

Some Guidelines for Writing Temporally Equidistant Three-Voice Canons in Sixteenth-Century Style

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Most courses in counterpoint in sixteenth-century style involve some work with canonic imitation. Although the literature generally features free imitation in which only a head motive is retained, or in which the pitch interval of imitation varies, it also contains numerous examples of strict canons by Palestrina and others. The composition of such canons, which the early theorists called "fugues,"¹ can pose a challenge for both teacher and student. This study will limit itself to the problems of composing a representative type of strict canon: the three-voice canon with temporally equidistant entries.²

Writing a three-voice canon with equally spaced entries in sixteenth-century style can be relatively easy, but it can also be extremely difficult. Students and teachers who attempt the task will find that much depends upon the pattern of voice entries and the resulting mapping of vertical intervals between the pairs of voices created by the entries. An investigation of the possibilities will reveal guidelines for writing such canons.

Consider Example 1, the opening of a mass movement by Palestrina,³ a strict canon on the text "Crucifixus etiam pro nobis."⁴

¹For information on early contrapuntal terminology, see Alfred Mann, *The Study of Fugue* (1958; reprint ed., New York: Dover, 1987), 9-30.

²General sixteenth-century style rules of voice leading and dissonance treatment are not addressed here. This discussion applies primarily to the sixteenth-century style because it takes into account the usual restrictions on interval patterns between entry pitches in that period, discussed below.

³All musical examples are taken from *Giovanni Pierluigi da Palestrina: Le opera complete*, ed. Raffaele Casimiri (Rome: Edizione Fratteli Scalera, 1939-).

⁴The cantus breaks the canon on the first syllable of "nobis."

EXAMPLE 1. Palestrina, *Missa: Repleatur os meum laude: Crucifixus*
(Vol 6, p. 137)

The musical score is presented in three systems, each corresponding to a vocal part: CANTUS (top), ALTUS (middle), and BASSUS (bottom). The notation includes standard musical symbols (staves, clefs, notes, rests) and figured bass notation (numbers 1-7 and letters A, B, C) placed below the bass staff. The lyrics are written below the notes.

System 1:

- CANTUS:** Cru - ci - fi - xus
- ALTUS:** Cru - ci - fi - xus
- BASSUS:** Cru - ci - fi - xus

System 2:

- CANTUS:** é - ti - am... pro no -
- ALTUS:** é - ti - am... pro no -
- BASSUS:** é - ti - am... pro no -

System 3:

- CANTUS:** é - ti - am...
- ALTUS:** é - ti - am...
- BASSUS:** é - ti - am...

The figured bass notation includes figures such as 13, 12, 10, 8, 7, 6, 5, 4, 3, 2, 1, A, B, C, and 5, 8, 10, C, which are placed below the bass staff.

Here each entry is separated by three half-note beats. The order of voice entries can be described as middle, low, and high. The entry pitches are e' , a , and a' , suggesting an Aeolian modality which is confirmed by the final cadence at the end of the movement. Within this modality the entry pitches represent scale degrees 5, 1, and 1, respectively. The melodic content of the canonic voices can be diagrammed as in Table 1 (the letters are also marked on Example 1).

Table 1. Opening melodic segments, Palestrina, *Missa: Repleatur os meum laude*: Crucifixus

		A	B	C
A	B	C		
	A	B	C	

Note that at the first interaction of the middle voice with the low voice, B is above A, and C is above B; whereas, at the first interaction of the high voice with the low, A is above B, and B is above C. Clearly this is a case of invertible counterpoint. The intervals produced by BC over AB (see Example 1) are 5, 1, 3, 3, 5, 4, 3, 8, 5, and 3; the corresponding intervals produced by AB over BC are 8, 12, 10, 10, 8, 9, 10, 5, 8, and 10. The mapping of these intervals onto each other is the familiar one of invertible counterpoint at the twelfth (Table 2).⁵ Canons of this form (temporally equidistant entries with middle voice: scale degree 5, low voice: scale degree 1, and high voice: scale degree 1) will always produce invertible counterpoint at the twelfth, and will always be as easy to write as invertible counterpoint at the twelfth—certainly within the capabilities of teacher and student.

Table 2. Invertible counterpoint at the 12th, interval inversions

1	↔	12
2	↔	11
3	↔	10
4	↔	9
5	↔	8
6	↔	7

⁵The double-headed arrows indicate that the mapping is to be read both ways: 1 maps to 12, 12 maps to 1, etc.

Consider next Example 2(a), the opening of another mass movement by Palestrina. Entries are temporally equidistant in the form high voice: scale degree 1 (g'), middle voice: scale degree 5 (d'), and low voice: scale degree 1 (g).⁶ However, in Example 2(a) the canon is not yet complete: segment A has been copied into the altus and bassus, and it is now time to copy segment B into the altus in mm. 5-6. This has been done in Example 2(b), with unfortunate results. Almost every interval between altus and bassus is a dissonance. The intervallic mapping between the two versions of A over B is shown in Table 3.

Table 3. Interval mapping, Example 2(b)

1	→	2
2	→	3
3	→	4
4	→	5
5	→	6
6	→	7
7	→	8
8	→	9
	↓	

In contrast to the mapping in Table 2, which is both familiar and closed, the mapping of Table 3 is unfamiliar and open-ended (it could be continued to infinity). The mapping also indicates the near impossibility of writing a strict canon with entries in this form. Palestrina's solution is shown in Example 2(c). In m. 5 the altus enters one step lower than in the strict version, producing the identity mapping shown in Table 4, and retaining in the altus and bassus the original intervals of the cantus and altus.

If the third entry produces the same vertical intervals as the second (the identity mapping), the canon will be relatively easy to write.

⁶The "key" of the scale degrees is arbitrary. The classification of the piece in a particular mode need not enter into the practical work of classifying scale degrees of entry pitches. Any entries which are separated by the intervals of a fifth and a fourth can be assigned scale degrees 1 or 5 in some tonality, which is all that is required here.

EXAMPLE 2a: Palestrina, *Missa: Primi toni*: Et ressurexit (Vol. 6, p. 46).

CANTUS

ALTUS

BASSUS

A **B**

A **B**

Et re-sur-ré-xit

Et re-sur-ré-xit

Et re-sur-ré-xit

The first system of musical notation consists of three staves. The first two staves are in treble clef and contain a single note each, both on the second line (G4). The third staff is in bass clef and contains a single note on the second line (G3). The notes are connected by a horizontal line across all three staves. Below the staves, the text 'ré - xit' is written.

EXAMPLE 2b: (cont)

A B
 8 6 5 3 3 1 2 3 1
 CANTUS Et re-sur - ré-xit tér-ti-a di- B 9 7 6 4 -
 ALTUS Et re-sur - ré-xit tér-ti-a A tér-ti-a
 BASSUS Et re-sur - ré-xit tér-ti-a Et re-sur -

4 2 3 4 2
 di - e, tér-
 ré - xit

EXAMPLE 2c: (cont)

Musical score for three voices: CANTUS, ALTUS, and BASSUS. The score is written in three staves, each with a treble clef and a key signature of one flat (B-flat). The lyrics are: "Et re-sur-ré-xit di-tér-ti-a Et re-sur-ré-xit di-tér-ti-a Et re-sur-ré-xit di-tér-ti-a". The score is divided into two systems. The first system contains measures 1 through 6, and the second system contains measures 7 through 12. The lyrics are written below the staves, with some words appearing in the margins. The score includes various musical notations such as notes, rests, and bar lines. The lyrics are: "Et re-sur-ré-xit di-tér-ti-a Et re-sur-ré-xit di-tér-ti-a Et re-sur-ré-xit di-tér-ti-a".

Detail of the musical score showing the lyrics: "e, tér-ti-di-e, tér-ré-xit". The score is written in three staves, each with a treble clef and a key signature of one flat (B-flat). The lyrics are: "e, tér-ti-di-e, tér-ré-xit". The score includes various musical notations such as notes, rests, and bar lines.

Table 4. Interval mapping, Example 2(c)

1	→	1
2	→	2
3	→	3
4	→	4
5	→	5
6	→	6
7	→	7
8	→	8
	↓	

The other temporally equidistant entry combinations that are found in the openings of Palestrina's three-voice movements, and which preserve vertical intervals at each entry, are shown in Examples 3, 4, and 5. These all have pitch intervals that are equal in size and direction between the starting pitches of the successive voices. In Example 3, the pitch interval between the successive voices is the perfect unison, in Example 4 it is the ascending major second, and in Example 5 it is the descending perfect fifth. Although canons of these forms constitute a small minority in Palestrina's work, it yet may be useful to know that any canon possessing temporally equidistant entries and intervals equal in size and direction between successive entry pitches will preserve the vertical intervals at each successive entrance, and therefore will be relatively easy to compose.

The great majority of three-voice canons have entry pitches separated by combinations of different perfect intervals. For the purposes of this investigation, these entry pitches can most easily be represented as scale degrees 1 and 5 of some modality. Entries of these forms always produce mappings other than identity, and some mappings are more difficult to work with than others. Table 5 identifies the mappings that result from the possible forms of this type of canon. In Table 5 the top of each column gives the order of entry of the voices, with H = high voice, M = middle voice, and L = low voice. The rows are labeled on the left with ordered entry pitches given as scale degree numbers. At the intersections of the rows and columns appear the letters A through J, which refer to the mappings given in Table 6. In Table 5, the last four columns are incomplete because two of the voices are of the same voice type (i. e.,

EXAMPLE 3. Palestrina, *Missa (sine nomine)*: Pleni (Vol. 18, p. 187)

Musical notation for the first system of 'The Rose Tree'. It consists of a treble clef, a key signature of one flat (B-flat), and a 2/4 time signature. The melody is written on a five-line staff. The notes are: G4 (quarter), A4 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F4 (quarter), E4 (quarter), D4 (half). Below the staff, the lyrics 'The Rose Tree' are written.

EXAMPLE 4. Palestrina, *Missa: Sacerdotes Domini*: Pleni (Vol. 24, p. 187)

C(u) Tribus vocibus
[Resolutio]
[Bisolutio]
[Trinitas in unitate]

TENOR I
TENOR II (Quintus)
BARITONUS (Sextus)

Pleni sunt coeli et terra.

2 3 3 1
coe - li
ter.
et ter.

EXAMPLE 5. Palestrina, *Missa: Ad fugam: Benedictus* (Vol. 4, p. 86).

CANTUS

ALTUS

TENOR

Be - ne - di - ctus

qui...

Be - ne - di - ctus

A

B

C

S.

6

di - ctus

qui...

ve

3 2 1 2 3

8 6 3 3 3

4 3 4 3 3 2 1 2 3

high, middle, or low). This pattern limits the possible scale degree combinations to those in which the duplicated voice also duplicates the scale degree.

Table 5. Interval mappings, perfect interval entries

	HML	HLM	MHL	MLH	LHM	LMH	HHL	HLL	HLH	LHL
115	G	A	D	A	D	H	G	-	-	-
151	E	B	C	B	C	F	-	-	B	C
155	I	D	A	D	A	G	-	H	-	-
511	G	A	D	A	D	I	-	J	-	-
515	F	C	B	C	B	E	-	-	C	B
551	H	D	A	D	A	J	I	-	-	-

Table 6. Interval mappings, perfect interval entries, interval inversions

A	B	C	D	E	F	G	H	I	J
1↔12	1↔7	1↔9	1↔11	1→2	2→1	1→4	4→1	1→5	5→1
2↔11	2↔6	2↔8	2↔10	2→3	3→2	2→5	5→2	2→6	6→2
3↔10	3↔5	3↔7	3↔9	3→4	4→3	3→6	6→3	3→7	7→3
4↔9	4↔4	4↔6	4↔8	4→5	5→4	4→7	7→4	4→8	8→4
5↔8		5↔5	5↔7	5→6	6→5	5→8	8→5	5→9	9→5
6↔7			6↔6	6→7	7→6	6→9	9→6	6→10	10→6
				7→8	8→7	7→10	10→7	7→11	11→7
				↓	↓	↓	↓	↓	↓

Some comments on the mappings are in order. A mapping is usable to the degree that it maps dissonances onto dissonances, and consonances onto consonances, with some advantage gained by mapping perfect consonances onto perfect consonances and imperfect consonances onto imperfect consonances. Mapping A, which appears eight times in Table 5, is the mapping for invertible counterpoint at the twelfth. It is the most usable mapping of the group, having all the advantages listed above, with the sole disadvantage of mapping the seventh (a dissonance) onto the sixth (a consonance) and vice versa. An examination of the openings of the 116 three-voice movements in the (Italian) Palestrina complete edition reveals that strict canons at equal temporal intervals are limited to six examples of the form MLH/511,⁷ two examples of the form MHL/

551,⁸ and the three special examples given in Examples 3, 4, and 5. It is curious that the four other entry patterns yielding mapping A are not used in any of these openings. It may be that they are used in interior entries of these or other multi-voiced works.

One could almost say that the other mappings and their concomitant entry patterns are of no use and should be avoided. Mapping B has the advantages of sending thirds to fifths and fourths to fourths, but parallel thirds would be impossible, and sixths and unisons would have to be treated as dissonances (a canon in eighteenth-century style might be possible with mapping B). Mappings C and D have only one pairing each of like intervals, $5 \leftrightarrow 5$ (C) and $6 \leftrightarrow 6$ (D), making them both virtually unusable. Mappings E through J can be grouped in three pairs (E and F, G and H, and I and J) by the retrograde relationship held by their corresponding elements. E and F hold no promise other than the mapping of $5 \rightarrow 6$ (E) and $6 \rightarrow 5$ (F), and that is surely not enough. G and H have the advantage of the mappings of $3 \rightarrow 6$, $4 \rightarrow 7$, and $5 \rightarrow 8$ (G), and $6 \rightarrow 3$, $7 \rightarrow 4$, and $8 \rightarrow 5$ (H). These advantages would probably be enough to work with, given that other intervals would be treated as dissonances. I and J also have only one pairing each of like intervals, $1 \rightarrow 5$ (I) and $5 \rightarrow 1$ (J), making them basically unusable.

In summary, the degree of difficulty of three-voice canonic writing with temporally equidistant entries in sixteenth-century style is directly related to the pattern of voice entries with regard to scale degrees and the relative highness or lowness of the entries. Students and teachers attempting to write such canons would do well either to memorize one or more of the usable entry patterns or to check their chosen entry pattern against Tables 5 and 6 above. In this way, potential problems may be circumvented, and successful strict canons composed.

⁷These are 1) *Missa: De Beata Virgine: Crucifixus* (Vol. 4, p. 12); 2) *Missa: Repleatur os meum laude: Crucifixus* (Vol. 6, p. 157); 3) *Lamentationem: Liber Quartus. Sabbato Sancto. Lectio I Pars mea.* (Vol. 13, p. 227); 4) *Hymni totius anni*, 38. In Festo S. Antonii de Padua. V. *Sub tanto* (Vol. 14, p. 199); 5) *Magnificat. Liber Primus. XIII. Quarti toni. 10. Sicut* (Vol. 16, p. 72); and 6) *Missa: Gia fu chi m'hebbe cara: Benedictus* (Vol. 27, p. 49).

⁸These are 1) *Lamentationem. Liber Secundus. Feria VI. In Parasceve. Lectio III. Meminavit* (Vol. 13, p. 76), and 2) *Magnificat. Liber Secundus. III. Toni 8. Esurientes.* (Vol. 16, p. 130).