

Research on Melodic Intervals in Vocal Parts of Jingju

Project for **Audio and Music Processing Lab**

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Introduction





Introduction

Jingju (Beijing Opera) was originated in Qing Dynasty (around 1790). Because Beijing was the capital of China then, outstanding opera artists all over the country came to Beijing, to make money, or play for the emperor, or develop their career. So, in Beijing, various types of local traditional operas integrated. Eventually, Jingju was formed and became the most influential traditional opera in China.

The main themes of Jingju are political and military struggles in history. Most stories are taken from historical romance and novel scripts. Where there is a story, there are characters. The **role types** of Jingju are as follows:

The gender of roles	Role type	Discription
Female	Dan (旦)	All female characters
Male	Jing (净)	Males with some peculiarity in character, quality, or appearance
	Chou (丑)	Comic characters, like clowns.
	Sheng (生)	Positive male characters other than Jing and Chou.



Introduction

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The gender is simply refers to the characters in the play. It has nothing to do with the gender of the artists.



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Female	Dan (旦)	All female characters
Male	Jing (净)	Males with some peculiarity in character, quality, or appearance
	Chou (丑)	Comic characters, like clowns.
	Sheng (生)	Positive male characters other than Jing and Chou.
	Laosheng (老生)	Sheng at an elderly age.



Introduction

Shengqiang (Melody)

Xipi and Erhuang are the most important Shengqiang in Jingju. Therefore, Jingju is also called Pihuang opera.

Xipi

Style: lively, vigorous, bright and light
Often to express cheerful, resolute,
passionate and restrained feelings.

Erhuang

Style: peaceful, modest, lyrical
Often to express meditation, sadness,
sigh and anger.

Research Question



Research Questions

One of the agreed differences between *erhuang* and *xipi* is the major use or larger intervals of the latter compared with the former.

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State of the art literature refers to intervals mostly as an identifying characteristic of *erhuang* and *xipi*. [...] The major second is the most used interval in both cases, followed by the minor third.

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1. What are the most frequent melodic motives of **three notes** in vocal parts?
2. Are they different between *Erhuang* and *Xipi*, or between *Dan* and *Laosheng*?

Male and female are very similar regarding the intervallic space, with a predominance of major seconds and minor thirds [...].

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Female singing is usually “more melismatic”.

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Methodology & Results

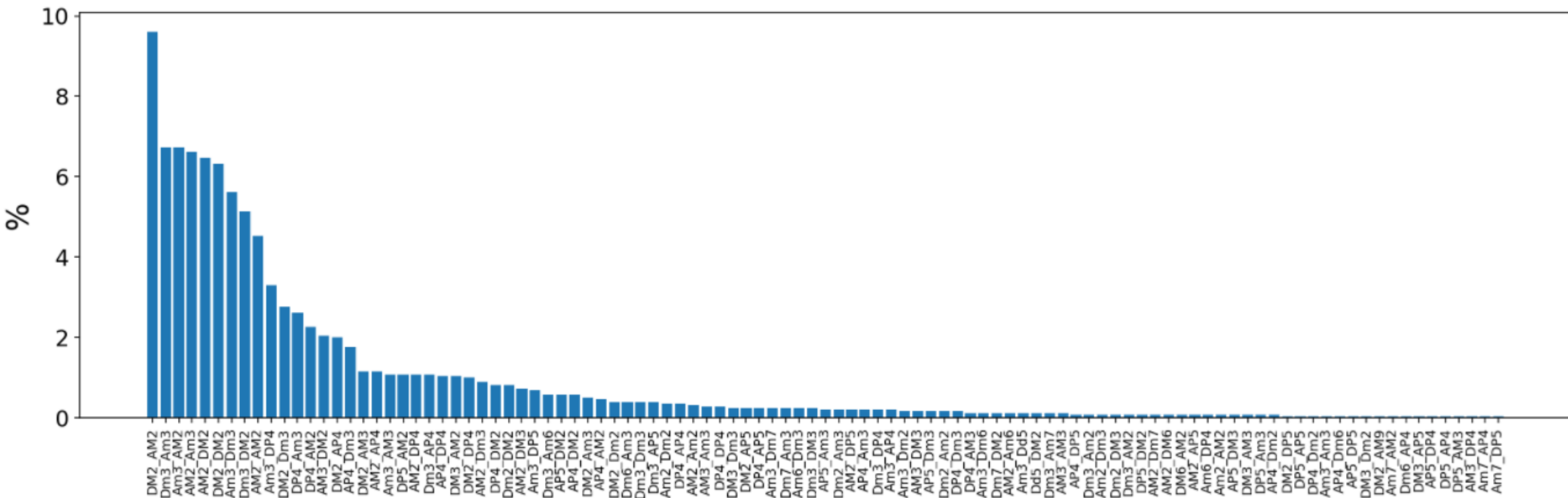




Methodology

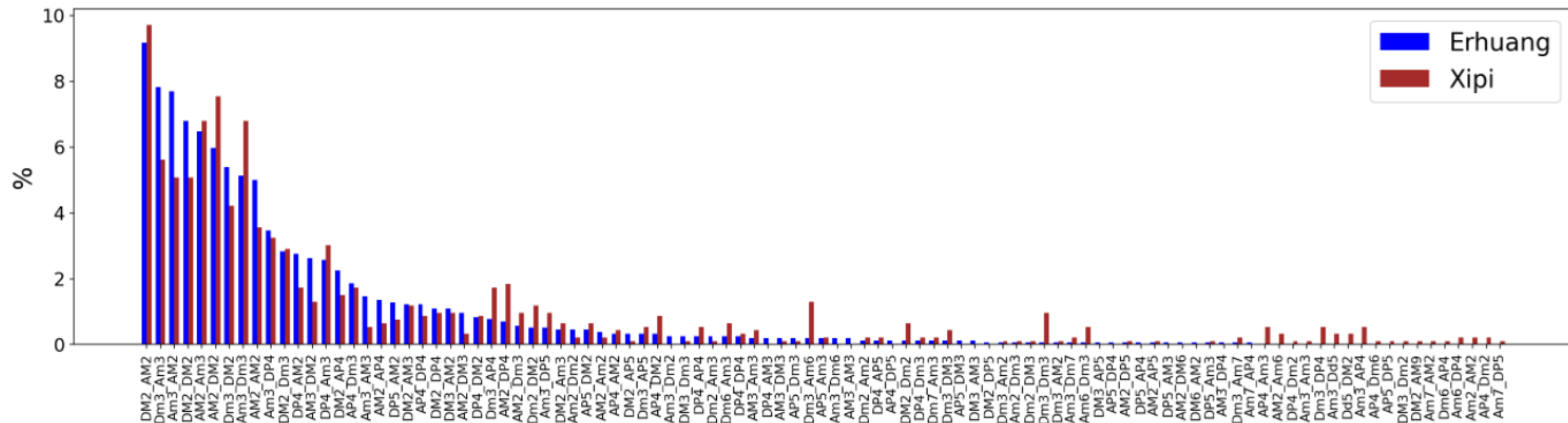
1. **Read all Jingju scores and extract sequences of three consecutive notes** for the vocal parts:
 - a. Without any rests in the middle
 - b. Skipping grace notes (skipping to the next note to extract the interval)
 - c. Not considering unison intervals
2. Read scores_data.csv file and extract the **Shengqiang** for each score
3. Read lines_data.csv file and extract the **Role Type** for each line (offset of each note should be compared to Start and End offsets of each line in the .csv).
4. **Save pair of intervals** in each separate dictionary with keys in **format**:
“{interval1_direction}{interval1_class}_{interval2_direction}{interval2_class}”, e.g. AM2_DM2
5. **Plot bar graphs** with percentage of each pair of intervals formed between the three consecutive notes:
 - a. First all the scores without making any distinction between Shengqiang or role.
 - b. Then separating between Erhuang and Xipi.
 - c. Then separating between Erhuang Dan, Erhuang Laosheng, Xipi Dan and Xipi Laosheng.

Results: All Scores



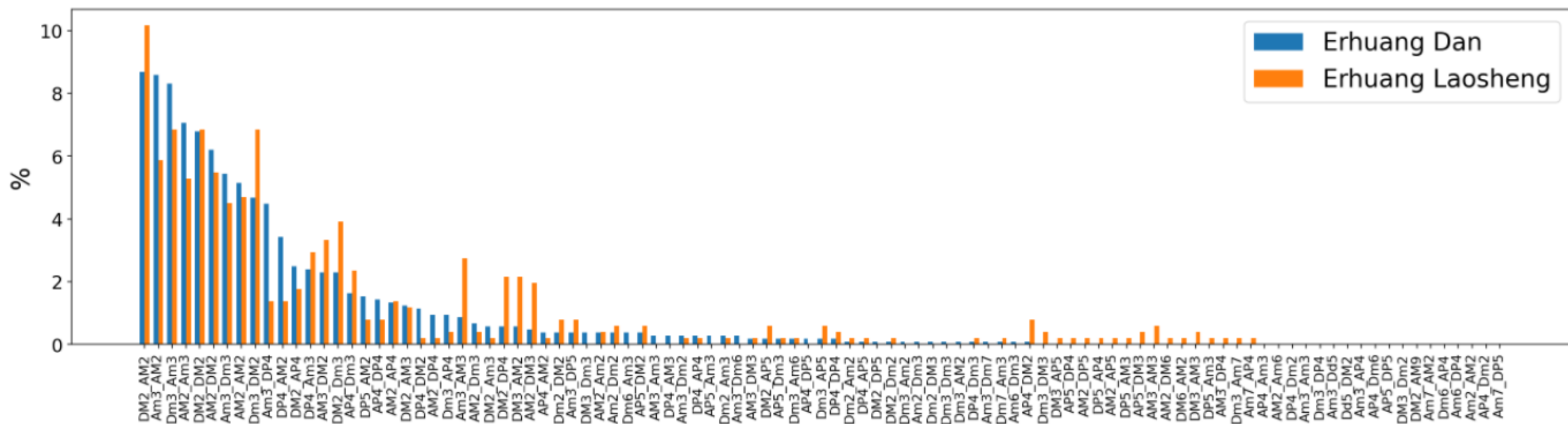
- 10 most frequent 3-note motives (in order) (*symmetric melodic movements marked in blue*):
 - DM2_AM2, Dm3_Am3, Am3_AM2, AM2_Am3, AM2_DM2, DM2_DM2, Am3_Dm3, Dm3_DM2, AM2_AM2, Am2_DP4
- The most important intervals are Major Second and minor Third → natural intervals of the pentatonic scale.

Results: *Shengqiang*



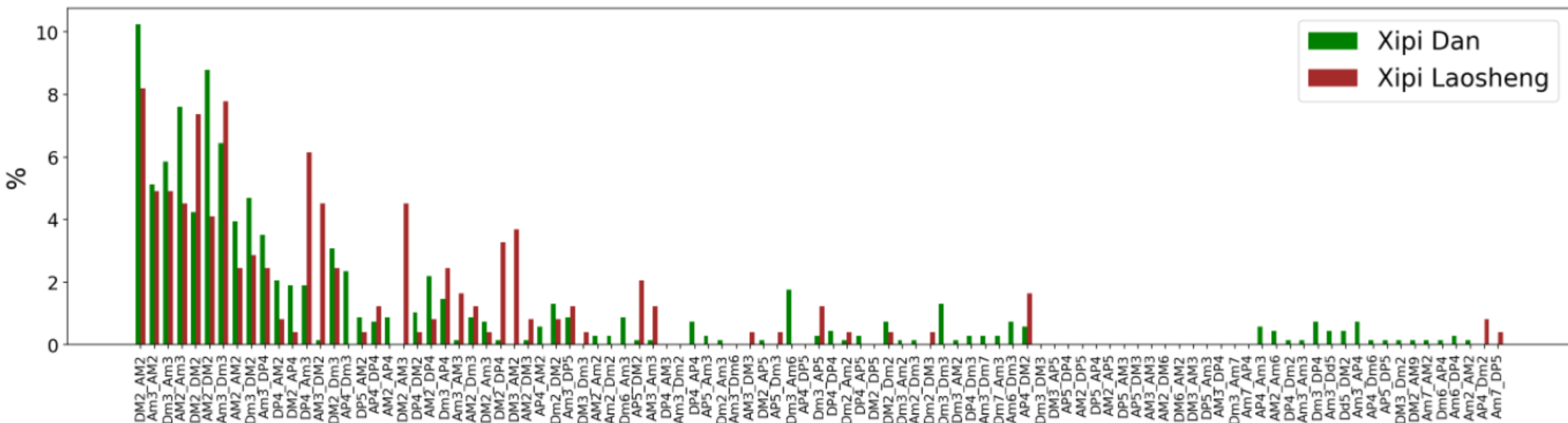
- 10 most frequent 3-note motives (in order) (*symmetric melodic movements marked in blue*):
 - Erhuang:** DM2_AM2, Dm3_Am3, Am3_AM2, DM2_DM2, AM2_Am3, AM2_DM2, Dm3_DM2, Am3_Dm3, AM2_AM2, Am3_DP4
 - Xipi:** DM2_AM2, AM2_DM2, Am3_Dm3, AM2_Am3, Dm3_Am3, Am3_AM2, DM2_DM2, Dm3_DM2, AM2_AM2, Am3_DP4
- The most important intervals are Major Second and minor Third → natural intervals of the pentatonic scale.
- Differences between *Erhuang* and *Xipi*:
 - In *Xipi* there are more types of combinations present between pairs of intervals than in *Erhuang*.
 - In *Xipi* there is a greater percentage of symmetric 3-note motives with M2 and m3 than in *Erhuang*.
 - In *Xipi* there is a slightly greater percentage of motives with intervals larger than M3 than in *Erhuang*, e.g. P4, P5, m6.

Results : Role type and *Erhuang*



- 10 most frequent 3-note motives (in order) (*symmetric melodic movements marked in blue*):
 - Erhuang Dan:** DM2_AM2, Am3_AM2, Dm3_Am3, AM2_Am3, DM2_DM2, AM2_DM2, Am3_Dm3, AM2_AM2, Dm3_DM2, Am3_DP4
 - Erhuang Laosheng:** DM2_AM2, Dm3_DM2, Dm3_Am3, DM2_DM2, Am3_AM2, AM2_DM2, AM2_Am3, AM2_AM2, Am3_Dm3, DM2_Dm3.
- Differences between *Erhuang Dan* and *Erhuang Laosheng*:
 - In *Erhuang Laosheng* there are more types of combinations present between pairs of intervals than in *Erhuang Dan*.
 - In *Erhuang Laosheng* motives with M3 (e.g. Am3_AM3, DM3_AM2 and AM2_DM3) have more presence than in *Erhuang Dan*.

Results : Role type and *Xipi*



- 10 most frequent 3-note motives (in order) (*symmetric melodic movements marked in blue*):
 - Xipi Dan:** DM2_AM2, AM2_DM2, AM2_Am3, Am3_Dm3, Dm3_Am3, Am3_AM2, Dm3_DM2, DM2_DM2, AM2_AM2, Am3_DP4
 - Xipi Laosheng:** DM2_AM2, Am3_Dm3, DM2_DM2, DP4_AM3, Am3_AM2, Dm3_Am3, AM2_Am3, AM3_DM2, DM2_AM3, AM2_DM2
- Differences between *Xipi Dan* and *Xipi Laosheng*:
 - In *Xipi Dan* there are more types of combinations present between pairs of intervals than in *Xipi Laosheng*.
 - In *Xipi Laosheng* motives combining M2 and M3 (e.g. AM3_DM2, DM2_AM3 and DM3_AM2) have more presence than in *Xipi Dan*.

Conclusion



Conclusion

One of the agreed differences between *erhuang* and *xipi* is the major use or larger intervals of the latter compared with the former.

Male and female are very similar regarding the intervallic space, with a predominance of major seconds and minor thirds [...].

State of the art literature refers to intervals mostly as an identifying characteristic of *erhuang* and *xipi*. [...] The major second is the most used interval in both cases, followed by the minor third.

1. What are the most frequent melodic motives of **three notes** in vocal parts?



Second major and minor third are the most used intervals

2. Are they different between *Erhuang* and *Xipi*, or between *Dan* and *Laosheng*?

- In *Xipi* there is more presence of 3-note motives with intervals larger than M3 than in *Erhuang*, e.g. P4, P5, m6.
- In *Xipi* there are more types of combinations of 3-note motives..
- In *Xipi* there is a greater percentage of symmetric 3-note motives with M2 and m3 than in *Erhuang*.
- In *Erhuang Laosheng* there are more types of combinations present between pairs of intervals than in *Erhuang Dan*.
- In *Erhuang Laosheng* motives with M3 have more presence than in *Erhuang Dan*.
- In *Xipi Dan* there are more types of combinations present between pairs of intervals than in *Xipi Laosheng*.
- In *Xipi Laosheng* motives combining M2 and M3 have more presence than in *Xipi Dan*.