

# Using Corpus Studies to Find the Origins of the Madrigal

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# The madrigal: a new musical genre

- Appears first c. 1520 in Florence
- Multiple theories about its origins
  - **Einstein (1949)**: transformation of the frottola
    - **Largely rejected**; two distinct traditions (Fenlon, Haar, Carter)
  - **Haar, Fenlon, Carter (1986, 1988, 1992)**: derived from the motet and French chanson
  - **Anthony Cummings (2004)**: came out of Florentine song and the villotta
- We tested these theories using a corpus study



# Our corpus: MIDI files of all the pieces in the MS **Florence 164**, c. 1520

Manuscript organization: genre classification from that time

**Section 1:** 27 of the **earliest madrigals**

- by Pisano, Sebastiano Festa, anon.

**Section 2:** 19 **Other Italian-Texted** pieces (“**OITs**”), mostly **villotte**

- by Pesenti, F.P., Sebastiano Festa, anon.

**Section 3:** 24 **French chansons**

- by Bruhier, Compere, Josquin, Ninot le Petit, Pipelare, anon.

**Section 4:** 12 **motets**

- by Andreas de Silva, Isaac, Josquin, Carpentras, Mouton, anon.



# Method

- We used jSymbolic 2.2 (McKay et al., 2018)
  - To extract **801 features** (relevant to Renaissance music) from each MIDI file
  - “Feature”: a numerical measurement of a single, precisely defined musical characteristic that can be extracted from a digital score
- We used the features as input to machine learning and statistical analysis processing, using Weka (the SMO SVM implementation)
- We trained the classification models on the 4 sections of Florence 164
  - Using a 10-fold cross-validation methodology
- Classification accuracy can suggest similarity and difference
  - If it is hard to classify pieces, the genres are similar
  - If it is easy to classify pieces, the genres are different



# Classification accuracy results

Comparison	Classification Accuracy
Madrigals vs. Motets	100.0%
Madrigals vs. Chansons	100.0%
Madrigals vs. OITs	71.7%



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Madrigals are significantly different from  
Motets and Chansons



# Classification accuracy results

Comparison	Classification Accuracy
Madrigals vs. Motets	100.0%
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Madrigals vs. OITs	71.7%

Madrigals are more similar to OITs than they are to Motets and Chansons



# Information gain analysis

- **Information gain** analysis provides insight into
  - which **individual features** are
  - statistically most effective in **separating** the genres
- We identified the features with the highest information gain for each classification task
  - Full feature descriptions are found in the jSymbolic manual online





# Pisano, Che deggio Madrigal

Four-part vocal setting (Cantus, Altus, Tenor, Bassus) in 2/4 time. The score shows measures 1 through 8. The Cantus part begins with a whole rest, followed by a half note G4, a quarter note A4, and a half note B4. The Altus part begins with a half note G4, a quarter note A4, and a half note B4. The Tenor part begins with a half note G4, a quarter note A4, and a half note B4. The Bassus part begins with a half note G3, a quarter note A3, and a half note B3. The music continues with various rhythmic patterns and melodic lines.

*Four features with the highest individual information gains in separating **madrigals** from **motets***

# Andreas de Silva Motet

Four-part vocal setting (Cantus, Altus, Tenor, Bassus) in 2/4 time. The score shows measures 1 through 6. The Cantus part begins with a half note G4, a quarter note A4, and a half note B4. The Altus part begins with a half note G4, a quarter note A4, and a half note B4. The Tenor part begins with a half note G4, a quarter note A4, and a half note B4. The Bassus part begins with a half note G3, a quarter note A3, and a half note B3. The music continues with various rhythmic patterns and melodic lines.

Information Gain (high)	Feature Name
0.890	Variability in rhythmic value run lengths
0.890	Prevalence of very long rhythmic values
0.890	Mean rhythmic value run length
0.890	Rhythmic value variability



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Four-part vocal setting (Cantus, Altus, Tenor, Bassus) in 2/4 time. The score shows measures 1 through 8. The Cantus part begins with a whole rest, followed by a half note G4, a quarter note A4, and a half note B4. The Altus part begins with a half rest, followed by a half note G4, a quarter note A4, and a half note B4. The Tenor part begins with a half rest, followed by a half note G4, a quarter note A4, and a half note B4. The Bassus part begins with a half rest, followed by a half note G3, a quarter note A3, and a half note B3. The score continues with various rhythmic patterns and rests. Red boxes highlight specific rhythmic features in the Cantus and Altus parts.

Information Gain (high)	Feature Name
0.890	Variability in rhythmic value run lengths
0.890	Prevalence of very long rhythmic values
0.890	Mean rhythmic value run length
0.890	Rhythmic value variability



# Pisano, Che deggio Madrigal

Cantus

Altus

Tenor

Bassus

Long strings of minims

# Andreas de Silva Motet

Cantus

Altus

Tenor

Bassus

Varied note values, few repeated values

*Four features with the highest individual information gains in separating madrigals from motets*

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# Pisano, Che deggio Madrigal

# Ninot, Et la la la Chanson

Four-part vocal setting (Cantus, Altus, Tenor, Bassus) in 2/4 time. The score shows the first four measures of the piece.

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*Four features with the highest individual information gain in separating madrigals from chansons*

Information Gain (high)	Feature Name
0.798	Partial chords
0.798	Average number of simultaneous pitches
0.798	Average number of simultaneous pitch classes
0.798	Chord type histogram (just two pitch classes)

# Pisano, Che deggio Madrigal

Cantus

Altus

Tenor

Bassus

*Four features with the highest individual information gain in separating madrigals from chansons*

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# Ninot, Et la la la Chanson

Cantus

Altus

Tenor

Bassus

Imitative texture with many rests; 2 & 3 vv sounding

# Pisano, Che deggio Madrigal

5

*Four features with the highest individual information gain in separating **madrigals** from **OITs***

# Pesenti, O dio OIT (Villotta)

5

Information Gain (low)	Feature Name
0.388	Relative note durations of lowest line
0.351	Rhythmic value histogram (eighth notes)
0.351	Prevalence of short rhythmic values
0.343	Total number of notes



# Pisano, Che deggio Madrigal

*Four features with the highest individual information gain in separating **madrigals** from **OITs***

# Pesenti, O dio Villotta (from OITs)

OITs are shorter (fewer notes)

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OITs have shorter note values (esp. in bass)

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# Conclusion

Our results:


- Suggest that the madrigal did NOT derive its style from the motet or chanson (as opposed to Haar, Fenlon, and Carter)
- Indicate that the madrigals are closer in musical style to OITs, especially the villotta, than they are to chansons and motets (supporting Anthony Cummings)

We should therefore investigate the villotta's role in the origins of the madrigal



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