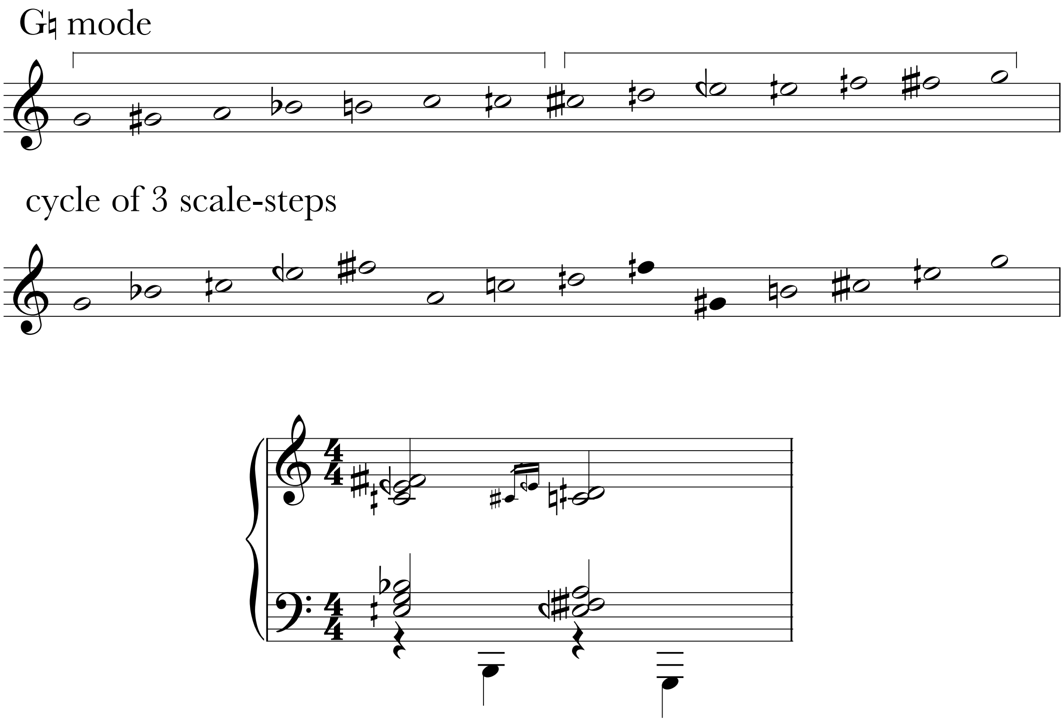
Example 5.10: *Prelude No. 7,* mm. 1-2

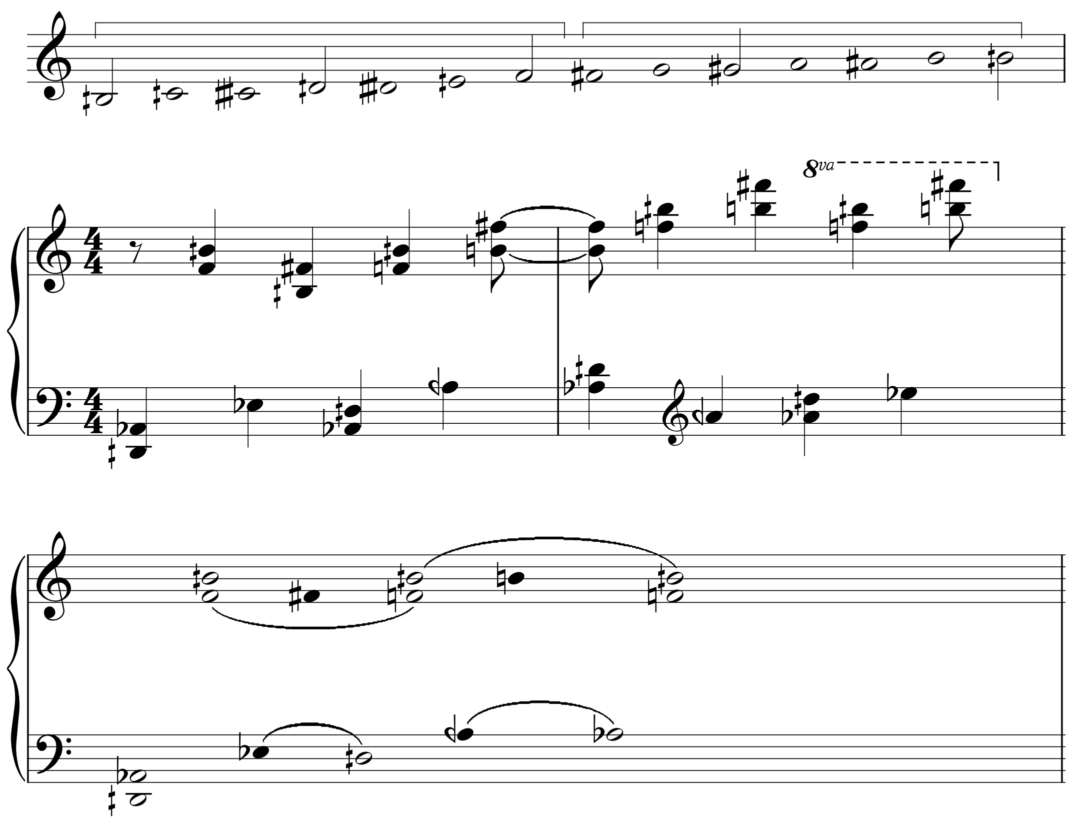


Example 5.11: *Prelude No. 14,* mm. 1-2

A common harmonic interval in the Preludes is the minor fifth (int 6.5), one of the possible realizations of ic 5.5. Because the scale upon which the Preludes are based is derived from the circle of minor fourths, it is not surprising to find numerous instances of ic 5.5. In Example 5.10, which shows the opening measures of Prelude No. 7, every boxed interval is int 6.5.

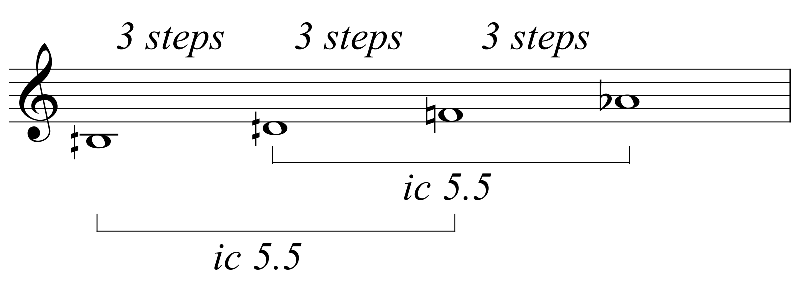
Most of these are spelled as minor fifths, except for the interval F♮–B𝄲, which is spelled as a fourth. The three harmonic intervals not boxed are not ic 5.5s (in fact, they are tritones), but the melodic lines do create ic 5.5s; the soprano line D𝄲–A♭–D𝄲 creates successive intervals <6.5 5.5> and the alto A𝄳, D♮, A𝄳 also creates successive intervals <6.5 5.5>. In Prelude No. 14 (Example 5.11), every boxed interval is int 6.5. The two pitches in the bass clef that are not boxed form the major fourth E♭–A𝄳. (The perfect fifth B♮–F♯ does not fit the pattern of ic 5.5s. In Example 5.14 below I demonstrate that the two pitches that make up this perfect fifth are non-chord-tones.)

E♮ mode

Example 5.12: *Prelude No. 17,* m. 1

Example 5.13: *Prelude No. 11,* m. 1

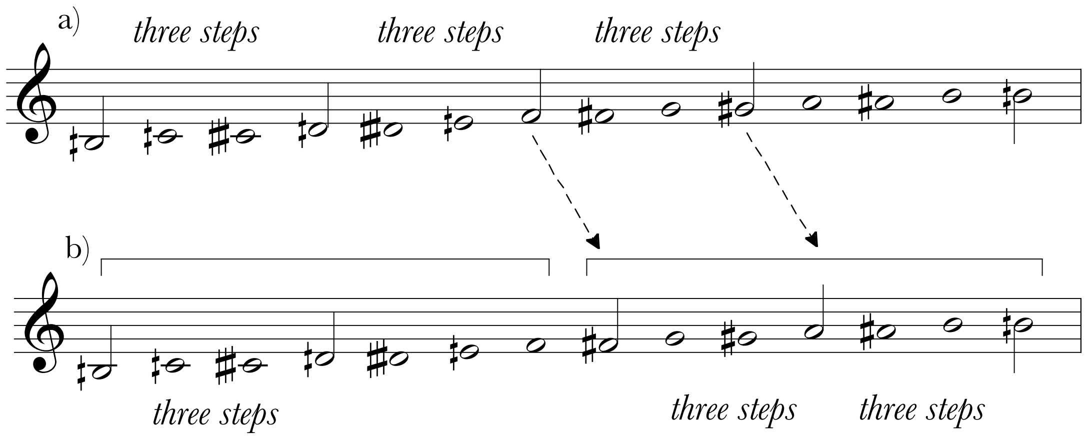
Wyschnegradsky uses cycles of the interval of three scale-steps to generate chords. (The specific size of these intervals depends upon the location of the scale-steps within the DC-scale.) In Prelude No. 17, the opening chord is the result of a cycle that begins on the tonic and works its way downward through the scale in intervals of three scale-steps: E–C♯–B𝄳–G♯–F (Example 5.12). In the opening measure of Prelude No. 11, the two half-note chords are cyclically generated. (The cycle of three scale-steps for the G♮-mode appears on the second staff of Example 5.13 to make the cycles easier to see.) The first half-note chord begins with the bass E𝄲, three scale-steps below the tonic and runs through the cycle to F♯. The grace note C♯ is three scale-steps below E𝄲, and the bass B♮, three scale-steps below C♯. The second half-note chord runs the cycle from E𝄳 to D𝄲. Every scale-tone from the G♮-mode appears in m. 1 except for two pitches, G♯ and F𝄲, and these two pitches are three scale-steps apart.

Example 5.14: *Prelude No. 14,* mm. 1-2

Example 5.14 above shows the opening chord of Prelude No. 14, which combines ic 5.5 with the pitches generated by the cycle of three scale-steps.

On the first staff of Example 5.14, I show the B𝄲 mode, and I have placed stems on the pitches {B𝄲, D𝄲, F𝄳, A♭} to represent the members of a tonic chord generated by the interval of three scale-steps. On the lowest staff of Example 5.14, I show the opening two measures of the Prelude as a prolongation of the tonic chord. The B♮ is a diatonic neighbour to the tonic, B𝄲, and the F♯ is a diatonic neighbour to F𝄲. The E♭ and A𝄳 do not belong to the B𝄲 mode but can be thought of as chromatic neighbours to the chord-tones D𝄲 and A𝄳. Example 5.15, shows that the tonic chord can be generated by the interval of three scale-steps and can also be regarded as a pair of interlocked ic 5.5s, {B𝄲, F♮} and {D𝄲, A♭}. Wyschnegradsky separates the chord into these two ic 5.5s by placing the B𝄲 and F♮ in the treble clef, and the D𝄲 and A♭ in the bass clef.

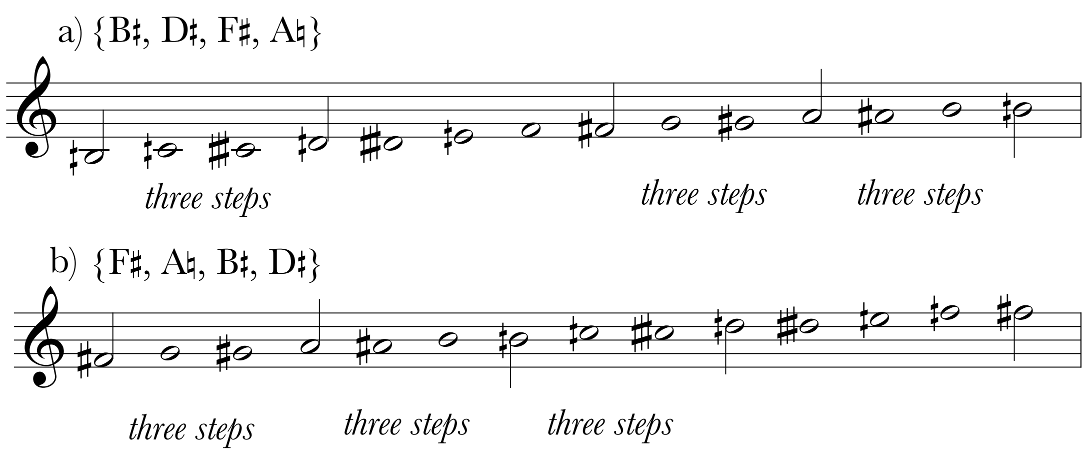


Example 5.15: Structure of tonic chord in Prelude No. 14



Example 5.16: a) small tonic chord; b) large tonic chord

I have discovered that there are two chords of similar structure that can serve as the tonic chord in any given prelude. The first tonic chord, which I call the "small" tonic chord, is equivalent to the tonic chord from Prelude No. 14. As I have shown, the structure of this chord is generated by a cycle of three scale-steps, beginning from the tonic, which results in a pair of interlocking int 5.5s. In Example 5.16a, I show the B♮ mode and place stems on the pitches of the small tonic chord. If we take the upper two pitches of the small tonic chord and shift them each up by one scale-step (represented by the dotted arrows between the staves), we obtain what I call the "large" tonic chord (Example 5.16b). The large tonic chord is derived from a cycle of three scale-steps, but unlike the small chord, its cycle begins not on the tonic, B♮, but F♯. In fact, the large tonic chord with a root of B♮ {B♮, D♮, F♯, A♮} is equivalent to the small tonic chord with a root of F♯ {F♯, A♮, B𝄲, D𝄲} (Example 5.17). The structure of the large chord reflects the symmetrical heptachordal structure of the DC-scale; the location of the upper pair of pitches (F♯ and A♮ in Example 5.16b) within the upper heptachord corresponds to the location of the lower pair of pitches (D𝄲 and B𝄲) within the lower heptachord. The large chord contains a pair of interlocking int 6.5s; in the large tonic chord on B𝄲 these are the minor fifths {B𝄲, F♯} and {D𝄲, A♮}.



Example 5.17: a) large tonic chord on B𝄲; b) small tonic chord on F♯

Wyschnegradsky's tonic chord shares two properties with the conventional triad (whether major, minor, or diminished); it is generated by a cycle of scale steps, and it is maximally even within the scale. The conventional tonic triad can be generated by a cycle of two scale-steps within the conventional diatonic scale; the interval between root and third is two scale-steps, and the interval between third and fifth is also two scale-steps. Wyschnegradsky's tonic chord, as shown above, is generated by a cycle of three scale-steps, and therefore the conventional triad and Wyschnegradsky's chord share this generated property. The conventional triad is maximally even within the conventional diatonic scale, and a specific example will help to illustrate this property. Consider the tonic triad in C–major: the interval between the root and third (C–E) is two scale-steps, the interval between the third and fifth (E–G) is also two scale-steps, and the "left over" interval between fifth and root (G–C) is three scale-steps. In the mod-7 universe of the major scale, the intervals of the tonic triad occur in two consecutive integer sizes, two and three, and therefore the triad is a maximally even set embedded within the scale. Wyschnegradsky's chord, in both its small and large forms, is made up of three three-step intervals and one four-step interval. Three and four are consecutive integers, and thus Wyschnegradsky's chord is maximally even within the DC-scale.

The DC-scale shares many properties with the conventional diatonic scale, and Wyschnegradsky's tonic chord shares properties with the tonic triad. We could therefore conclude that it is at least theoretically possible for music composed with the DC-scale to support chord progressions and prolongations analogous to those we find in the common-practice tonal repertorie. Although Wyschnegradsky is not consistent in his approach (indeed, there is no evidence suggesting that he seeks to "reinvent" tonality with the DC-scale), I have found specific configurations that can be interpreted as prolongations of a tonic chord.

Prolongations of the Tonic Tetrachord

In Example 5.18, I have sketched the opening to Prelude No. 13. On the topmost staff, I give the transposition of the DC-scale upon which the Prelude is based (in this case, the DC-scale on F♯), and I have added stems indicating the pitches belonging to the large tonic chord. On the next system, I show the pitches and rhythms of the opening measures as they appear in the score, and on the lowest system appears my analytical sketch, which shows the straightforward prolongations of the large tonic chord {F♯, A♮, C𝄲, E𝄳}.[7] The soprano presents an arpeggio that starts with the chord-tone C𝄲 and moves up through E𝄳 to F♯ before returning to C𝄲. The opening

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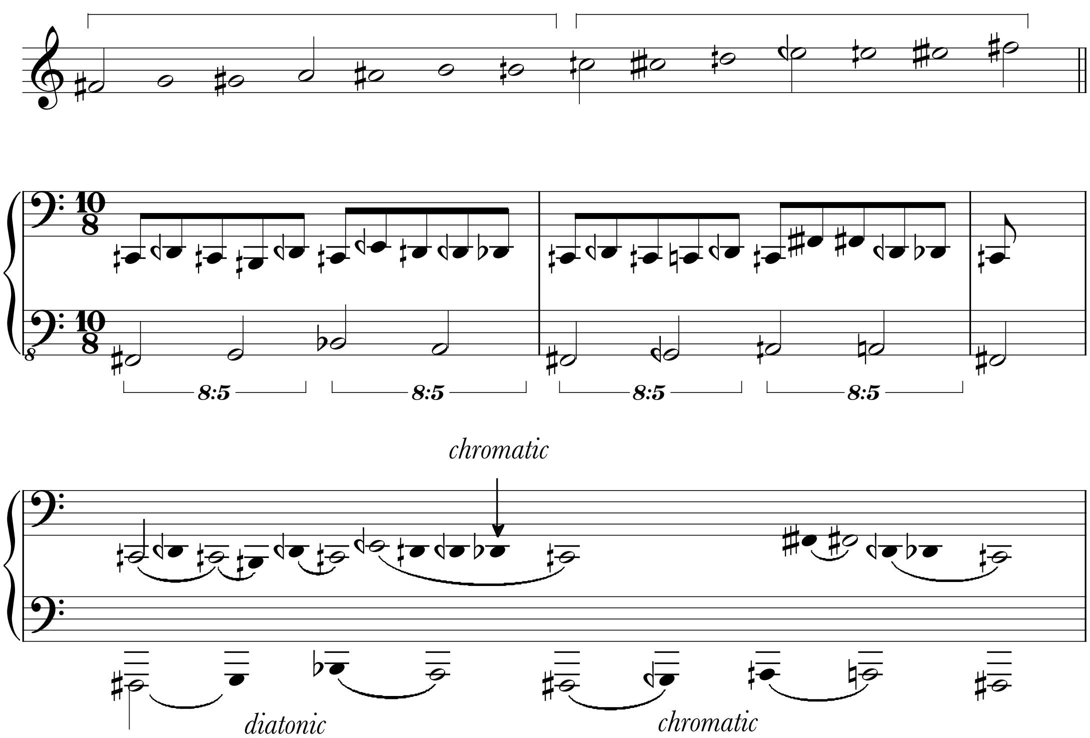
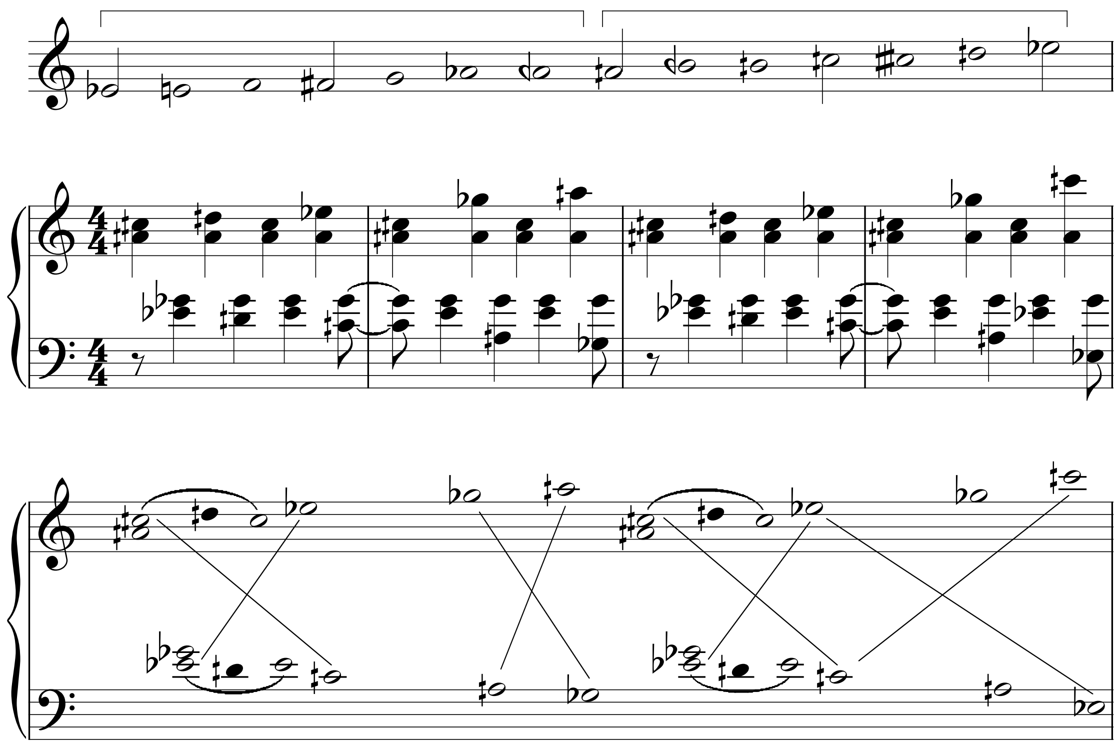
[7] Most of my analytical examples in this chapter follow this three-level format to help orient the reader: the first level shows the DC-scale and its tonic chord; the second level shows the actual music as it appears with correct rhythm; and the third staff shows my analytic sketch.

C𝄲 is embellished by a double-neighbour figure C𝄲–B𝄲–D♮–C𝄲, skips up to the chord-tone E𝄳, and returns to C𝄲 via a descending line that includes two diatonic passing-tones (D𝄲 and D𝄳) and one chromatic passing-tone (D♭). The bass presents the chord-tones F♯ and A♮ which in the first measure are embellished by diatonic upper neighbours (G♮ and B♭) and in the second measure by chromatic upper neighbours (G𝄳 and A𝄲). The bass begins and ends with F♯ (the lowest-sounding pitch in the passage), which strengthens the conclusion that this passage represents a prolongation of the tonic chord in root position.

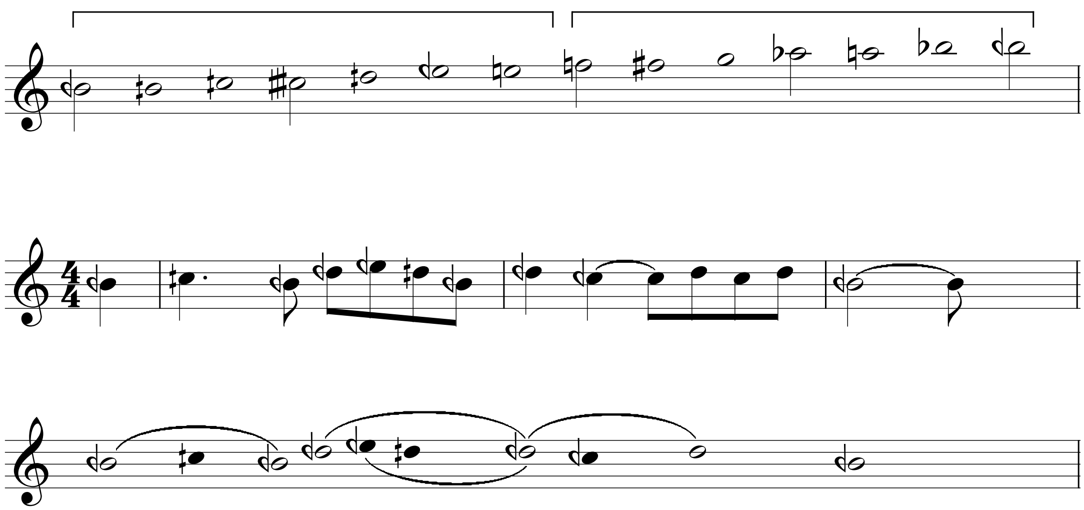


Example 5.18: *Prelude No. 13,* mm. 1-3



Example 5.19: *Prelude No. 19*, mm. 1-4

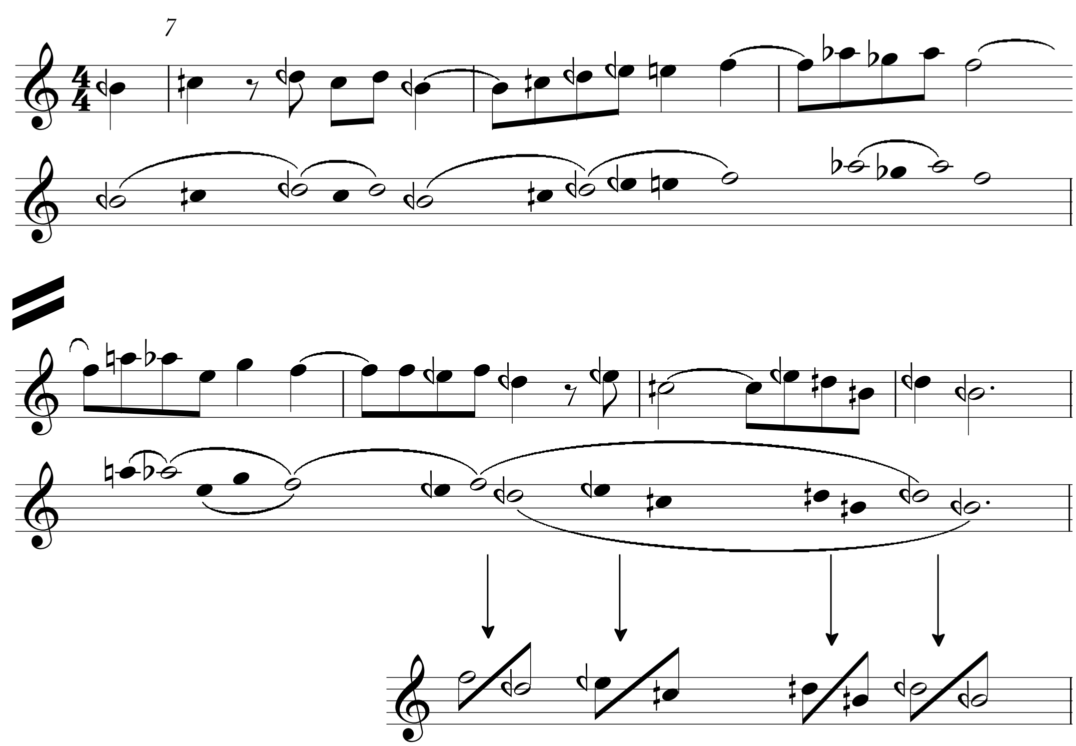
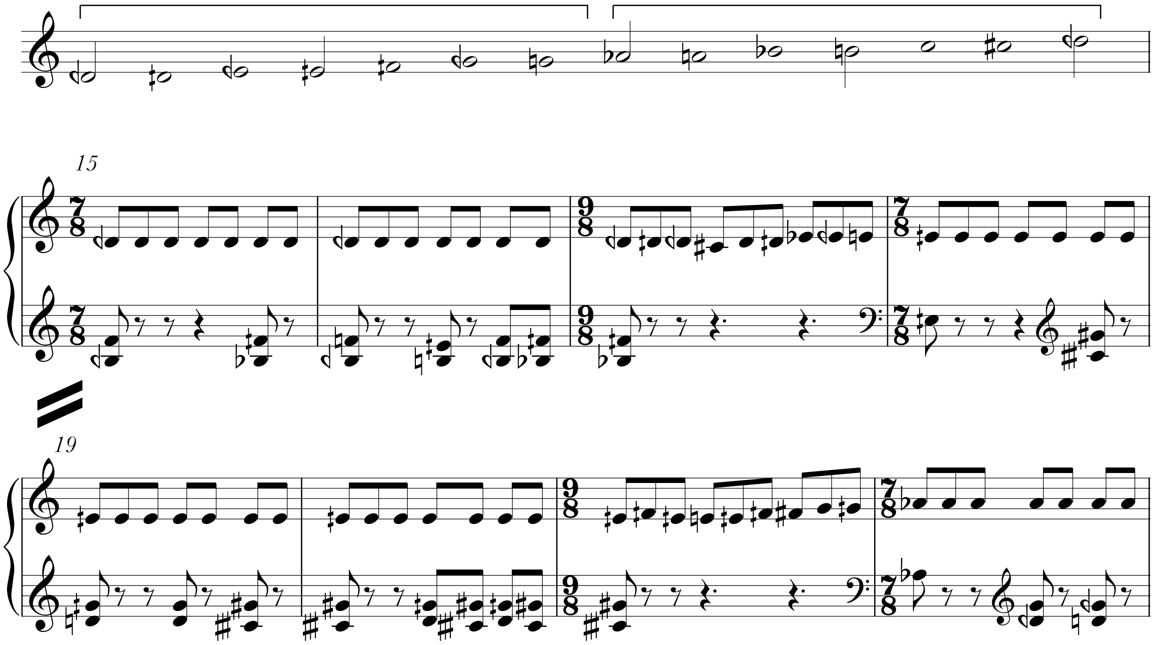
In the opening measures of Prelude No. 19 (Example 5.19), a series of voice exchanges prolongs the large tonic chord {E♭, G♭, A♮, C♮}. The bass begins with a tonic E♭ (elaborated by a lower neighbour D♮) and arpeggiates downward through all four members of the large chord, while the soprano begins with the chord tone C♮ (elaborated by an upper neighbour D♮) and arpeggiates upward. The contrary motion of the outer voices creates a pair of voice exchanges. The third and fourth measures repeat the pattern of the first two measures with an important change—the outer voices return to their initial configuration with the tonic E♭ in the bass, so that the four-measure passage both begins and ends with the large chord in root position.

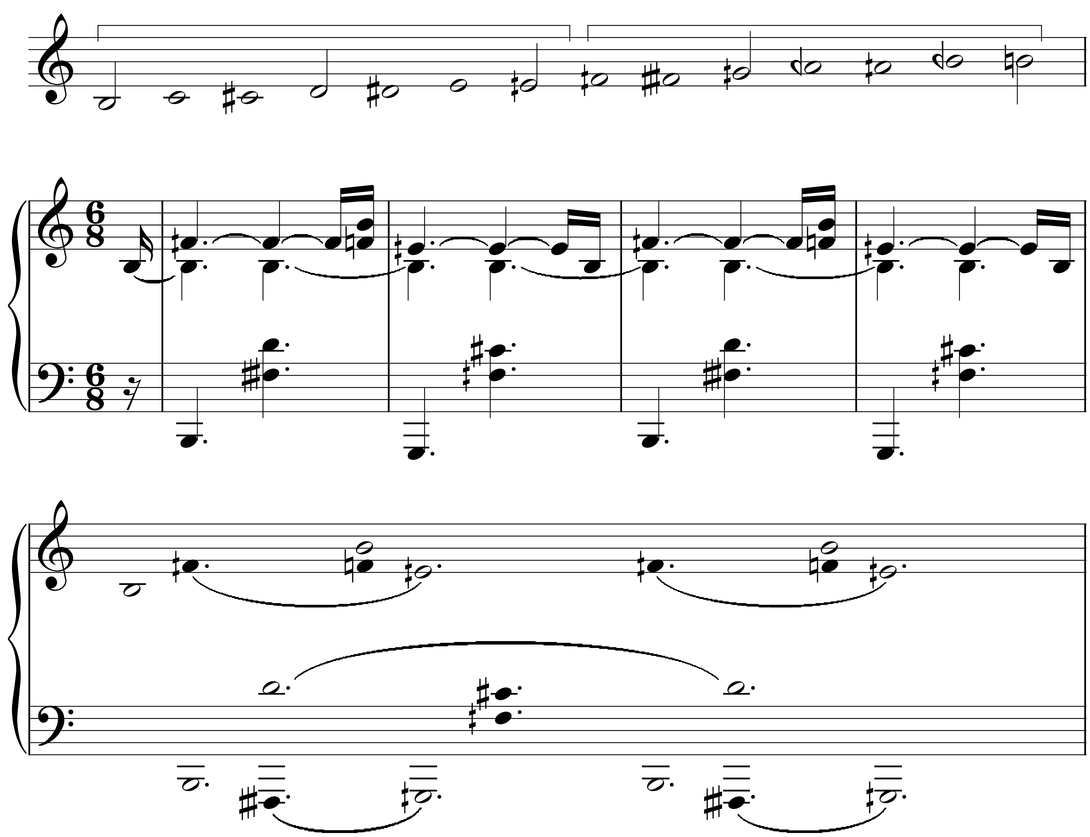


Example 5.20: *Prelude No. 16,* mm. 1-3

In Prelude No. 16, the large tonic chord {B𝄳, D𝄳, F♮, A♭} helps determine the shape of the melodic line.[8] As Example 5.20 shows, the opening phrase of this unaccompanied melody outlines the lower third {B𝄳, D𝄳} of the large chord, elaborated by diatonic neighbour notes. A second statement of the unaccompanied melody (Example 5.21) presents an antecedent-consequent structure in the melody that begins by outlining the lower third {B𝄳, D𝄳} (m. 7), moves up through the diatonic passing-tones E𝄳 and E♮, outlines the

[8] D𝄳≡C♯. Wyschnegradsky gives C♯ as the fourth scale-degree of the B𝄳 mode, but substitutes the enharmonically equivalent D𝄳 for C♯ in Prelude No. 16.

upper third {F♮, A♭} (mm. 9-10), and then returns to the tonic, B𝄳. The descent from F♮ to B𝄳 is carried out through a compound line composed of an upper-voice descent F♮–E𝄳–D𝄲–D𝄳 and a lower-voice descent D𝄳–C𝄲–B𝄲–B𝄳. On the lowest staff of Example 5.21, I have represented this compound line as a series of unfoldings, beginning with the third {D𝄳, F♮} and moving down through {C𝄲, E𝄳} and {B𝄲, D𝄲} before coming to rest at the tonic-supported third {B𝄳–D𝄳}. This melodic example demonstrates that Wyschnegradsky "composes out" the tonic chord over spans longer than immediate surface prolongations.

Example 5.21: *Prelude No. 16,* mm. 7-13

Example 5.22: *Prelude No. 10,* mm. 15-22

In Prelude No. 10, Wyschnegradsky uses the large chord {D𝄳, E𝄲, A♭, B♮} to determine the transpositions of an ostinato figure over eight measures (Example 5.22). The ostinato, consisting of repeated eighth notes, begins in m. 15 on the tonic, D𝄳, and moves through a series of ascending scales, first to E𝄲 in m. 18 and then to A♭ in m. 22. The repeated notes function as a large-scale arpeggiation of the tonic chord.

Example 5.23: *Prelude No. 3,* mm. 1-4

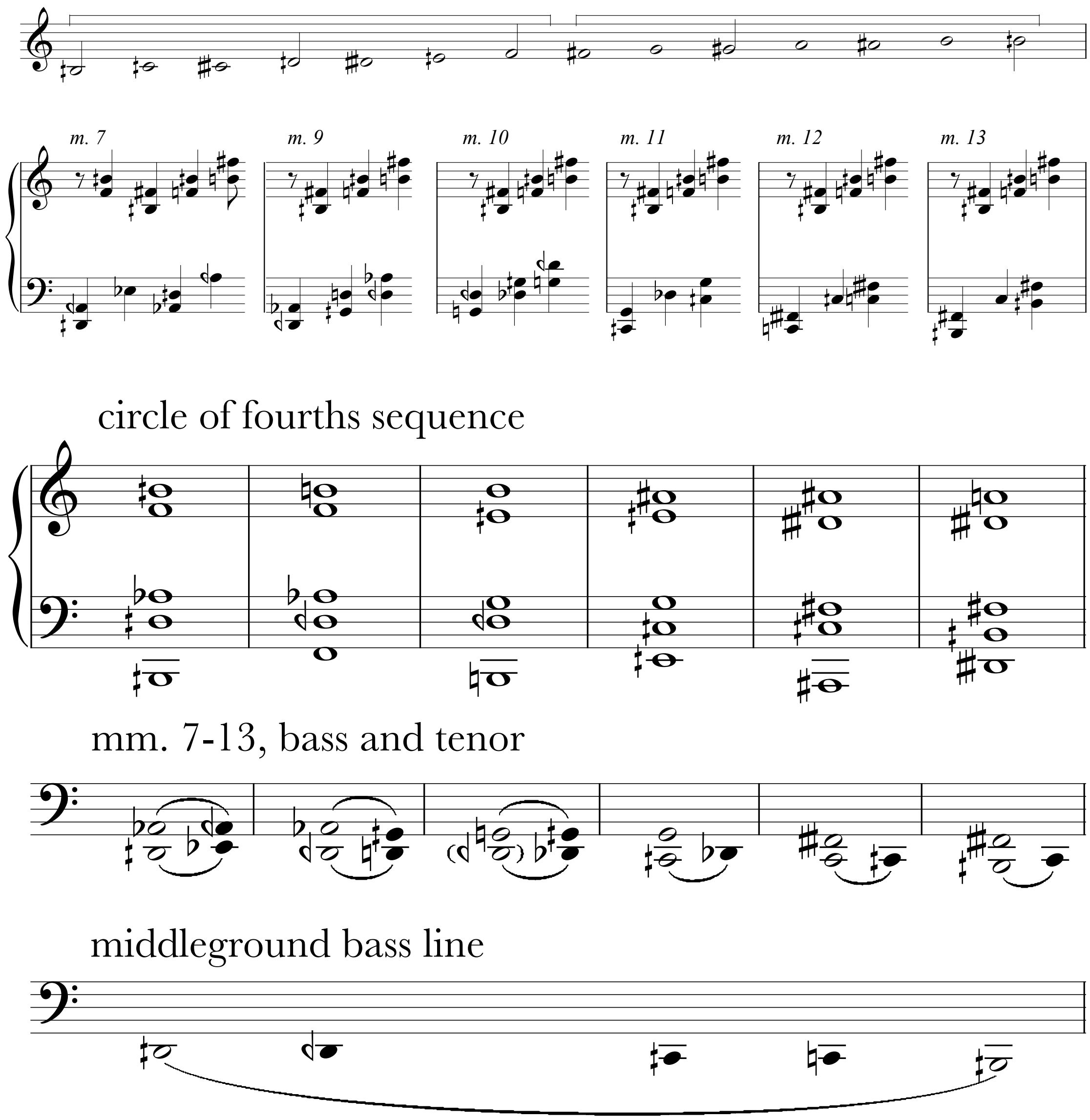
Example 5.23 illustrates the analytical difficulties encountered when the opening of a prelude strongly suggests a tonic chord, but the methods of prolongation are less obvious than in the previous examples. Although clear prolongations occur in some of the Preludes, they do not occur in all. For example, do the first two measures of Prelude No. 3 (Example 5.23) represent two separate chords or one single chord? In examples such as this, simple prolongational models do not account for the relationships between chord-tones and non-chord-tones. The analytic sketch of this passage adopts a middleground perspective in which I assume that the entire excerpt prolongs the small chord {B, D, E𝄲, G𝄲}; but there are problems with this assumption. In the previous examples, all of the harmonic prolongations of tonic chords appear to be supported by the tonic in the bass, but the lowest note in this excerpt is not the tonic, B♮, but instead G𝄲. Does the excerpt in Example 5.23 represent a prolongation of an inversion of the small chord, with G𝄲 in the bass, or does it represent two separate root-position chords, one with a root of B♮ and the second with a root of G𝄲? Accounting for the F𝄲's in this example is also problematic. If we consider the first measure to be an incomplete version of the large chord {B, D, F𝄲, A𝄳}, then the F𝄲 in the first measure is a chord-tone; if not, it could be considered an upper neighbour to the chord-tone E𝄲 that follows in the second measure. The F𝄲 in the second measure is even more problematic. Is it a chord-tone as a part of some sort of chord with G𝄲 in the bass, or is it a non-chord-tone? If it is a non-chord-tone, what is its relationship (if any) to any chord-tones it might embellish? Is it a neighbour to the chord-tone G𝄲 in the bass or perhaps to the F# in the same register in the previous measure? The latter seems a more likely explanation, because the figuration makes the F𝄲 and F# more like inner-voice pitches than bass pitches. Is the F# then to be considered a chord tone in the first measure? The answers to these questions are not altogether clear. Even though the pitches of the small chord appear prominently in this excerpt, we may not be able to say that the small chord is being prolonged by the non-chord tones. While the prolongational model is an interesting lens through which to view some of the Preludes, it is not appropriate in all situations. Consequently, we should not expect that all of the Preludes fit a single model.

Prelude No. 14 appears to exhibit a true chord progression based on the diatonic circle of fourths. Example 5.24 shows the beginnings of m. 7 and mm. 9-13 (to save space, I have omitted the endings of these measures). The harmony in m. 7 is the small tonic chord {B𝄲, D𝄲, F♮, A♭} and the right hand establishes an ostinato pattern including B𝄲 and F♮, both members of the small tonic chord; the harmony in m. 13 appears to be an incomplete tonic chord, including only B𝄲 and F♮, so the passage begins and ends with tonic harmony. The third system of Example 5.24 shows an idealized diatonic root-position circle-of-fourths progression of small chords in five voices.[9] The bass of this progression (not literally present in the music) starts with the tonic B𝄲 and works its way through the circle of fourths to D♯. This ideal chord progression is represented by only two voices, bass and tenor in mm.

[9] This idealized chord progression resembles the archetypal circle-of-fifths sequence of seventh chords in which five voices are required to show all chords complete with correct voice-leading.

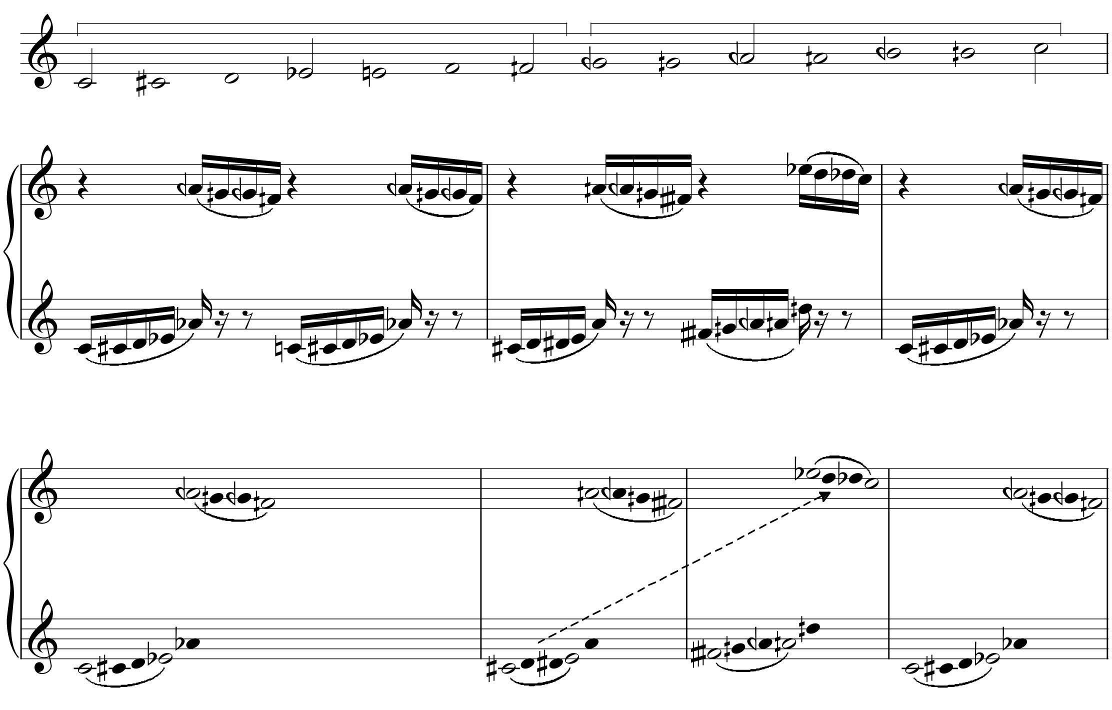
7-13 (bottom system in Example 5.24); the soprano and alto have been displaced by an ostinato in which the repeated B𝄲 creates the effect of a tonic pedal. The bass line supports a series of inverted chords, beginning with the tonic chord-tone D𝄲 and moving down through D𝄳, C𝄲, and C♮ to come to rest on the tonic, B𝄲. There are two further complications to the harmony. In m. 10 the bass D𝄳 has been registrally shifted up, sounding above the tenor G♮, and in m. 12, the diatonic pitches C𝄲 and F♯ have been replaced with the chromatically-inflected pitches C♮ and F♯. None of these complications—registral shifts, chromatic inflections of diatonic chord tones, or a tonic pedal—would be out-of-place in a conventional tonal circle-of-fifths progression, and so it seems reasonable to posit the underlying circle-of-fourths progression in this passage. The large-scale function of this progression prolongs tonic harmony while the bass fills in the span between two tonic chord-tones, D𝄲 and B𝄲.[10]

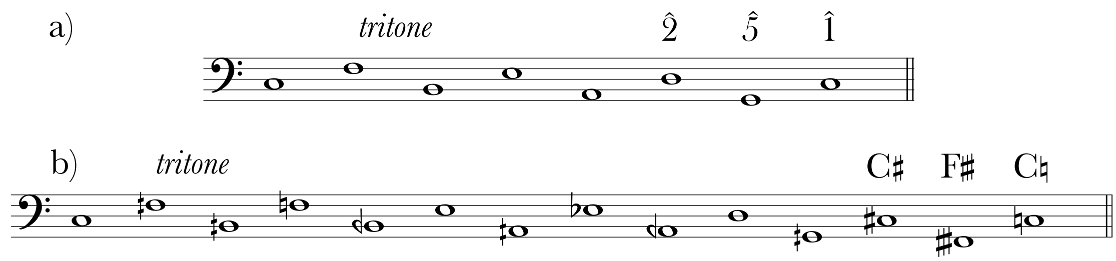
[10] To carry the tonal analogy further, the line D𝄲–D𝄳–C𝄲–C♮–B𝄲 (where D𝄲 and B𝄲 are tonic chord tones, D𝄳 and C𝄲 are diatonic passing tones, and C♮ is a chromatic passing tone) most resembles the descending span $\hat{3}$–♭$\hat{3}$–$\hat{2}$–♭$\hat{2}$–$\hat{1}$ that prolongs tonic harmony in a major key.



Example 5.24: *Prelude No. 14,* mm. 7-13

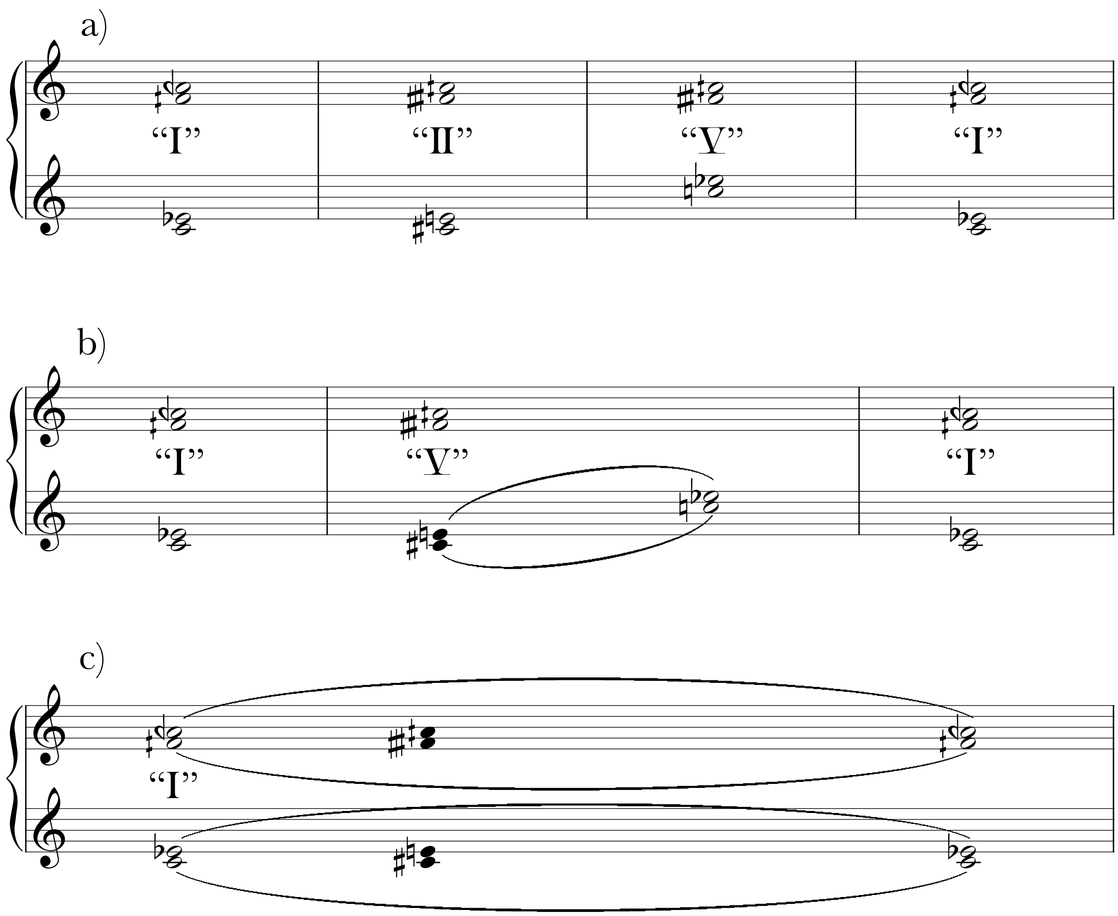
Multiple Prolongations of Tonic Harmony in *Prelude No. 1*

I have shown how Wyschnegradsky prolongs tonic harmony over short spans of music using conventional tonal techniques, such as passing-tones, neighbour-notes, voice exchanges, arpeggiations, and unfoldings. The next logical step is to ask whether prolongations take place over larger spans or even entire pieces. While nothing resembles an *Urlinie* in any of Wyschnegradsky's compositions, we can see how Prelude No. 1 projects multiple prolongations of tonic harmony from beginning to end.

Example 5.25: *Prelude No. 1,* mm. 1-3



Example 5.26: a) diatonic circle of fifths in C–major;
b) diatonic circle of fourths in the DC-scale on C

The first measure of Prelude No. 1 unfolds an arpeggiation of the small tonic chord {C♮, E♭, F𝄲, A𝄳} elaborated with diatonic passing tones. (The A♭ is a chromatic pitch that creates a brief, discordant clash with the chord-tone A𝄳.) Following the pattern established by the figuration in the first measure, we can then interpret the second measure as two separate chords, the first a small chord with a root of C♯, and the second, a small chord with a root of F♯. In the third measure, the harmony returns to the tonic, creating a four-chord progression with a root succession of C♮–C♯–F♯–C♮ that has a structure that is similar to a common tonal progression. Just as $\hat{2}$, $\hat{5}$, and $\hat{1}$ are the last three scale-degrees in the diatonic circle of fifths, C♯, F♯, and C𝄲 are the last three pitches in the diatonic circle of fourths; thus the progression that opens Prelude No. 1 occupies a similar place in the circle of fourths that I–ii–V–I does in the circle of fifths. In this progression, the four voices move by no more than one semitone; the C♮ and E♭ in measure two represent a registral shift (shown with a dotted arrow in Example 5.25) of the voices leading from the preceding C♯ and E♮.



Example 5.27: *Prelude No. 1,* opening chord progression

In Example 5.27a, I have simplified the four-voice chord progression found in the opening three measures. I have moved the registrally-shifted C♮ and E♭ to the lower staff to make it easier to see their linear connection with C♯ and E♮. I have labelled the chords "I", "II", and "V" although it is important to remember that in this context, these labels do not imply the functions of tonic, dominant preparation, and dominant; they are merely convenient labels that reflect the relationship between the root-succession and the diatonic circle of fourths. Example 5.27b shows that the "II" chord can be subordinated to the "V" chord; F♯ and A‡ are common-tones shared by the two chords, and C♯ and E♮ are diatonic lower neighbours to C♮ and E♭.[11] Example 5.27c shows how the entire progression represents an elaboration of tonic harmony. The non-chord tones are diatonic upper neighbours to the tonic chord-tones. Diatonic neighbours form an important motive in this Prelude. The common-tones in Example 5.27 lead to an interesting ambiguity. The "V" chord and the "I" chord (both of the small chord type) share two common tones, C♮ and E♭. Remember, however, that some preludes feature prolongations of a large tonic chord. In the DC-scale on C♮, the large tonic chord is {C♮, E♭, F♯, A‡}, giving it identical pitch content to the "V" chord {F♯, A‡, C♮, E♭}, which is itself equivalent to the small tonic chord of the DC-scale on F♯. This equivalency allows us to conclude that every large tonic chord has identical pitch content to the small tonic chord of the DC-scale whose tonic is adjacent on the circle of fourths.

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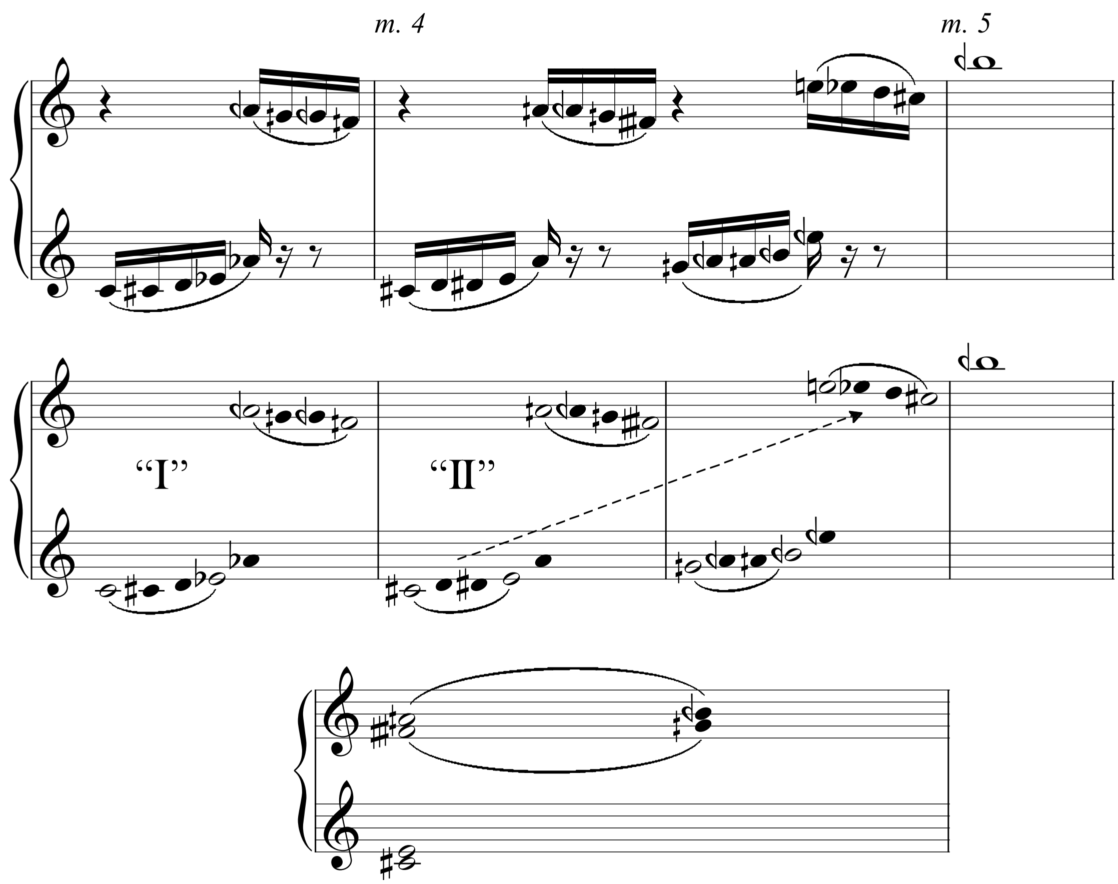
[11] In a tonal context, we might prefer to identify C♯ as a chromatic inflection of C♮ rather than as a neighbour to it. I identify as diatonic neighbours all non-chord tones that occupy a scale-step adjacent to a chord tone.

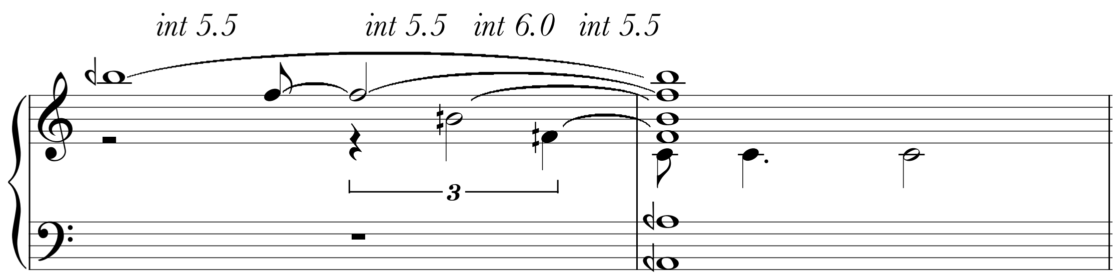
This ambiguity means that any chromatic chord is potentially ambiguous and forces us to consider whether we are looking at a small tonic chord from one scale or a large tonic chord from a different scale.

The difficulty in determining the identity of specific chords makes it problematic to establish a case for functional harmony. To prove that functional harmony operates in these Preludes, one would need to demonstrate at least a clear opposition between tonic and dominant. I have already shown that there is a tonic chord that occurs in both a small form and a large form. I could argue in favour of the "V" chord serving as a dominant by comparing this chord to the conventional dominant. The root of "V" is the penultimate member of the circle of fourths; likewise, the root of the conventional dominant chord is the penultimate member of the circle of fifths. The root of "V" is the lowest note in the upper heptachord of the DC-scale; the root of the conventional dominant chord is the lowest note in the upper tetrachord of the major scale. However, the argument in favour of granting "V" dominant status is weakened considerably by the fact that "V" does not possess a leading tone. The two common tones shared between the tonic and "V" (one of which is $\hat{1}$ in the DC-scale) render the "V" chord functionally ambiguous; the conventional V^7 does not include $\hat{1}$ as a chord tone. This ambiguity is further compounded by the fact that "V" (a small chord whose root is a scale step that could serve as a dominant) is equivalent to the large tonic chord.[12]



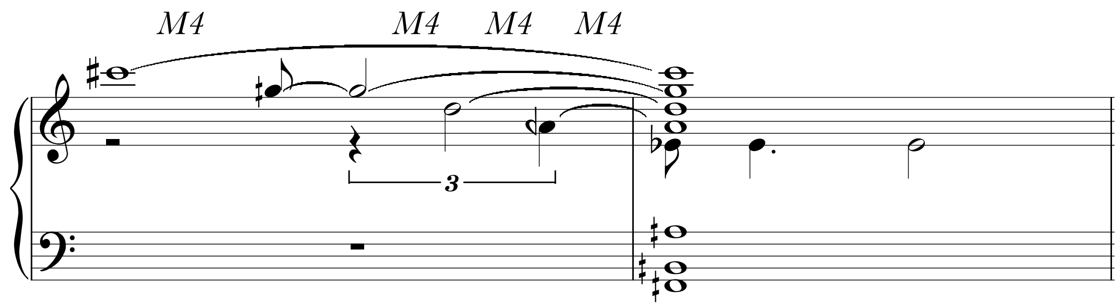
Example 5.28: *Prelude No. 1*, mm. 3-5

[12] This ambiguity does not present an analytical problem in simple diatonic contexts. In attempting to identify any arbitrary chromatic tetrachord, however, our inability to distinguish between a potential small dominant chord and a large tonic chord from the same scale makes it difficult to establish a syntax for functional chromatic harmony. One could imagine a similar syntactic ambiguity in tonal chromatic harmony if, for example, V^6 and I were equivalent in any given key.



Example 5.29: *Prelude No. 1,* mm. 5-6

The progression in mm. 3-4 is similar to the one in mm. 1-2. The first two chords are identical to the opening "I" and "II", but the third chord is modified. The registral shift between the second and third chords in mm. 1-2 is preserved in mm. 3-4, and there is a common-tone connection between the two chords. Here, though, the common tones are not F♯ and A𝄲 as they were in the opening, but C♯ and E♮, giving rise to a different chord in m. 4 and leading to a new point of arrival in m. 5, B𝄳. From this B𝄳, Wyschnegradsky begins a descent through the diatonic circle of fourths that culminates on the tonic (Example 5.29). All of the intervals in the diatonic circle of fourths are instances of int 5.5 except for {B𝄲, F𝄲}, which is a tritone. Just as there is one tritone in the diatonic circle of fifths in the major scale (between $\hat{4}$ and $\hat{7}$), so too there is one tritone in the diatonic circle of fourths derived from the DC-scale (indicated on Example 5.26 above). The bass A𝄳, itself a member of the small tonic chord, harmonizes the tonic C♮.

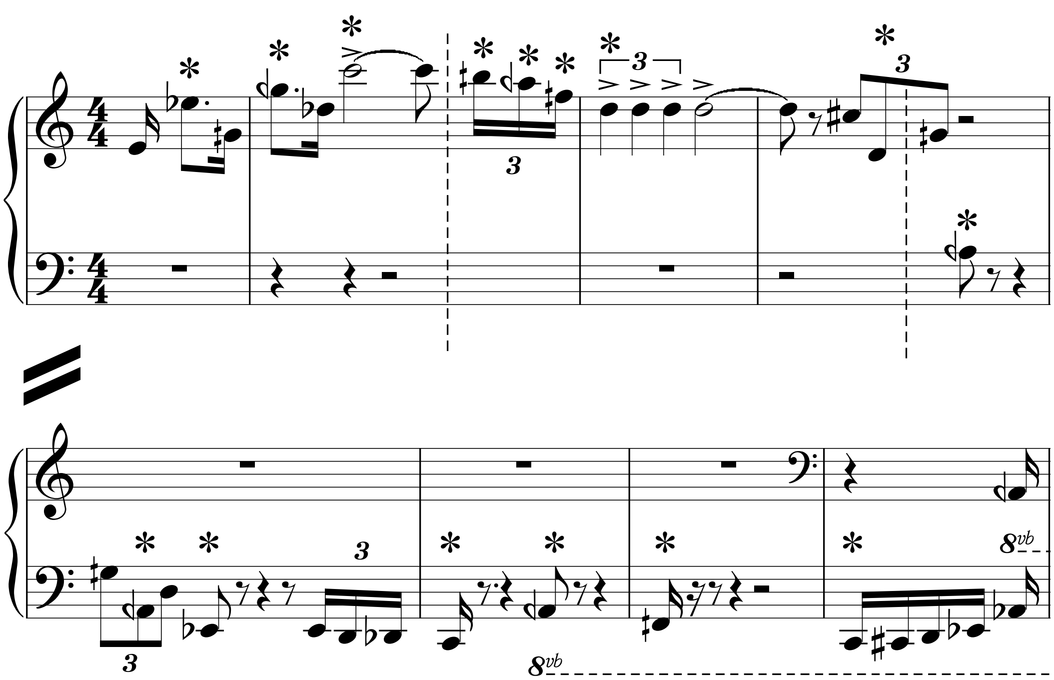


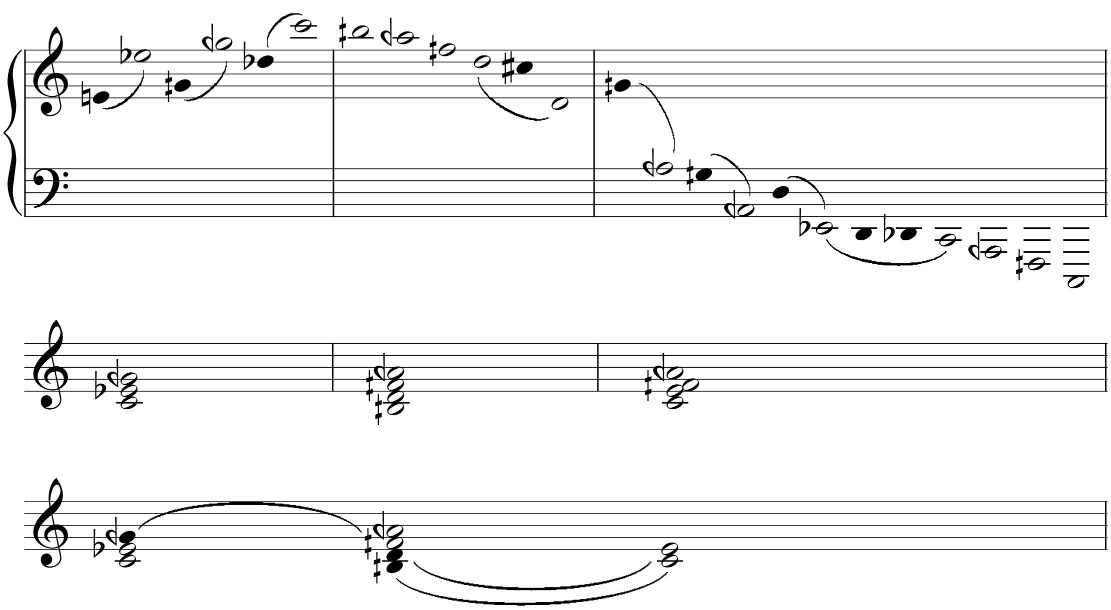
Example 5.30: *Prelude No. 1,* mm. 12-13

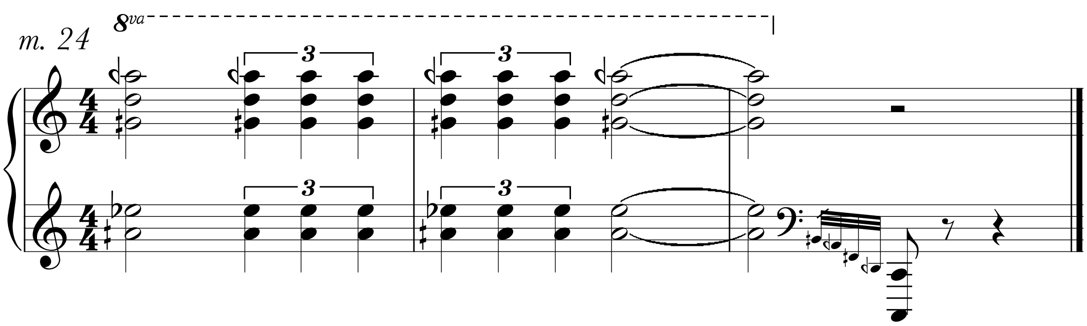
Example 5.31: Chord tones displaced by diatonic neighbours

The passage in mm. 12-13 (Example 5.30) is similar to the one in mm. 5-6. Here the descending circle of fourths arrives at the tonic chord-tone E♭ harmonized by another tonic chord tone, F𝄲, and two additional pitches, B𝄲 and A𝄲, which are not themselves members of the small tonic chord. These two non-chord-tones are diatonic neighbours to missing tonic chord-tones, reinforcing the role of the neighbour note as an important motive in this prelude. All four members of the small tonic chord {C♮, E♭, F𝄲, A𝄳} are represented by the chord struck on the downbeat of m. 13. E♭ and F𝄲 are present in the music, while A𝄳 is represented by its upper neighbour A𝄲, and C♮ is represented by its lower neighbour B𝄲 (Example 5.31).

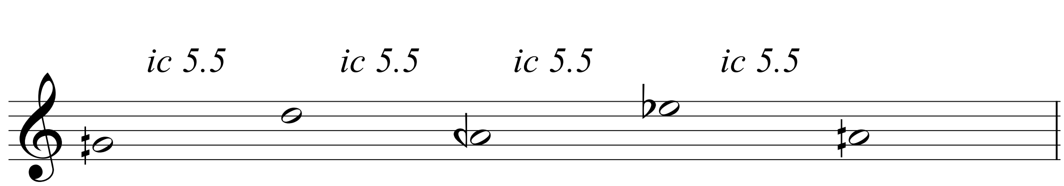
Example 5.32 shows a transitional passage that leads from m. 14 to the recapitulation in m. 21. On the example, asterisks mark chord tones; the vertical dotted lines represent the boundaries between the separate chords. This passage prolongs tonic harmony by means of three arpeggiated chords. Example 5.33 shows the initial ascending gesture as an upward arpeggiation of the chord {C♮, E♭, G𝄳}; C♮ and E♭ are tonic chord tones approached by octave-displaced upper neighbours. Because G𝄳 is approached in the same way, I am inclined to consider it a chord tone as well. However, the three-note chord is ambiguous. Is it an incomplete version of the large tonic {C♮, E♭, G𝄳, A𝄲}, or is it an incomplete version of the enharmonically equivalent chord {G𝄳, A𝄲, C♮, E♭} (equivalent to "Y" in Example 5.27 above)? The middle chord could be interpreted as a dominant, because it contains B𝄲, which could serve as a leading-tone to C♮; moreover, the tritone {B𝄲, F𝄲} resembles the characteristic dominant tritone that normally occurs between $\hat{7}$ and $\hat{4}$. (In fact, the chord {B𝄲, D♮, F𝄲, A𝄳} looks similar to *vii*$^{\circ 7}$ in the key of C.) But the tritone does not function as it would in a conventional tonal dominant. We would expect B𝄲, playing the role of $\hat{7}$, to resolve up to the tonic, which it does. We would further expect F𝄲, playing the role of $\hat{4}$, to resolve downwards; but F𝄲 is a common tone shared with the tonic chord that follows. The third chord is a complete small tonic chord, with octave-displaced lower neighbours embellishing A𝄳 and E♭ and a pair of diatonic passing tones filling in the space between E♭ and C♮. The bottom staff of Example 5.33 shows how the three chords work to prolong tonic harmony. On this middleground level, the troublesome G𝄳 is interpreted as an upper-neighbour to F𝄲, and the B𝄲 and D𝄲 of the dominant-like middle chord as lower neighbours to E♭ and C♮.



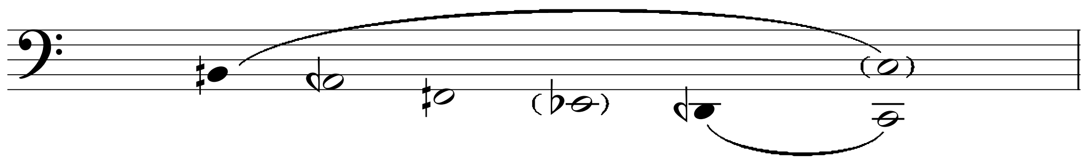
Example 5.32: *Prelude No. 1,* mm. 14-21

Example 5.33: ***Prelude No. 1,*** **mm. 14-21 reduced**



Example 5.34: ***Prelude No. 1,*** **mm. 24-26**



Example 5.35: ***Prelude No. 1,*** **mm. 24 harmony expressed as circle of fourths**



Example 5.36: *Prelude No. 1,* m. 26

The final three measures, shown in Example 5.34, sum up the significant motives of the Prelude—circle of fourths cycles, neighbour notes, and chords that share pairs of common tones with tonic harmony. The component pitches of the five-note chord in mm. 24-25 can be rearranged into the circle of fourths in Example 5.35. The penultimate chord in the Prelude is realized as a series of four grace notes leading to the final tonic. The resultant chord {B𝄲, D𝄳, F𝄲, A𝄳} is similar to the dominant-like chord in Example 5.33 above, with D𝄳 replacing D♮. This grace note D𝄳 is the only chromatic pitch that appears in the Prelude. Most likely, Wyschnegradsky altered the D♮ for practical reasons. Remember that quarter-tone piano music is typically played on two separate keyboards, by two performers. With a D𝄳 in m. 26, one performer can play all four grace notes in a single gesture of the left hand. (The alternative, with D♮, would call for the first three grace notes to be played by one player and the final grace note played the other, the timing of which would be difficult to realize in performance.) In Example 5.36, I show the implied voice-leading between the penultimate chord {B𝄲, D𝄳, F𝄲, A𝄳} and the final tonic. The F𝄲 and A𝄳 are common tones shared by the penultimate chord and the small tonic chord. The B𝄲 is best viewed as a leading tone that resolves up to an implied C♮, and the D𝄳 resolves down to C♮. The interval between B𝄲 and D𝄳 is an augmented sixth, and the way both of these pitches lead to C♮ reminds one of the normal resolution of an augmented sixth to an octave.[13]

I have shown that for *24 Preludes,* Wyschnegradsky invents a “diatonicized chromatic” scale (or DC-scale) that shares several important properties with the major scale, and that there is a tonic chord within the DC-scale that is in many respects analogous to the tonic triad in the major scale. Wyschnegradsky’s prolongations of this tonic chord suggest that the DC-scale is capable of supporting a hierarchical system of harmonic syntax with a sophistication that mimics that of common-practice tonal harmony. However, the ambiguities created by shared pairs of common tones in circle-of-fourths chord progressions make it difficult to establish a case for

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[13] In fact, the penultimate chord {B𝄲, D𝄳, F𝄲, A𝄳} is equivalent to a German sixth chord in the key of F𝄲.

harmonic syntax based on anything resembling the traditional opposition between dominant and tonic. In Chapter 6, I return to the DC-scale and consider the interactions between neo-Riemannian transformational theory and Wyschnegradsky's DC-scale. The canonic neo-Riemannian operators P, L, and R are normally applied to conventional consonant (major and minor) triads. From the consonant triad, Richard Cohn derives a generalized trichord that can be situated in not only the quarter-tone universe, but also in an infinite number of different microtonal systems. He then explores the canonic operators in the context of his generalized trichord.[14] However, Cohn's generalization cannot be applied to the DC-scale, because Wyschnegradsky's primary tonic sonorities (both small and large) are not trichords, but rather tetrachords. I speculate about the interactions of the canonic operators when Wychnegradsky's small tonic tetrachord plays the role of the traditional triad.

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[14] Richard Cohn, "Neo-Riemannian Operations, Parsimonious Trichords, and Their *Tonnetz* Representations," *Journal of Music Theory* 41/1 (1997).