A Brief Story of *Tone Perfect*: a Mandarin Chinese Audio Database

Catherine Ryu & the Tone Perfect Team
Overview

I. What is *Tone Perfect*?
II. How it came about
III. How to use *Tone Perfect*
IV. Broader Implications and Future Developments
Part I: What is *Tone Perfect*?
Tone Perfect:
Multimodal Database for Mandarin Chinese

https://tone.lib.msu.edu/
An exhaustive collection of **monosyllabic sounds** in Mandarin Chinese, including “lexical gaps” (410 in total)

*In all 4 tones (410 x 4 = 1,640)*

*6 native Mandarin speakers (3 female and 3 male)*

*9,840 audio files (6 sets of 1,640) in CD quality*
Part II: How *Tone Perfect* Came About
VOICE ACTORS
ZIJIN LIU
YIWEI LU
TIANYUAN WU
CHANGCHANG YANG
GONG YI
YIFAN ZHANG
Multimodal Database for Mandarin Chinese

A digital repository

as an accessible,

interactive web-based database
Swamplr is custom software created at MSU to process and ingest collections.

Approximately 10,000 WAV files

Robustly named files:
- ma3_FV3.wav
- ting1_MV1.wav

Provide data about:
- syllable
- initial
- final
- tone
- speaker id
- speaker-supplied gender

Custom XML metadata

Spreadsheet data:
- Sample character(s)
- Lexical gap (YN)
- Frequent character count

mp3 derivatives produced with ffmpeg

Swamplr is custom software created at MSU to process and ingest collections.
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Multimodal Database for Mandarin Chinese

*An outcome of a multidisciplinary collaborative project
The team!

Audio Production
Research
Digital Humanities
MSU Librarians
Supporting Units
Part III: How to Use Tone Perfect
Two Key Aspects of *Tone Perfect*
As An Accessible Pedagogical Tool

- Multimodality
- Interactivity
Multimodality

Visualization of Tonal Information: “Seeing & Hearing”

Tone-Number

Tone-Pitch Contour

Tone-Colored Wave Form
Multimodality

Scripts: Sounds & Comprehension

*Pinyin* (Romanization of Mandarin Sounds)

Traditional Chinese characters

Simplified Chinese characters

Identical sound/tone for multiple words
ma1 / mā / 媽 / 妈 / "mother"
"High level tone"

ma2 / mā / 麻 / "hemp"
"Rising tone"

ma3 / mǎ / 马 / 马 / "horse"
"Dipping tone"

ma4 / mà / 罵 / "scold"
"Falling tone"
Interactivity

Multiple search options to interact with the database

Sound
Tone
Speaker
Gender
Lexical gap
<table>
<thead>
<tr>
<th>Sound</th>
<th>Tone</th>
<th>Speaker</th>
<th>Gender of Speaker</th>
<th>Lexical Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>ai (24)</td>
<td>1 (102)</td>
<td>FV1 (68)</td>
<td>female (204)</td>
<td>No (324)</td>
</tr>
<tr>
<td>bai (24)</td>
<td>2 (102)</td>
<td>FV2 (68)</td>
<td>male (204)</td>
<td>Yes (84)</td>
</tr>
<tr>
<td>cai (24)</td>
<td>3 (102)</td>
<td>FV3 (68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>chai (24)</td>
<td>4 (102)</td>
<td>MV1 (68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dai (24)</td>
<td></td>
<td>MV2 (68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gai (24)</td>
<td></td>
<td>MV3 (68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hai (24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kai (24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lai (24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mai (24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ai 1 by all six speakers
ai in 4 tones by FV1 only
“ai” combined with other consonants produced by FV1
“ai” FV1 and MV1 Comparison
“ai” FV1, FV2, and FV3 Comparison
Multi-Repurposing Digital Resources with Multiple Download Options

M-ToPP (empirical L2 experiments)

Picky Birds (app)

Heart Doubt & Lingua Incognita (electronic music)

Psychoacoustic Analysis of Mandarin tones, etc.
Part IV: Broader Implications and Future Development
Broader Implications of *Tone Perfect*

Standardization of audio asset production process

Standardization of the meta structure for Mandarin audio databases

Standardization of audio assets for empirical research and its reproducibility

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Tone Perfect’s Future Developments

Multi-syllable sounds in Mandarin Chinese
Native speakers in greater numbers
Other Chinese dialects
Other tonal languages
Future Developments

Hands-on Workshops
Collaborators beyond MSU
Tone Perfect as a shared digital resource for pedagogy, knowledge production, and dissemination
Tone Perfect
https://tone.lib.msu.edu

https://tone.lib.msu.edu/
THANK YOU!