

Melodic Similarity

CS 275B/MUSIC 254

A solid purple horizontal bar at the bottom of the slide.

"Natural history" of similarity

Concept of similarity fundamental to organization of most art music

Types of similarity widely variant

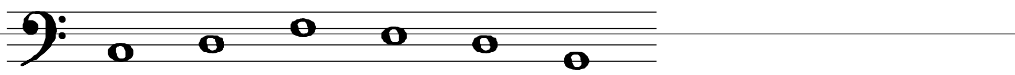
Roles of similarity widely variant

Similarity in *art music* is **intentional**

Contour matches (accidental)

Target:

- Chant: “Lucis Creator”



Some hits:

- Bach *WTC*



- Bizet: *Carmen*



- Saint-Saens: *Carnival* (via Offenbach)



- Mozart: *Symphony No. 41, IV*



Melodic “invisibility” factors

- **Elaboration** of something simple
- Compound melodies (monophonic)
- Psycho-acoustic tricks (polyphonic)
- Rotating melodies
- **Ambiguous** foreground/background
- Metrical **ambiguity**

Elaboration

Bach, Art of Fugue (after Wiering et al.)

Contrapunctus I, alto.



Canon per Augmentationem in Contrario Motu. soprano. EMD 5.55284; PTD 5.90789



Classic features of melody: *symbols vs humans*

Eerola et al, MP (2001):
Statistical vs perceptual
melodic similarity

- Material used: Finnish folk songs

Frequency distributions
(symbols)

- Tones
- Intervals
- Durations
- Two-tone transitions

Frequency distributions
(listeners)

- Tessitura
- Mean pitch
- Rhythmic activity
- Rhythmic variability
- Melodic predictability

Algorithmic vs Human Judgment (Daniel Muellenseifen)

Works by Passion Fruit



The image shows two musical staves, each labeled 'Alt'. Each staff contains a sequence of notes in a specific key signature and time signature. The first staff starts with a treble clef, a key signature of two flats (B-flat and E-flat), and a common time signature (C). The notes are: G4, A4, B-flat4, C5, D5, E5, F5, G5, A5, B-flat5, C6, D6, E6, F6, G6, A6, B-flat6, C7, D7, E7, F7, G7, A7, B-flat7, C8. The second staff starts with a treble clef, a key signature of two flats, and a common time signature. The notes are: G4, A4, B-flat4, C5, D5, E5, F5, G5, A5, B-flat5, C6, D6, E6, F6, G6, A6, B-flat6, C7, D7, E7, F7, G7, A7, B-flat7, C8.

Features:

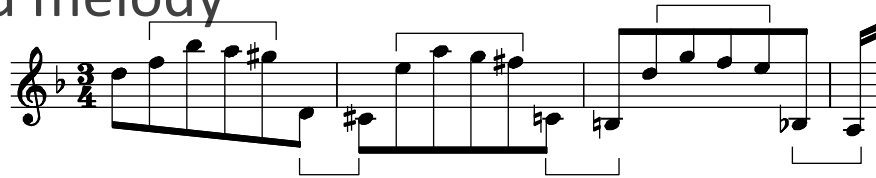
- intervals
- contour
- rhythm
- harmony
- recurrent motifs

- Repertory: popular
- Data: MIDI
- Processes include:
 - contour generalization
 - aliasing
 - fuzzification

Class	Intervals	Name
-4	< -7	Big leap down
-3	-7, -6, -5	Leap down
-2	-4, -3	Big step down
-1	-2, -1	Step down
0	0	Same
1	1, 2	Step up
2	3, 4	Big step up
2	5, 6, 7	Leap up
4	> 7	Big leap up

Composers' perceptual tricks

Compound melody



One voice that we hear as two

Distributed melody

Violin I

Violin II

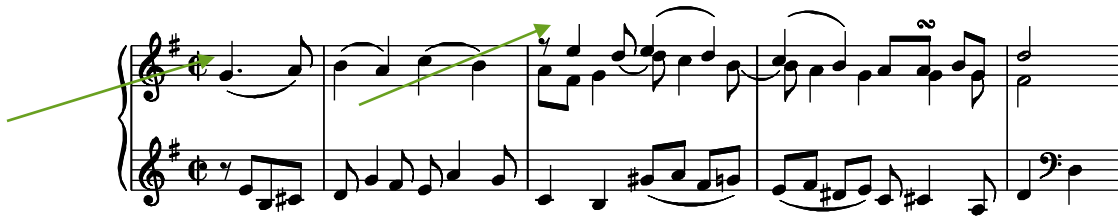
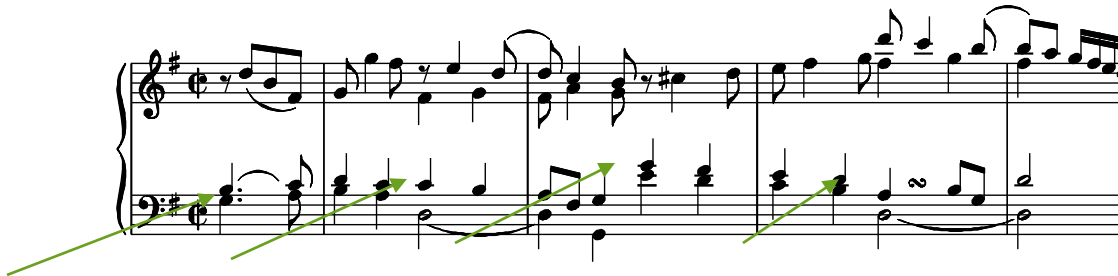
Musical notation for a distributed melody in 3/4 time, key of D major. It features three staves: Violin I, Violin II, and a third staff (likely Violin II or Viola). The Violin I staff contains a melody: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F#4 (quarter), E4 (quarter), D4 (quarter). The Violin II staff contains a melody: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F#4 (quarter), E4 (quarter), D4 (quarter). The third staff contains a melody: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F#4 (quarter), E4 (quarter), D4 (quarter). Lines connect the notes between the Violin I and Violin II staves, showing that the melody is distributed across the two voices.

Two voices that we hear as one

Rotating melodies



B, T, B, T; A, S



Haydn: "Archduke" String Quartet

Perceptual tricks:

Ambiguous foreground/background

A musical score snippet in G major, 4/4 time. The right hand plays a melodic line with eighth notes, and the left hand plays a bass line with quarter notes. A purple oval highlights a specific note in the right hand. Dynamics include *cresc.* and *p*.

A musical score snippet in G major, 4/4 time. The right hand plays a melodic line with eighth notes, and the left hand plays a bass line with quarter notes. A purple oval highlights a specific note in the right hand. Dynamics include *p*.

Schubert

Perceptual tricks: Metrical ambiguity

A single melodic line in treble clef, key of D major (F#, C#, G#, D), and 6/4 time signature. The notes are: D4 (quarter), E4 (quarter), F#4 (quarter), G#4 (quarter), A4 (quarter), B4 (quarter), C#5 (quarter), D5 (quarter). The final note, D5, has a cross symbol (✕) above it.

Ratner

Col intimissimo sentimento ma senza troppo marcare la Melodia

Piano accompaniment in treble and bass clefs, key of D major, and 6/4 time signature. The music consists of a steady eighth-note accompaniment. The dynamic marking *pp* is present. The final note in the treble clef has a cross symbol (✕) above it.

Brahms

A single melodic line in treble clef, key of D major, and 6/4 time signature. The notes are: D4 (quarter), E4 (quarter), F#4 (quarter), G#4 (quarter), A4 (quarter), B4 (quarter), C#5 (quarter), D5 (quarter). The final note, D5, is a half note with a slur underneath it.

Piano accompaniment in treble and bass clefs, key of D major, and 6/4 time signature. The music consists of a steady eighth-note accompaniment. The final note in the bass clef has a cross symbol (✕) above it.

Tune-family studies (social cognition)

“Morris tune”

- Weelkes (1608)



- Jones (1802)



“Londonderry air”

- Verse part: 1704



- Chorus part: 1850



A similarity study: The Ballo di Mantova



Fug-gi fug-gi fug - gi da que - sto cie - lo, aspr' e du - ro, spie-ta - to ge - lo



Prima Parte



The “Ballo di Mantova,” cont.



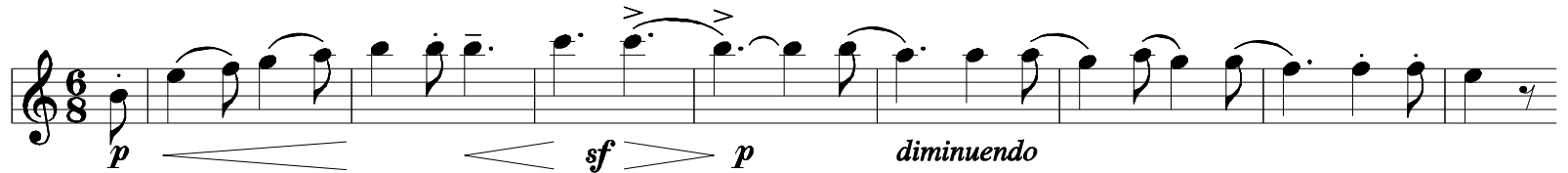
De ge - bo - den da - gen Viert, o Ca - tho - lijk: Dat ghy Godt mooght be -
- ha - gen, En win - nen 't he - mel - rijk.

A two-staff musical score. The top staff contains the vocal melody in C major, 3/4 time, with lyrics underneath. The bottom staff contains the accompaniment, starting with a treble clef and a common time signature. The lyrics are in Dutch and describe the birth of Christ and the promise of heaven.

A three-staff musical score. The top staff is the treble clef with a 3/8 time signature, showing a complex accompaniment of eighth and sixteenth notes. The middle and bottom staves are also in 3/8 time, with the middle staff featuring a treble clef and the bottom staff featuring a bass clef. The accompaniment is intricate, with many beamed notes and rests.

Same melody, different social contexts: The “Ballo di Mantova,” cont.

Dance of Mantua (17th c.) as Dvorak’s “Moldau”
theme (19th c.)



As “Hatikva” (Israeli national anthem)



What makes “similar” melodies recognizable?

- **Meter** (except compound adaptations)
 - Especially rhythmic patterns associated with particular dance steps
 - Residues of motor memory?
- **Mode** usually (not always) preserved
 - Are major > minor equivalent to minor > major?
- **Social convention**
 - Properties external to music itself