

Contrapuntal studies

CS 275B/Mus 254
Stanford University

Counterpoint overview

- Various methods governing the combination of voices in a polyphonic work
- Main approaches
 - Note against note (*punctus contra punctum*), usually called “sixteenth-century” or “species” counterpoint
 - Palestrina counterpoint (also from the 16th century)
 - “Free” counterpoint (also “18th-century”)
- Highly rule-driven
- Originally required a pre-existing melody
 - *Cantus firmus* (later “tenor”)

Automatic species counterpoint

(Bill Schottstaedt)

Counterpoint

Cantus Firmus

First species—1:1

Second species—2:1

Second Species

Cantus Firmus

Species counterpoint, cont.

Third Species

Cantus Firmus

5

8

67

75

**aug4 at a cadence point is OK.

Third species—4:1

Fourth species—2:1 w/ suspensions

Cambiata: allowed some dissonances

Third Species

Cantus Firmus

5

8

An example of the contour of a nota cambiata figure

The contour of a double-neighbour figure including a legal leap from a dissonance

4th species

67

75

**aug4 at a cadence point is OK.

Fifth species, and its allowances

Fifth Species

Cantus Firmus

16th-century practice
as codified
In the 18th century

6

- As a neighbour-note figure (a stepwise connection between two instances of the same (consonant) note may be used if and only if the middle note is also a consonance).

8th-note rules

A quaver neighbour note figure

6 3 6 7 6 5 6 5 1

- As passing notes that connect two consonant notes an interval of a fourth apart (rarely used).

A step wise quaver figure

6 3 6 7 6 5 6 7 6 3 6 7 6 5 6 7

More allowances

Fourth Species rule:

Now this is also possible:

Musical notation in 2/4 time. The first staff (treble clef) shows a sequence of notes: a whole rest, a quarter rest, a half note, a quarter note, a half note, a quarter note, a half note, and a quarter note. The second staff (treble clef) shows a sequence of notes: a whole rest, a quarter note, a half note, a quarter note, a half note, and a quarter note.

Rests

Interrupted suspensions

Musical notation in 2/4 time. The first staff (treble clef) shows a sequence of notes: a quarter note, an eighth note, a quarter note, a half note, a quarter note, a half note, a quarter note, and a half note. The second staff (treble clef) shows a sequence of notes: a whole note, a half note, and a whole note. A vertical line connects the first staff to the second staff, indicating a suspension. A star symbol (*) is placed above the second note of the first staff.

Many more rules ([Palestina-style](http://ars-nova.com)) at ars-nova.com

Palestrina: Missa Papae Marcellus

Soprano
Ky - ri - e e - - - le - i - son Ky - ri - e e - - -

Alto
Ky - ri - e e - le - i - son Ky - ri - e e -

Tenor 1
Ky - ri - e e - - - - - - - - - - - - - - - - -

Tenor 2
Ky - ri - e e - - - le - i -

Bass 1
Ky - ri - e e - - - - le - i - son

Bass 2
Ky - ri - e e - - - -

St. Peter's Basilica (Rome)



Sistine chapel

- Where much of the most accomplished music was performed



Uses: 16th-18th centuries

- Consonance and dissonance
- Differentiation of vocal and instrumental rules
- Growing rhythmic independence between parts
- Increasing use of canons and fugues
- Substitution (Protestant cultures) of chorale melodies for *cantus firmi* (Catholic cultures)
- Elaboration of chorale melodies in chorale preludes (Protestant culture)

Consonance and dissonance

Two-Voice Analysis

Vincentino: *L'artico musica* Vol. 4

A musical score for two voices (treble and bass clefs) in a single system. The treble clef staff contains a melodic line with various intervals and accidentals. Below the notes are guitar-style fingering numbers: 5, 6, 8, 2, 3, 3, 5, 3, 5, 3, 2, 8, 7, 5, 4, 3, 5, 4, 3, 3, 3, 3, 8, 6, 5. Some notes are marked with a 'p' for piano. The bass clef staff contains a simpler accompaniment line.

Three-Voice Analysis

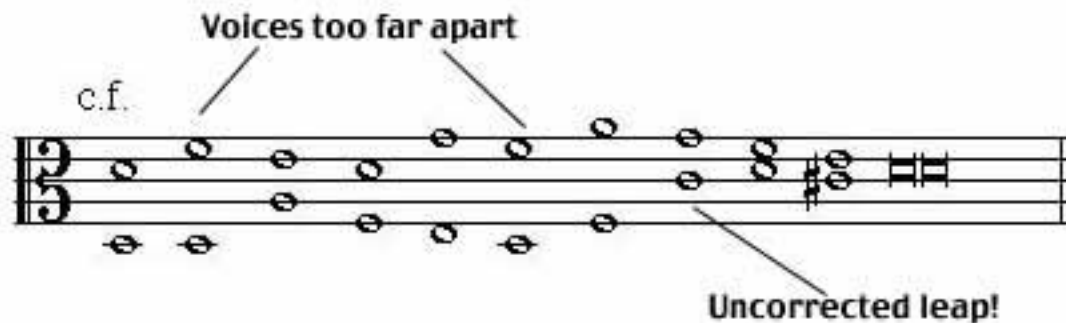
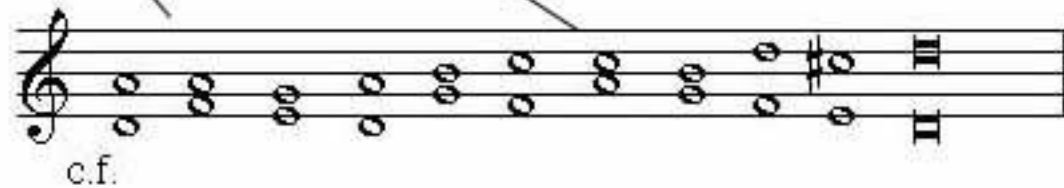
Robert Ke lley

A three-voice musical score for Soprano (A), Tenor (T), and Bass (B). The lyrics are: "Ec - ce Do - mi - rum nos - ter cum vir - tu - te ve - ri - et". The score includes various musical markings such as 'p' (piano), 'Port.' (portamento), and 'Cons. 4 S'. Below the notes are guitar-style fingering numbers for each voice part. The Soprano part has numbers: 5, 6, 3, 5, 6, 3, 8, 5, 3, 2, 3, 8, 2, 3, 3, 6, 3, 2, 3, 3, 5, 4, 8, 6, 7, 3, 3, 6, 5. The Tenor part has numbers: 8, 7, 3, 8, 7, 6, 5, 3, 3, 5, 6, 6, 6, 3, 2, 3, 3, 5, 4, 8, 6, 7, 3, 3, 6, 5. The Bass part has numbers: 5, 6, 3, 5, 6, 3, 8, 5, 3, 2, 3, 8, 2, 3, 3, 6, 3, 2, 3, 3, 5, 4, 8, 6, 7, 3, 3, 6, 5.

Intervals weighted

repeated notes acceptable only in texted work

Mix of perfect/imperfect consonances is good. Abstract exercise can't show stylistic treatment of rhythm/duration.



Counterpoint in Protestant countries

- Chorale melodies (common songs) substituted for *cantus firmus*
- Many fewer rules
- Traditional emphasized elaboration
 - Chorale fantasia
 - Chorale motet
 - Chorale variations
- Music a **substitute** for visual stimulation

Protestant places of worship (Weimar)



Ducal church, Weimar DE



Served by Bach, Telemann, J.G. Walther

Chorale settings

Cantus.
Vom Him - mel hoch, da komm' ich her. Ich

Altus.
Vom Him - mel hoch, da komm' ich her.

Tenor.
Vom Him - mel hoch, da komm' ich her. Ich

Bassus.
Vom Him - mel hoch, da komm' ich her. Ich bring'

Canons and Fugues

TEN. Subject

Ein' fe - - - - - ste Burg ist un - ser

ALTO Answer

Ein' fe - - - - - ste Burg ist un - ser Gott,

TEN.

Gott, ein' gu - te Wehr und Waf -

Chorale cantata

Ob., Tript. ← Chorale tune

S.
A. - - fen, ein fe - ste Burg — ist un - ser Gott, ein

T. Wehr — und Waf - - fen; ein

B. Waf - - - - fen,

Wehr — und Waf - fen, ein gu - te

Double bass, organ pedals ← Chorale tune

The musical score is written in G major (one sharp) and 4/4 time. It features a chorale tune in the upper and lower staves. The vocal parts (Soprano, Tenor, Bass) sing the lyrics. The instrumental parts (Ob., Tript., Double bass, organ pedals) provide accompaniment. The lyrics are in German and describe a fortress as a good one.

Keyboard fugue: culminating genre

The image displays a musical score for a keyboard fugue, consisting of four systems of staves. Each system contains a treble clef staff and a bass clef staff. The key signature is D major (two sharps: F# and C#), and the time signature is common time (C). The score shows the beginning of the piece, with the first system starting at measure 1. The second system begins at measure 7, the third at measure 12, and the fourth at measure 17. The music features complex rhythmic patterns, including sixteenth and thirty-second notes, and various rests. The bass line is particularly active, often playing sixteenth-note patterns. The treble line features more melodic and harmonic development, including some longer note values and rests.

Chorale variations (keyboard)

A musical score for keyboard, consisting of two staves: a treble clef staff and a bass clef staff. The key signature is one sharp (F#) and the time signature is 4/4. The score is divided into four measures. The treble staff contains a simple melody of quarter notes. The bass staff contains a more complex accompaniment with eighth and sixteenth notes, including some beamed patterns.

A musical score for keyboard, consisting of two staves: a treble clef staff and a bass clef staff. The key signature is one sharp (F#) and the time signature is 4/4. The score is divided into four measures. The treble staff contains a simple melody of quarter notes. The bass staff contains a more complex accompaniment with eighth and sixteenth notes, including some beamed patterns.

Dominik Hoernel
(U. Karlsruhe, 2000)
2019 update: CEO,
Capella software

<https://www.capella-software.com/de/>

Gradus ad Parnassum (1725)

Steps to Mt. Parnassus J.J. Fux

Part One: *Musica Speculativa*

i.e. tuning, acoustics, and their implications

- **Mathematically exact intervals** result in **half steps** that may be
 - Larger or
 - Smaller
- **Equal temperament (ET)** a response to awkwardness of split keys in short octaves
- ET a practical solution to a physical problem
- Same division used by J.G. Walther (1708) and others

Gradus ad Parnassum (1725)

Steps to Mt. Parnassus

Part Two: *Musica Prattica*

Purpose: “to invent a simple method by which a novice can progress, step by step”

- Counterpoint
- Fugue
- Double fugue

“Theory without practice is useless”

Steps (*species*) of the path (*Gradus*)

- *First.* (whole) note against note
- *Second.* (whole) note against half-note(s)
- *Third.* (whole) note against quarter-note(s)
- *Fourth.* Introduces suspensions, of turning figures (*cambiate*)
- *Fifth* (florid): **Use of mixed rhythmic values**

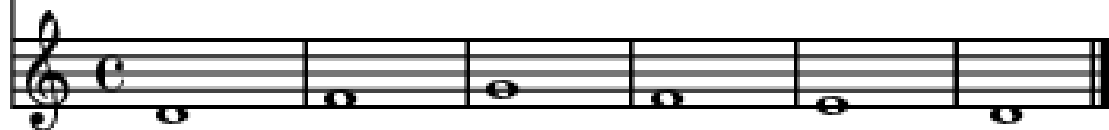
The *Gradus* is only book from Bach's theory library to survive.

Species: Second, Third, Fifth

Second

Musical notation for the Second species of counterpoint. The upper staff (treble clef) shows a melodic line starting with a whole rest, followed by quarter notes G4, A4, B4, C5, B4, A4, and a half note G4. The lower staff (treble clef) shows the cantus firmus: a whole note C4, a half note G4, a quarter note C5, a half note G4, a quarter note C5, a half note G4, and a whole note C4.

Cantus firmus

Musical notation for the Cantus firmus of the Second species. The lower staff (treble clef) shows a whole note C4, a half note G4, a quarter note C5, a half note G4, a quarter note C5, a half note G4, and a whole note C4.

Third

Musical notation for the Third species of counterpoint. The upper staff (treble clef) shows a melodic line starting with a quarter note C4, followed by quarter notes D4, E4, F4, G4, A4, B4, C5, B4, A4, G4, F4, E4, D4, and a half note C4. The lower staff (treble clef) shows the cantus firmus: a whole note C4, a half note G4, a quarter note C5, a half note G4, a quarter note C5, a half note G4, and a whole note C4.

Cantus firmus

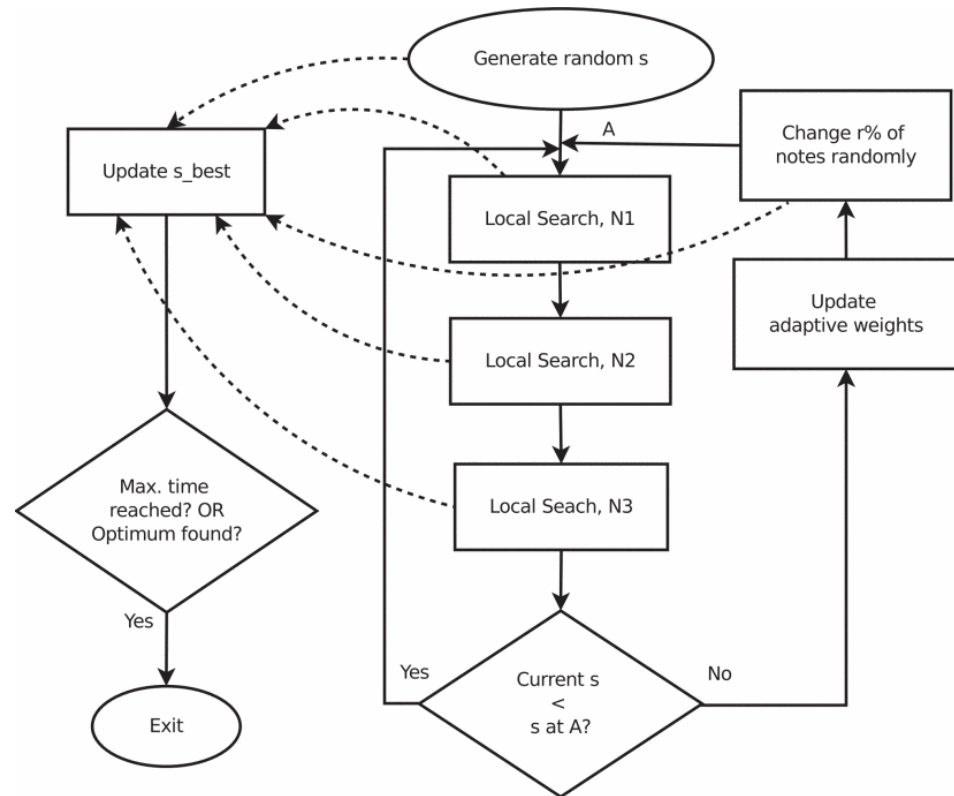
Fifth

Musical notation for the Fifth species of counterpoint. The upper staff (treble clef) shows a melodic line starting with a whole rest, followed by quarter notes G4, A4, B4, C5, B4, A4, G4, F4, E4, D4, C4, B3, A3, and a half note G3. The lower staff (treble clef) shows the cantus firmus: a whole note C4, a half note G4, a quarter note C5, a half note G4, a quarter note C5, a half note G4, and a whole note C4.

Cantus firmus

Fux, an Android app the generates fifth-species counterpoint (Herremans, Soerensen)

- Relies on **Variable Neighborhood Search (VNS)**
- VNS=local search strategy
- Here: three neighborhoods



Herremans, Soerensen: Musical details

Edit-distance inspired accommodations in *cantus firmus*

- Original;
- Swap;
- Change;
- Change 2

Fig. 2.
» Show in Context



(a) Original



(b) Swap move



(c) Change1 move



(d) Change2 move

Herremans, Soerensen: Musical details

Edit-distance inspired accommodations in cantus firmus

- Original; Swap; Change; Change 2

[several violations of cp rules: tritones, hidden fifths....]

The first system of musical notation shows a cantus firmus in 4/4 time. The treble clef staff contains a melodic line with various intervals, including a tritone. The bass clef staff contains a simple harmonic line with whole notes.

The second system of musical notation shows a cantus firmus in 4/4 time, starting at measure 12. The treble clef staff contains a melodic line with various intervals, including a tritone. The bass clef staff contains a simple harmonic line with whole notes.