

# There’s more to timbre than musical instruments: a meta-analysis of timbre semantics in singing voice quality perception

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Listen to the famous soprano Maria Callas (1923–1977) singing the aria “Vissi d’arte” from Puccini’s *Tosca*.

*How would you describe the timbre of her voice?*

## The semantics of timbre

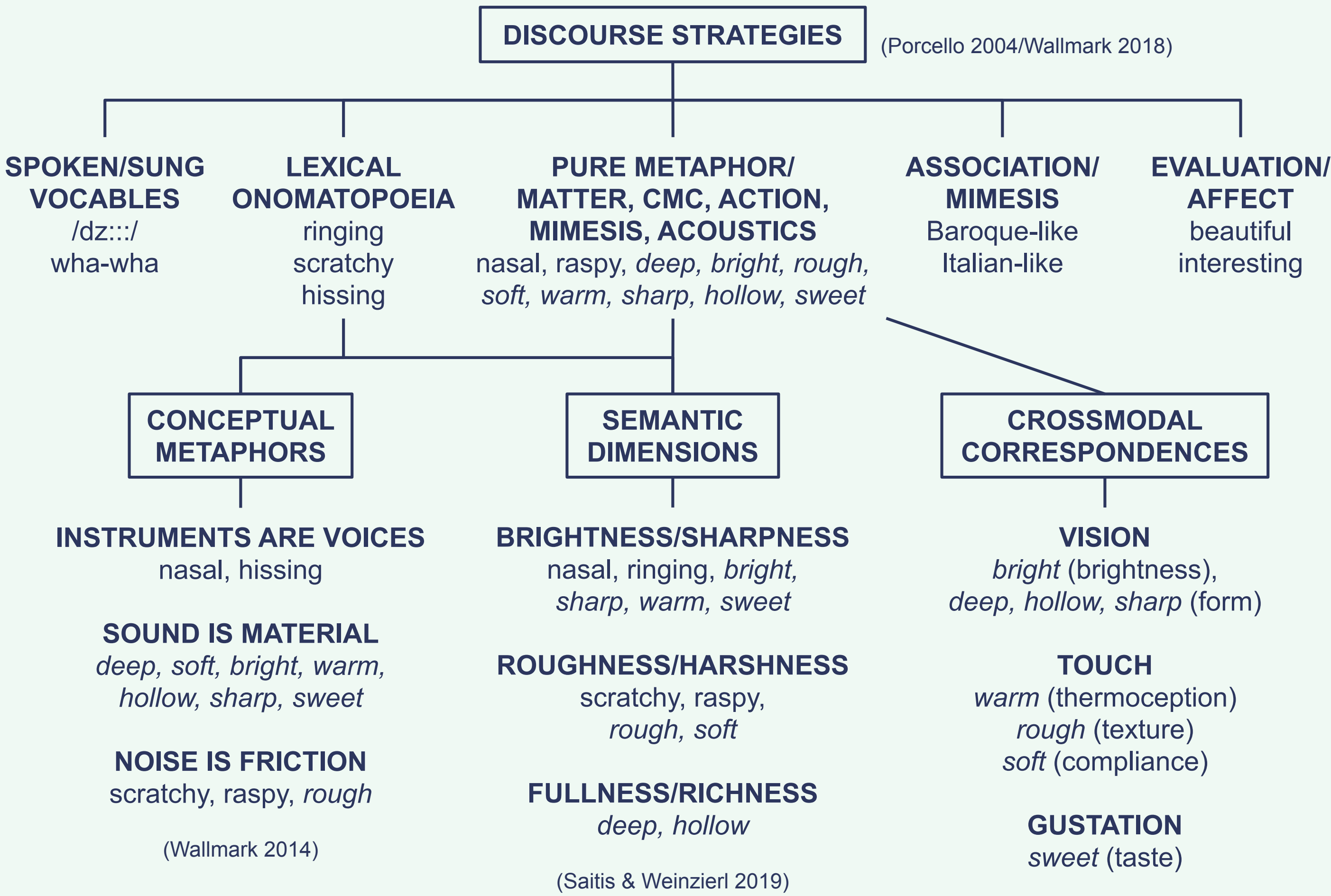
Timbral descriptions like pressed, falsetto, hoarse, or wobble are essentially **sound source identifiers acting as semantic descriptors**.

How to best describe **attributes of the voice that bear no source associations?**

Manuel Garcia II (1855) distinguished between registrar quality (sound source identifiers) and timbral quality (open vs. closed; *voix sombrée* vs. *voix blanche*).

Stumpf (1890) theorized a low-dimensional semantic space of orchestral instrument timbre, which many empirical studies have since confirmed (Saitis & Weinzierl 2019; see diagram to the right).

*We propose the use of a semantic differential method to determine if the terminology developed for orchestral instruments can capture the characteristics of singing timbre.*



## Research plan

### Meta-analysis (in progress)

- Review previous research on verbal attributes of singing voice timbre with a particular focus on pedagogical texts—as well as work from music psychology, music information retrieval, musicology, and ethnomusicology
- Incorporate theoretical, practical, and empirical perspectives

### Survey with singing teachers

- Interview with free verbalization task during a listening test
- Design a questionnaire informed by meta-analysis results
- Perform psycholinguistic inference of semantic categories from the verbal data itself through syntactic context and linguistic markers

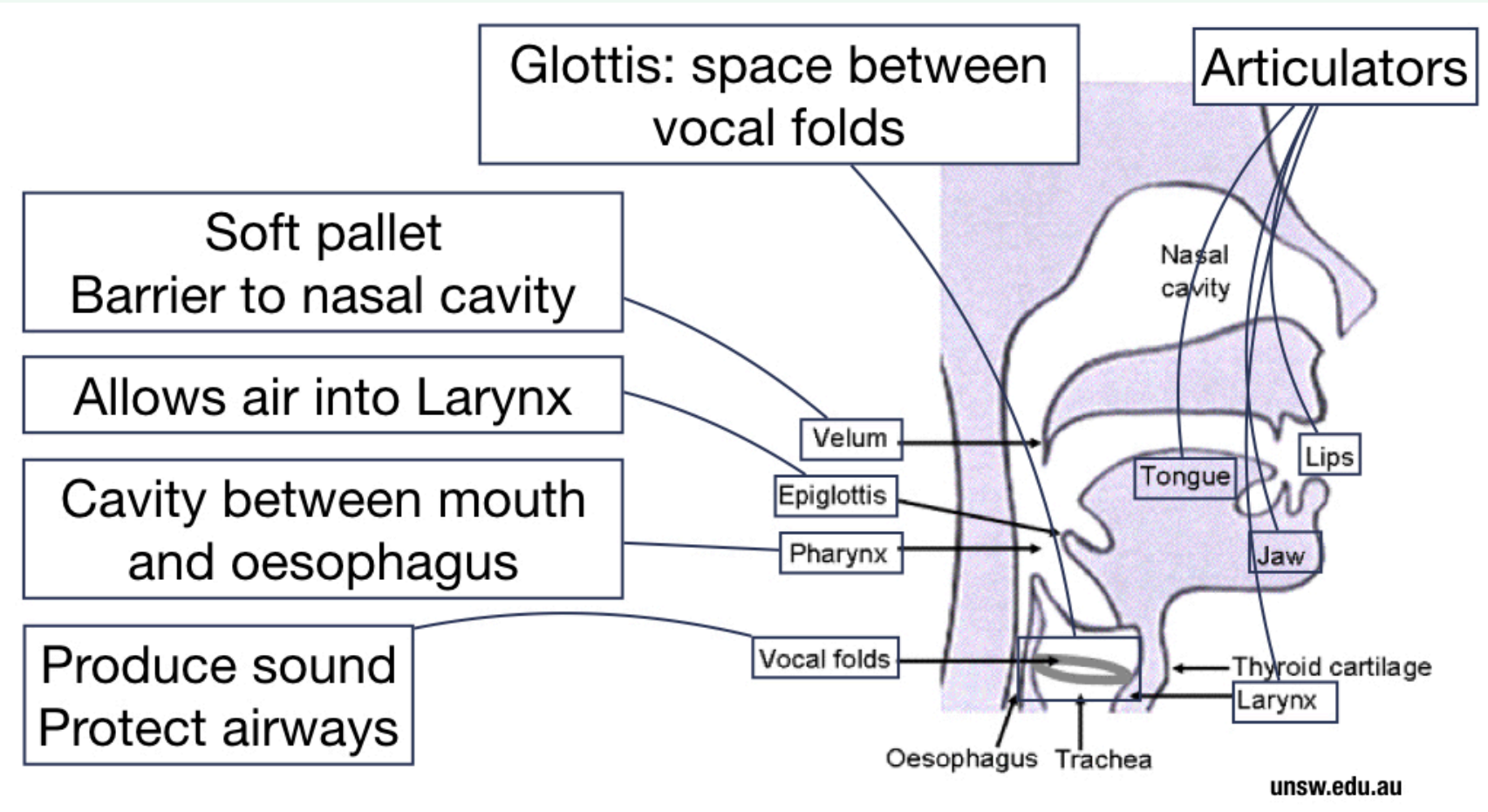
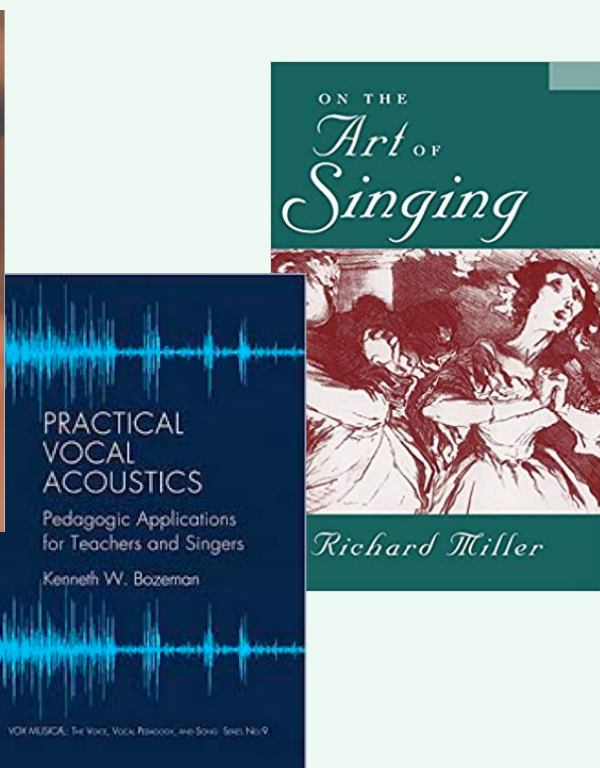
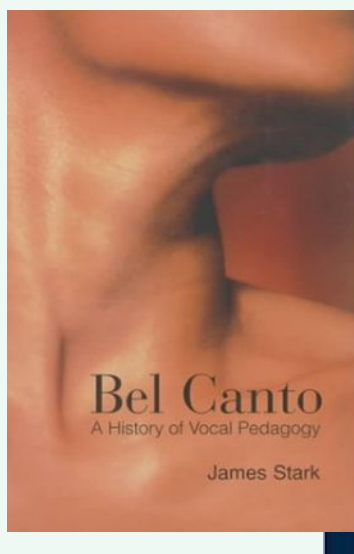
### Semantic differential study

- Collect semantic ratings of tested sounds using the meta-analysis and teacher survey to generate a more appropriate lexicon than verbal scales from instrumental timbre
- Consider three types of “expertise”: singers, musicians, non-musicians

### Acoustical analysis

- Extract acoustic features from tested sounds
- Interpret semantic dimensions using a psychophysical approach

## Timbre in pedagogical singing texts



Some **pedagogical terms** map to sound source modifications, while others relate to metaphorical descriptions that bear no source associations:

<b>vowels/resonance</b>	front–back high–low, bright–dark, lateral–round
<b><i>copertura</i></b> (covering)	vowel/resonance modification via subtle laryngeal and supraglottic adjustments → maintains the timbre <i>voce chiusa</i> as the pitch mounts
<b><i>la gola aperta</i></b> (open throat)	resonance modification via the position of the larynx, the pharynx, the velum, the tongue, the lips, the mandible
<b><i>chiaroscuro</i></b>	resonance balance → ideal basic timbre between light ( <i>chiaro</i> ) and dark ( <i>scuro</i> ) between bright and round (Garcia II 1855) → “purest tone” like taste of sweet-and-sour (Stark 2003)
<b><i>voce chiusa</i></b> <b><i>voce piena</i></b> <b><i>voce coperta</i></b> <b><i>voix sombrée</i></b>	closed voice (not referring to the throat) dark, domed, tipped, smoother, covered, tall, round
<b><i>voce aperta</i></b> <b><i>voce chiara</i></b> <b><i>voix blanche</i></b> <b><i>timbre clair</i></b>	open voice (not referring to <i>la gola aperta</i> ) bright, clear, straightforward, fresh, exposed

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