Parallel successions of perfect fifths in the Bach chorales

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Background in music theory. Although strictly prohibited since the 14th century, parallel fifths can be detected in medieval and Renaissance music, mainly in cadential passages of works written even by composers such as Palestrina and Lassus. In addition, as Brahms has pointed out (1980), almost all 'great masters' (17th-19th centuries) did not always seem to care to avoid successions in parallel fifths. In his commentary upon Brahms's facsimile, Schenker argued that within the prolongation of one triad the rules of strict counterpoint may not apply; consequently that, "… consecutive octaves or fifths need not be considered wrong". So, there are cases in which, even if parallel fifths appear in the score, they do not convey the effect of hollowness, emptiness or stillness that parallel fifths may have on listeners. With respect to Bach's four-part harmonizations of chorale melodies, Malcolm Boyd identified a couple of cases in which parallel fifths do appear, suggesting that one could suspect, "… that either the text is at these points corrupt, or that Bach has not spotted the consecutives and would have corrected them if he had".

Background in computer science. There are few available tools for expressing and searching for complex relational networks of notes such as the parallel fifth. The Humdrum toolkit (Huron, 1997) provides methods for transforming scores to harmonic interval successions, but it is difficult to formulate accurate (with high precision and recall) pattern queries for complex networks involving several properties of notes and simultaneities as arise in the parallel fifth. The PROLOG logic programming language is very well suited to elegantly express and efficiently execute such queries.

Aims. Since we are unconvinced by the argument that "…Bach has not spotted the consecutives", we undertook a detailed computational search to find all passages containing parallel fifths in Bach chorales. After referring in short to the reliability of certain widely circulating printed editions of Bach chorales, such as Breitkopf & Härtel, Schirmer, and Editio Musica Budapest, and chorales found in MIDI format on websites, we will account for all the cases of parallel fifths formed in Bach chorales; explain thoroughly the computational methods used to spot these consecutives; and analyze each passage separately.

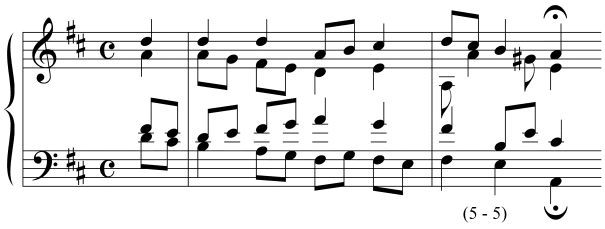
Implications. For a thorough study of musical structure, a systematic and precise examination of all kinds of musical procedures is necessary. However, it is not possible for a music theorist/analyst to have full control of the infinite compositional choices. As this paper demonstrates, computational queries with relational networks in music can provide a first necessary and interesting step toward a better understanding of musical structure.

The prohibition of parallel successions of perfect consonances has been considered as one of the strictest rules that apply in all forms of Western music since the fourteenth century. Many scholars have pointed out that Renaissance and tonal composers have invented and successfully applied techniques to avoid parallel fifths and/or eights, such as the familiar 5 – 6 – 5 and 8 – 10 – 8 techniques (for the avoidance of parallel fifths and eights respectively). However, there are cases for almost all 'great masters' where it seems that they did not always care to avoid such successions –especially successions in parallel fifths. It is well known that Brahms himself has listed approximately 140 examples of successive fifths and octaves by composers from the sixteenth to the nineteenth century, and that Heinrich Schenker has published Brahms's facsimile (Vienna, Universal edition, 1933) with a commentary of his own.[i] Schenker's point was that within the prolongation of one triad the rules of strict counterpoint may not apply, that in some cases "the consecutive octaves or fifths need not be considered wrong"[ii]. In other words, there are cases in which, even if consecutive 5ths (or even 8ths) appear in the score, these do not really function as parallel fifths; that is, they do not convey the effect of hollowness, emptiness or stillness that 'real' parallel 5ths may have on listeners.

Even a quick look at some scores shows that in his four-part harmonizations of chorale

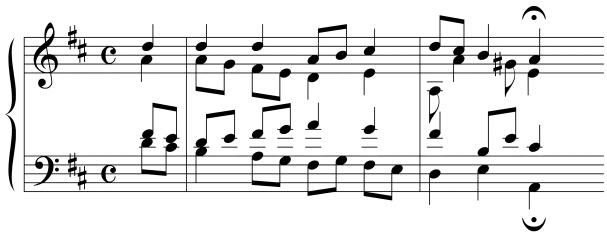
melodies Johann Sebastian Bach usually "went to considerable pains to avoid consecutives", as Malcolm Boyd argues.[iii] Given that some successions of this kind do exist in the Bach chorales, though, the goal of our project was to account for all cases of consecutives formed in the chorales, to understand why they appear and how they function in each particular passage. However, comparing the scores presented in widely circulating editions, such as the Breitkopf & Härtel and Schirmer editions, with those found in the revised and corrected edition of the '371' (actually, 370) by Frieder Rempp, as presented in the *Johann Sebastian Bach*, *Neue Ausgabe sämtlicher Werke*, we came to realize that there are problems inherent in relying exclusively on these editions of Bach chorales.[iv]

In fact, Boyd, using the 1941 Schirmer / Riemenschneider edition, is referring to two passages in which parallel fifths appear; in trying to explain why such a parallel motion emerges in these cases, he suggests that one could suspect that "either the text is at these points corrupt, or that Bach has not spotted the consecutives and would have corrected them if he had".[v] One of those passages concerns the ending of the first phrase of chorale No 273 (Schirmer edition), *Ein' feste Burg ist unser Gott*, in D Major, where parallel 5ths seem to appear between the voices of bass and soprano at the beginning of m. 2: F#-C# / E-B.



Example 1. Chorale No 273, first phrase

One may wish to justify the existence of the consecutives in this passage by comparing the cadential pattern that closes the first phrase with similar cadential passages by Renaissance composers. He /she may even want to examine two other Bach harmonizations of the same melody (chorales no 20 and no 250 from the same edition) and realize that, in these cases, Bach made special efforts to handle the voice-leading in such a way that permitted him to 'get rid' of the parallel fifths altogether. Nevertheless, all this would be futile since what appears as "Chorale No 273" is the one that concludes the Cantata for the Reformation Sunday, BWV 80, and as shown in the Critical edition (as well as in Editio Musica Budapest) the parallel fifths identified by Boyd in this case are due to errors found in the Schirmer and Breitkopf editions. By consulting the correct score, one sees that no consecutives are formed between the external (or any other) voices.[vi]



Example 2. Chorale BWV 80 (No 75), first phrase

After detailed research, carefully avoiding 'wrong' scores found in certain printed editions of Bach chorales, we came up to the conclusion that in 18 passages Bach seemed to be tolerant with such 'forbidden' successions. Below we explain in detail the computational methods used to retrieve these consecutives and we analyze each and every case separately.

Computational method

A computational query of the Bach chorales was constructed for the identification of parallel fifths (antiparallel fifths are not considered here). The query uses various different properties and relations of events (see Table 1) to express the concept of a parallel fifth. Four events (say, A, B, C, D) within two different voices indicate a parallel fifth if several conditions are met. Events A and C, and events B and D, must be in the same voice and meet: that is, not separated by other events or rests. Events C and D must be simultaneous and must form a pitch class interval of 7. The pitch interval between events A and C, and events B and D, must be the same (i.e., parallel successions

are formed) and must not be zero. The above conditions can be precisely and compactly encoded in the PROLOG logic programming language (Figure 1).

Bach chorales were downloaded from the web site www.jsbchorales.net. On this site is an extensive collection of Bach chorale harmonizations, encoded using Finale, quantized to musical durations, and available as MIDI and score files. Conveniently, the MIDI files are Type 1, with each voice within the chorale presented on an individual track, facilitating the determination of voice.

Chorales were converted from MIDI events to a PROLOG database comprising the basic predicates pitch/2, duration/2, onset/2, and meets/2, with other predicates simul/2, higher/2, intpc/3, and int/3 computed from the basic predicates. An initial run of the query returned several cases that on closer inspection were not interesting. First, in chorales with expanded repeated sections, the query found a few parallel fifths that occur between the last chord of one part of the chorale and the chord that begins the (exact) repetition of that part; however, we are inclined to think that these should not be regarded as parallel fifths. Second, repeated material in the same chorale sometimes caused the same parallel fifth to be indicated more than once. Finally, we found several cases of apparent parallel fifths that on further inspection were due to errors in the encoded MIDI files, or in a few cases errors in the particular edition of the chorales used.

Relation	**Meaning**
pitch(X,Y)	event X has pitch Y
duration(X,Y)	event X has duration Y
onset(X,Y)	event X has onset time Y
meets(X,Y)	Event Y follows event X in the same voice, and there is no rest between
intpc(X,Y,I)	I is a directed pitch class interval between events X and Y
int(X,Y,I)	I is a directed pitch interval between events X and Y
higher(X,Y)	event X has a higher pitch than event Y
simul(X,Y)	X and Y have the same onset time

Table 1. Event properties and relations

```
par5(A,B,C,D) :-
        simul(C,D),
        higher(C,D),
        intpc(D,C,7),
        meets(A,C),
        meets(B,D),
        not(intpc(A,C,0)),
        int(A,C,I1),
        int(B,D,I2),
        I1 = I2.
```

Figure 1. The parallel fifth query in PROLOG

Table 2 shows the filtered results, with voices between which the consecutives are formed, the exact measure numbers for each case as well as the specific pitches involved. It also indicates a rough characterization of the type of parallel fifth (last column): whether completely exposed (exp); caused by the existence of a non-harmonic tone, such as an anticipation (ant), a passing tone (pas), or a neighbor tone (nei); caused by an arpeggiation (arp); or, finally, appearing between the end of one phrase (under a fermata) and the beginning of the next (fer).

BWV	*Mvt*	*Voices*	*Measure*	*pitches*	*type*
40		tenor/soprano	m. 2	C-B♭ / G-F	ant
40		tenor/soprano	m. 4	E♭-D♭ / B♭-A♭	ant
40		tenor/soprano	m. 6	C-B♭ / G-F	ant
40		tenor/soprano	m. 16	E♭-D♭ / B♭-A♭	ant
48		tenor/alto	m. 10	D-C / A-G	pas
86		tenor/soprano	mm. 9-10	B-F# / F#-C#	arp
99		tenor/soprano	m. 7	A-B / E-F#	nei
146		tenor/soprano	m. 6	D-C / A-G	ant
174		tenor/alto	m. 17	B-D / F#-A	fer
194		tenor/alto	m. 7	C-B / G-F#	exp
244		tenor/soprano	m. 4	E-D / B-A	ant
248	23	bass/alto	m. 6	D-E / A-B	fer
248	33	alto/soprano	m. 2	E-F / B-C	pas
263		tenor/soprano	m. 6	A-G / E-D	ant
301		bass/tenor	m. 3	A-D / E-A	fer
323		tenor/soprano	m. 8	E-B / B-F#	exp
355		bass/soprano	m. 15	E-D / B-A	nei
361		tenor/soprano	m. 12	F-E♭ / C-B♭	ant

Table 2. 18 parallel fifths found in Bach chorales

Identified parallel fifths

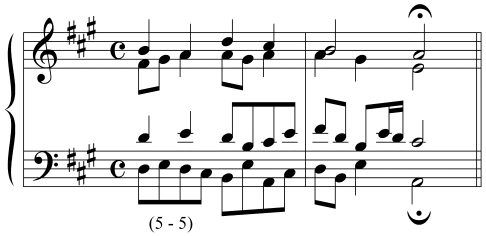
The 18 excerpts presented in Table 2 should, in fact, be further reduced to 15. Concerning BWV 194, 248.23 and 355(195) it is questionable whether Bach really intended to write parallel fifths.

In the results there is a chorale in G Major under the title 'BWV 194, Variation in G', in which parallel fifths seem to be formed between tenor and alto in m. 7: C-G / B-F#. This chorale is not shown in EMB, but appears

as chorale No 64 in the Schirmer and Breitkopf editions. Nevertheless, it is not included in Cantata 194 –only a harmonization of the same melody in B♭ Major appears in 194. In other words, the designation of the G Major chorale as 'BWV 194' is incorrect. It is possible that either C. P. E. Bach, in his 1784-1787 edition, transposed the chorale from B♭ Major to G Major, or that he registered the G Major chorale from a lost cantata that his father may have written. Although in the Schirmer and Breitkopf editions parallel fifths do appear in m. 7, in his corrected edition of the '371' chorales edited by C. P. E. Bach, Frieder Rempp does not show consecutives at this point.[vii] Therefore, the mistake presented at the aforementioned editions should be 'credited' either to C. P. E. Bach himself or to the editors of these publications. In any case, it seems that J. S. Bach never intended to write parallel fifths in m. 7.

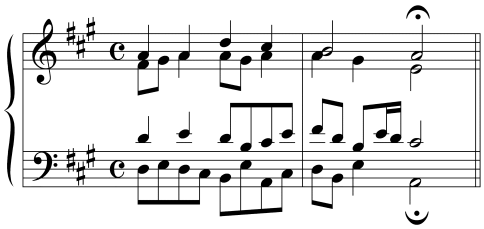
Regarding BWV 248.23 (in G Major, not included in EMB), two different harmonizations of that melody appear in EMB (chorale numbers 323 and 324), but in 4/4 instead of 12/8 measure and in D and C Major respectively. This is the chorale that ends the second Cantata of the Christmas Oratorio. The particular Cantata begins with a *Sinfonia* in 12/8 measure which includes, among other things, ritornellos of a pastoral character played by the oboes. The same ritornellos are recalled in the final chorale (again in 12/8), separating the two-bar vocal phrases. The four-part reduction of this score, with the ritornellos having been removed, appears as No 344 in the Breitkopf and Schirmer editions –however, in Breitkopf it is shown in 4/4 measure instead of the (correct) 12/8 indicated in the Schirmer; the latter is also the score returned in the results (Table 2). The reduction shows that parallel fifths are formed between the triad under the penultimate fermata and the one which begins the last phrase. Nevertheless, in the source Cantata, an almost two-bar ritornello intervenes between these two triads. As with the previous case, Bach did not write consecutives.

Finally, BWV 355 (195) is a special case. All printed editions (EMB No 195, Schirmer and Breitkopf No 169), as well as the analysis corpus show that there are parallel fifths between the external voices in the penultimate measure, E-B / D-A:



Example 3. BWV 355, mm. 15-16

It seems that the melody of the soprano itself appears with a wrong note in all editions. That is, in the last phrase of the chorale the soprano should not begin with B_4, but rather with A_4 (repeated twice). So, no parallel fifths are formed:



Example 4. BWV 355, mm. 15-16, correct version

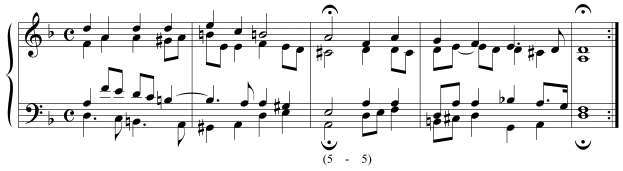
It is possible that J. S. Bach found this melody (with the 'correct' A_4 instead of the 'wrong' B_4) in an anthology of chorale melodies printed around 1680 in Breslau. There is also another collection of chorale melodies from 1747, in which the correct version appears. After Bach's death, two other editions with four-part harmonizations appear before the edition of the '371' by C. P. E. Bach: one by Friedrich Wilhelm Birnstiel with "200 vierstimmige Choräle" (Berlin, Leipzig 1765 and 1769) and another (anonymous) one with 252 chorale harmonizations. In both of these editions, the ultimate phrase begins with A_4 in the soprano. The C. P. E. Bach edition shows B_4, but the corrected edition by Frieder Rempp (see footnote 7) reinstates A_4 as the correct soprano note at the beginning of the last phrase. Therefore it is more likely that J. S. Bach has used this version of the melody in

BWV 355 and did not intend to write parallel fifths.

Apart for the aforementioned 3 excerpts, 15 cases of consecutive fifths now remain to be examined. In two of them the successive fifths are formed between the last triad of one phrase (the pause chord under the fermata) and the triad that opens the next phrase: BWV 174 (151), and 301 (73).[viii] Boyd, writing about consecutives appearing "at the end of one line and the beginning of the next" argues: "What is sometimes forgotten, or not understood, is that many of the '371' chorales are taken from cantatas … and that in the originals each line of the chorale was separated from the next by an instrumental passage. When these instrumental passages are removed … consecutives often appear in the vocal parts where, in the original, they do not exist. There can be little doubt that Bach himself would have removed the consecutives if he had intended to perform the chorales as we find them in the '371'".[ix]

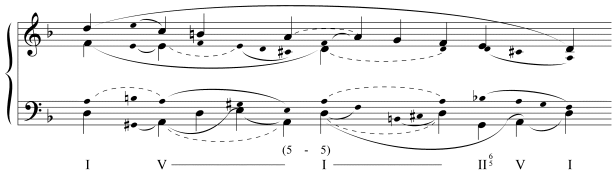
However, we think that this viewpoint is rather incorrect. In the vast majority of the '371' there are no such instrumental passages. It is true that voices are doubled by instruments but no instrumental interludes intervene *between* the vocal phrases. There are, indeed, very few among those that we use to know as the (371 or 388) 'Bach Chorales' found in printed editions, in which instrumental passages *do separate* the vocal parts. For example, in only 4 from the 388 chorales included at EMB, instrumental interludes are actually presented between the vocal phrases: BWV 41 (208), BWV 79 (256), BWV 105 (191), and BWV 248 (323). Two of those four chorales also appear in the Schirmer and Breitkopf editions (no 11 and 46) but, unlike the scores found at EMB, the instrumental passages are not notated. Nevertheless, this does not mean that in most of the remaining chorales there were such passages that the editors have simply removed –an examination of the scores of the corresponding Cantatas may easily prove the correctness of this viewpoint. One could even argue that such chorales (with instrumental parts separating the vocal parts) should not be included among the authentic four-part Bach chorales –bear in mind the case of BWV 248.23, discussed earlier, that is not found in EMB. In any case, we suggest that one could refer to such chorales as 'enriched' chorales, in contrast to the majority of the 'pure vocal' chorales.

The two chorales already mentioned, BWV 174 (151), and 301 (73), are indeed pure vocal chorales. In both of these chorales Bach did not care to remove the consecutives even though no interludes intervene. For BWV 174 we could not say why he chose to do so – probably because tenor and bass sing in unison.[x] Let us see, however, the first two phrases from BWV 301, where parallel fifths appear between the male voices, A-E / D-A, in m. 3:



Example 5. BWV 301 (73), mm. 1-5

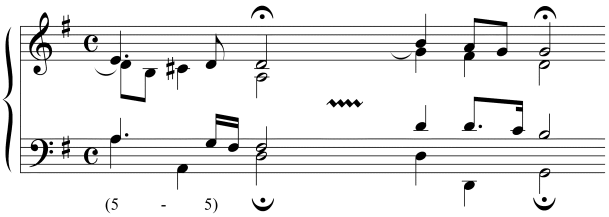
One could argue that in this case the parallel fifths occur within a prolongation of the tonic triad, D minor. Indeed, the first two phrases of the chorale could be perceived as one single phrase, with a momentary pause (and emphasis) at the intermediate dominant that insists in mm. 2-3. One could hear, especially, the downward stepwise motion of the upper voice, from D_5 towards D_4, that can be perceived at a middle-ground level. The initial D_5 as well as the anti-penultimate F_4 of the soprano melody are both harmonized with a D minor triad in root position, while under the penultimate E_4 one can hear both the predominant and the dominant chords that drive the phrase towards the final tonic. As shown in the following middle-ground graph, the tenor insists around A_3 throughout mm. 1-4. In fact, the E_3 that appears on the downbeat of m. 3 –actually, the pitch that is responsible for the formation of the parallel 5ths– is there just to make the dominant of D minor, A Major, sound complete.[xi] It seems that Bach did not want to sacrifice this possibility in order to avoid consecutives that, after all, do not function as such.



Example 6. BWV 301 (73), mm. 1-5: Middle-ground graph

In 8 of the remaining 13 cases the parallel fifths are formed in the same way: that is, when the soprano moves from $\hat{2}$ to $\hat{1}$ in perfect authentic cadences, there is an eighth-note anticipation of the final $\hat{1}$. The existence of an eighth-note 7th of the dominant chord (a passing note in a $\hat{8} - \hat{7} - \hat{6}$ succession, always at the tenor voice in these 8 passages) leads to the formation of parallel fifths between tenor and soprano. In BWV 40 (106) especially, this kind of parallel-fifth succession acquires an almost motivic character, appearing four times (in mm. 2, 4, 6, and 16 of the chorale). The same kind of formation also appears in BWV 146 (369, end of the 3rd phrase), 244 (371, end of the 2nd phrase), 263 (19, end of the 3rd phrase) and 361 (207, final cadence).

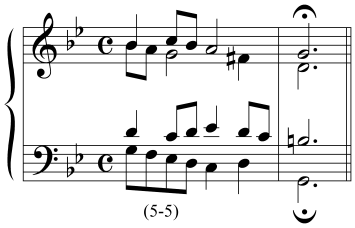
However, it is surprising that Bach allowed those fifths, given the fact that in numerous other cases he has taken special care to avoid consecutives in such harmonic-melodic cadential patterns. He has done this either by delaying the appearance of the 7th of the V^7 (making it passing as a sixteenth note and, thus, not coinciding with the eighth-note anticipation –see BWV 301, end of the second phrase) or by using the dominant chord with its 7th from the start of the cadential V – I succession, or even by omitting the 7th of the dominant altogether. Counting *only* final cadences in Bach chorales, one may enumerate more than 20 such handlings. It is more than impressive that one of those final cadences in which Bach has taken care to avoid this kind of parallel fifths is in BWV 263 (19), one of the chorales which, as we have already said, Bach allowed such consecutives in the middle of the chorale. In other words, one is led to assume (?) that at the end of the 3rd phrase of this particular chorale the composer 'has not spotted the consecutives' between tenor and soprano, while at the end of the 6th and final phrase of the *same chorale* became sensitive as to avoid parallel fifths of the *same type*, between the *same voices*.[xii] See the cadences which end the 3rd and the final phrase of BWV 263 (19):



Example 7. BWV 263 (19), m. 6 and m. 12

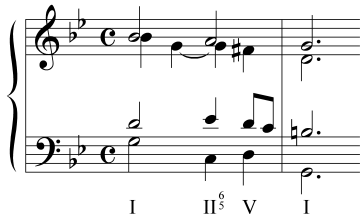
There remain only 5 chorale passages in which parallel fifths also seem to be formed and which could not be classified under the previous categories: BWV 48 (139), 86 (88), 99 (340), 248.33 (334) and 323 (238). We shall see that in most of these passages the parallel fifths shown at the score may not be heard as 'problematic' cases of consecutives.

In BWV 48 the consecutives are formed in the penultimate measure, between tenor and alto (D-A / C-G), due to the presence of a passing note in the latter voice:



Example 8. BWV 48 (139), mm. 10-11

Bach has harmonized the same melody three more times (EMB nos 140, 141, and 142) and had easily avoided those fifths. However, we are inclined to think that, even in the case of BWV 48 the parallel fifths do not function as real consecutives because they appear within a prolonged tonic triad –as it happens in BWV 301. The chords that do have a structural harmonic function in the last two bars are the tonic on the downbeat of m. 10, the predominant and the dominant on the second half of that measure and the final tonic (m. 11), as the following middle-ground graph shows:

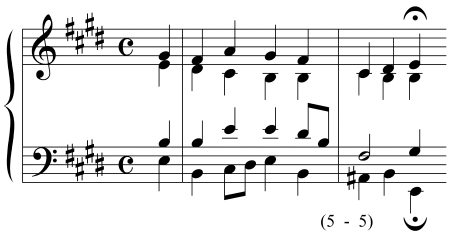


Example 9. BWV 48 (139), mm. 10-11: Middle-ground graph

The initial tonic triad persists throughout the first two beats of m. 10 and the IV^6 that is heard on the second beat of the same measure is a contrapuntal formation, created by the voice-leading and not by any kind of harmonic necessity. Indeed, during the first two beats of m. 10 the three upper voices sing either neighbor or passing notes to the notes of the G minor triad, while the bass descends in a stepwise motion from the tonic root G_3 to the C_3 of the predominant seventh-chord. Therefore, the consecutives which are formed because of the (supposed) I – IV^6 succession do not really convey the impression that parallel fifths between two harmonic (and not contrapuntal) triads may convey.

The case of BWV 99 (340) resembles the one of BWV 48. The parallel fifths are now formed between tenor and soprano at the beginning of the cadential idea that closes the penultimate phrase of the chorale. Here, a rather unnecessary neighbor note in the soprano causes the formation of the successive fifths A-E / B-F#. As in BWV 48, the soprano sings an embellished $\hat{3}$ – $\hat{2}$ – $\hat{1}$ succession (in D Major), the alto moves toward the typical leading-tone suspension, while the bass descends, as in BWV 48, from $\hat{1}$ to $\hat{4}$. Again, the consecutives are not formed between two harmonic chords and, thus, may not be perceived as real parallel fifths.

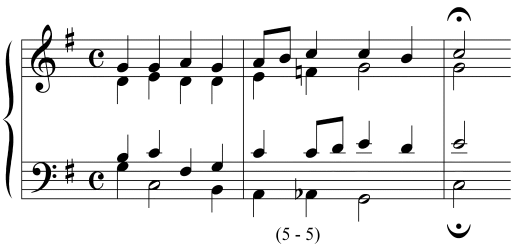
In BWV 86 (88) the fifths appear again toward the end of the chorale, between the tenor and the soprano: B-F# / F#-C#.



Example 10. BWV 86, mm. 9-10

Observing the way in which Bach has formed the lines of the four voices, those fifths seem to be unavoidable. The soprano melody sings in a rather low register and towards the end of the chorale descends to its lower limits ($C\#_4$). This fact forces the alto to also remain in its low register in order to move, in contrary motion with the soprano, toward the same C# on the downbeat of m. 10. The result is that the tenor crosses above the alto for a while (beats 2, 3, and 4 of m. 9). However, the tenor must return to its own (low) register on the downbeat of m. 10, and so he does in a hasty manner through a downward arpeggio which causes the formation of the parallel fifths. There are other compositional choices that could easily avoid parallel fifths at this point and Bach has proven it by harmonizing the same (although slightly more elaborate) chorale melody four more times –see EMB nos 87, 89, 90, and 91; in some of these chorales voice crossings are also necessary (for example, between soprano and alto or even between tenor and bass) but no parallel fifths are formed.

In BWV 248.33 (334) the parallel fifths appear at the beginning of m. 2 between the two female voices: E-B / F-C.



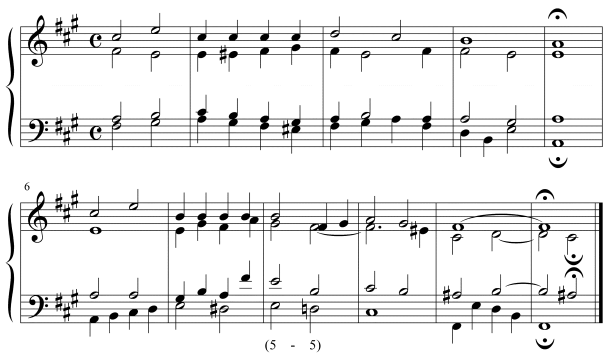
Example 11. BWV 248.33 (334), first phrase

This is the second example of parallel-fifths formation mentioned by Malcolm Boyd, who assumes that "Bach has not spotted the consecutives and would have corrected them

if he had". On the contrary, we are inclined to argue that Bach may have noticed the parallel fifths but did not really care for their being there. In other words, he may have considered that they do not really create a kind of significant problem, and that they do not really function as parallel fifths since they appear within the prolongation of the same harmonic function –this time, within the predominant function of the cadential pattern which leads the first phrase to its close.

What one perceives on a local level in the first two beats of m. 2 is a VI – IV^6 succession in C (Major-minor). However, both of these chord formations belong to one, and only one, harmonic function: the predominant function which is already (and rather inescapably) on its way to the following dominant –observe the chromatic movement A-A♭ that 'pushes' the bass line toward G– that will eventually lead to the final tonic of the first phrase, C Major. Arguably, only one triad is really heard (and functions) in the first half of m. 2, a IV^6 of C (Major-minor), if one perceives the E_4 of the alto as a passing note between D_4 and F_4, a passing note that has been rhythmically shifted: instead of appearing as an eighth-note, grouped with D_4 at the last beat of m. 1, becomes a quarter note on the downbeat of m. 2. Thus, it may be argued that this kind of rhythmical shift creates an illusion of a submediant triad in root position that is followed by a subdominant in first inversion. In any case, appearing in such a context, the successive perfect fifths do not at all convey a feeling of stillness that would impede the forward thrust created by the longing of the predominant to lead to the dominant function.

Finally, parallel fifths appear in m. 8 of BWV 323 (238) between tenor and soprano: E-B / B-F#. The melody of this particular chorale has a special history; a brief reference to the set of fixed tunes known as *psalm tones* is needed here.



Example 12. BWV 323 (238)

Already since 1558, Gioseffo Zarlino has noticed that there were two kinds of modes used in the Catholic liturgical practice: the so called 'varied modes' in which one could sing "antiphons, responsories, introits, graduals, and other similar things", and the 'stable modes', in which one sings "the Psalms of David and the New Testament canticles".[xiii] There were 8 such stable modes, known as *psalm tones*; these psalm tones corresponded to the 8 medieval modes, one by one, but they were not to be identified with them. Unlike the 8 known modes, the 8 psalm tones were, in fact, completely predetermined, fixed melodies, structured as *inflected monotones* (recitatives) which move around one reciting note –different for each psalm tone– called *tenor* or *tuba*, and with also fixed melodic formulas for the beginning (*intonatio*), the middle (*mediatio*), and the end (*differentia*, *terminatio*).

Apart from those specific 8 psalm tones, there was one more, a 9th psalm tone called *tonus peregrinus*, probably of Jewish origin, the binary form of which is structured around *two* (and not only one) *different tenors*. The melody of BWV 323 is attributed to Luther (1529) but originates from the formulaic melodic patterns that characterize this 9th psalm tone of the ecclesiastical tradition – note the two *tenors* that are persistently repeated in the two phrases: $C\#_5$ for the first phrase and B_4 for the second. It seems rather unlikely that Bach "had not spotted the consecutives" in this case since it is very easy for someone to see (and hear) them at once. The reason of their being there, however, could be that, after the insistent repetition of the *tenor* (*tuba*) of the second phrase, B_4, a slight pause could be introduced in order to

separate the E Major triad on the downbeat of m. 8 from the B minor triad (in first inversion) that supports the beginning of the final melodic gesture, the *differentia* of the *tonus peregrinus*.

Epilogue

This paper has applied a computational query, precisely and compactly expressed in the PROLOG logic programming language, for the search for parallel fifths in Bach chorales.

The analyses have indicated that very few parallel fifths are formed within the prolongation of one triad. The majority of the consecutives occur in cadential passages in which the forward movement of paradigmatic melodic lines moving toward their (melodic) goals is so intense that it renders the existence of parallel fifths rather insignificant. A similar compositional attitude toward consecutive fifths may be encountered in many Renaissance cadential patterns. For example, due to the presence of simultaneously sounding, stereotypical melodic formulae, Orlando di Lasso, Palestrina and other sixteenth-century composers did not hesitate to include almost fully-exposed parallel fifths in some of their cadences –see, for example: Lassus, *Ego sum resurrection et vita*, final cadence; Lassus, *Domine non est exaltatum cor meum*, m. 93; Lassus, *Beati omnes qui timent Dominum*, final cadence; Lassus, *O Maria clausus hortus*, m. 20; Palestrina, *Haec dies*, mm. 72-73; Palestrina, *Vergine bella*, mm. 93-94; Ferrabosco, *Io mi son giovinetta*, final cadence. Those stereotypical melodic patterns –called *clausula tenorizans*, *clausula cantizans*, and *clausula basizans*[xiv]– were the *sine qua non* components of all cadential formations, at least since the beginning of the sixteenth century and with slight modifications they have continued being present and regulate each and every perfect authentic cadence in the Bach chorales.

Usually, the full cadences of J. S. Bach are considered as the cornerstone, the *essence* of a 'harmonic' way of composing –a IV-V-I, II-V-I, or even VI-V-I paradigmatic succession. However it seems that, even in Bach's time, a kind of contrapuntal-intervallic mode of thinking is still responsible and controls the musical procedures, occasionally allowing the formation of parallel fifths which come to be considered as a musical feature of secondary structural importance.

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[i] Brahms 1980: 1-196.

[ii] Ibid: 146.

[iii] Boyd 1967: 22. Boyd writes here about fifths appearing between the last chord of one phrase and the first chord of the next phrase. He also mentions some of the means Bach used to avoid consecutives in such places, namely by omitting the fifth from the pause chord, by making the parts cross, or by rearranging the voice parts.

[iv] Unlike those editions, the "388 vierstimmige Choralgesänge" of the Editio Musica Budapest (hereafter referred as EMB in this paper) can be considered highly trustworthy.

[v] Boyd 1967: 22.

[vi] See Rempp (ed.) 1987:142. Observe that, in order to avoid the formation of the same parallel fifths between the tenor and soprano voices, Bach makes the tenor leaping down to B_3 before going to E_4 (m. 2). Given the fact that, as already mentioned in footnote 4, EMB is an easily accessible publication that, unlike Schirmer or Breitkopf editions, can be considered reliable, all the chorales that will be mentioned hereafter will be

presented by the BWV number, as well as by the EMB number (in parenthesis).

[vii] Rempp (ed.) 1996: 35 (chorale No 63).

[viii] There are a few more cases in which consecutive fifths seem to appear between two voices in triads across a fermata. This happens because *the same* pitch classes are repeated in the two voices, whether both voices sing exactly the same pitches or jump an octave –see, for example, BWV 73 (325): the triad under the second fermata is C Major, with the bass and the soprano singing C_3 and G_4 respectively; the same triad opens the second part of the chorale (m. 4, last beat) with the two voices now singing C_4 and G_5. We do not consider those as cases of parallel fifths, however.

[ix] Boyd 1967: 21-22.

[x] The consecutives appear between the triad that closes the penultimate and the one that opens the ultimate phrase: B-F# / D-A, tenor-alto.

[xi] The $G\#_3$ which has been left 'hanging' at the end of m. 2 finds its way to A_3 at the beginning of the next phrase.

[xii] One may argue that Bach allowed the formation of such consecutives in intermediate cadences, while he was more sensitive in final cadences. The only exception is found in BWV 361, in which the parallel fifths occur at the end of the chorale –however, one may wonder why he did not apply in the final cadence the melodic pattern used in the cadence of mm. 3-4 (alto) of the same chorale, where the same kind of parallel fifths are avoided in a rather sophisticated manner.

[xiii] Zarlino 1983: 46-47.

[xiv] See Meier 1988: 90-95.