Imperfect Rhymes as a Measure of Phonological Similarity

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Similarity

- The degree of similarity between segments is central to many domains of phonology:
  - IO & BR Faithfulness (McCarthy & Prince 1995)
  - OCP (e.g. Leben 1973): adjacent elements must be dissimilar
  - Agreement by Correspondence (e.g. Rose & Walker 2004): harmony between segments that meet a threshold of similarity
- Intuition: speakers are aware of and can measure how similar segments are. Sometimes similarity is avoided (OCP), and sometimes it is reinforced (ABC).

Measuring Similarity

- Similarity is measured with distinctive features, and all features are equal.
- Does this match speakers' intuitions about similarity?

Measuring Similarity

- Do more featural differences = greater dissimilarity?
- Is a difference in [±F] equivalent to a difference in [±G]?

Probing speakers' assessments about similarity: imperfect rhymes

Imperfect Rhymes

- Imperfect rhymes: sometimes rhyming words don't rhyme exactly:

This version of the world will not be here long [laŋ]
It is already gone It is already gone [gan]

T Bone Burnett, "Palestine, Texas"

- Assuming lyricists are more likely to use similar-sounding imperfect rhymes than dissimilar ones, we can use imperfect rhymes to probe speakers' judgments about segmental similarity.

Imperfect Rhymes

- If featural similarity matches speakers' judgments about similarity, the frequency of consonantal pairings in imperfect rhymes should be inversely proportional to the number of features they mismatch on.

The Data

- Zwicky (1976): a limited study of “rock rhyme” in 1960s–1970s rock.
- Our study: rhymes from 117 songs from many genres of popular music; 1977–2016.
- Data collected by AK and students at the North Carolina School of Science and Mathematics.
  - Juniors in John Woodmansee & Ormand Moore’s 2016–2017 American Studies class

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- Identical vowels (analysis here focuses on consonants)
- Same number of consonants: *long/gone* but not *fun/fund*

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Total: 378 pairs of mismatched consonants

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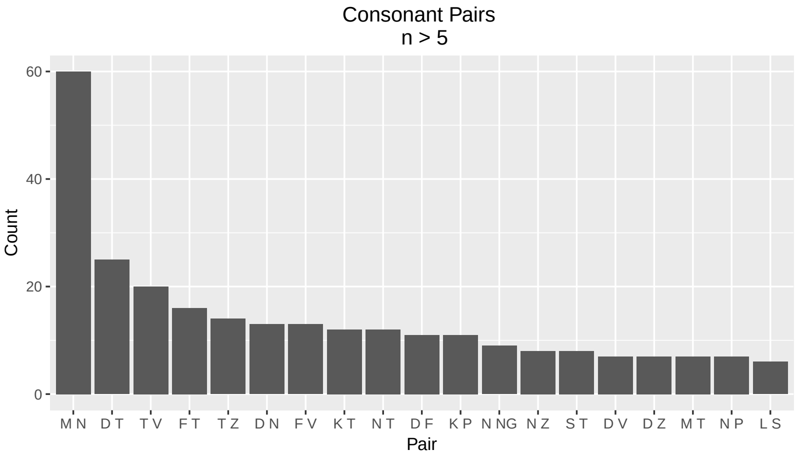
⇒ This idealized feature system provides a rough starting point: do distinctive feature systems in general have a hope of reflecting speakers' judgments?

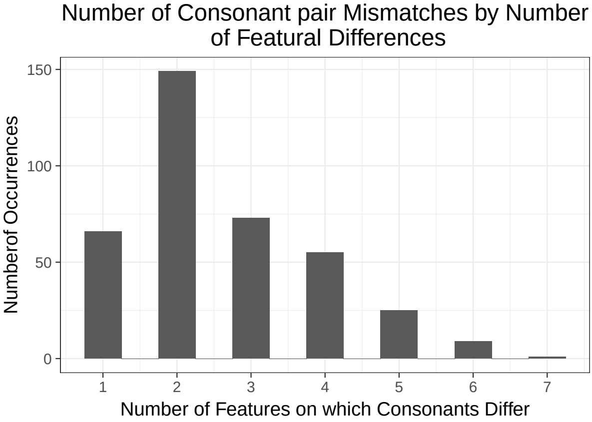
General Trends

Most Common Mismatched Consonants



Are mismatches with fewer featural differences more common?

Yes, mostly:

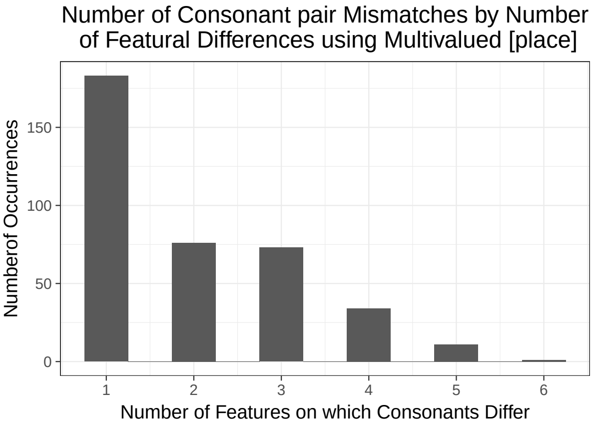


The Numbers & Some Examples

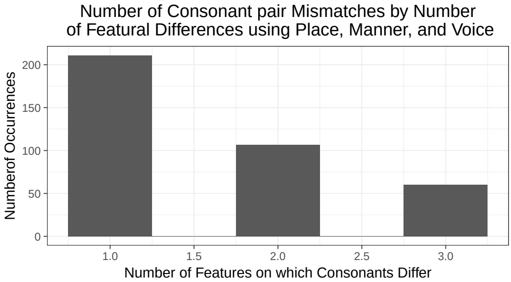
- One feature different: 66
- Two features different: 149
- Three features different: 73
- Four features different: 55
- Five features different: 25
- Six features different: 9
  - *smile/time* × 2; *while/time* (Colbie Caillat, "Bubbly")
  - *whole/home*; *close/home* × 2; *nine/life* × 2 (Emimem, "Lose Yourself")
  - *roof/moon* (Tom Petty, "Even the Losers")
- Seven features different: 1
  - *whole/broke* (Emimem, "Lose Yourself")

Place Features are to Blame. . .

- Low number of 1-feature differences: place features
- A multivalued [Place] feature smooths things out:



Multivalued Features Everywhere



Interim Summary

- Distinctive features do a good job of modeling imperfect rhyme frequency.

⇒ Featural differences match speakers' similarity intuitions. . .

- Except for place features: mismatches in place mean a large number of featural differences, but this is not reflected in the frequency of pairs mismatching in place.
- Fewer multivalued features perform better than many binary features.
- Next step: compare specific feature systems.

A Closer Look

Not All Features are Equal

- If consonants mismatch on exactly one feature:

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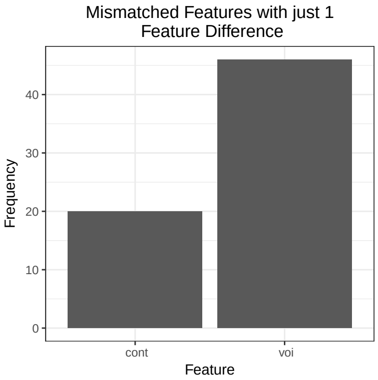
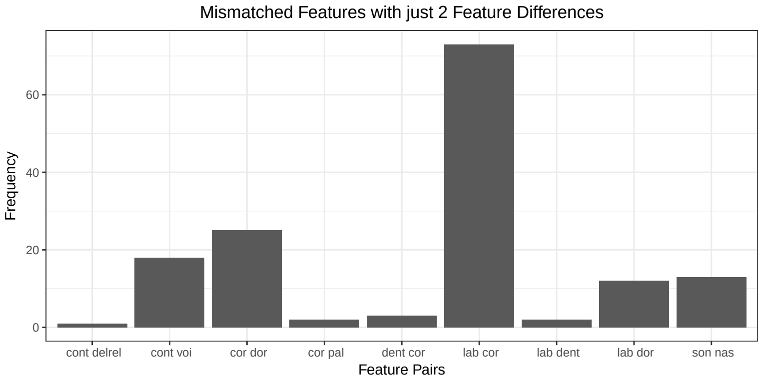


Not All Features are Equal

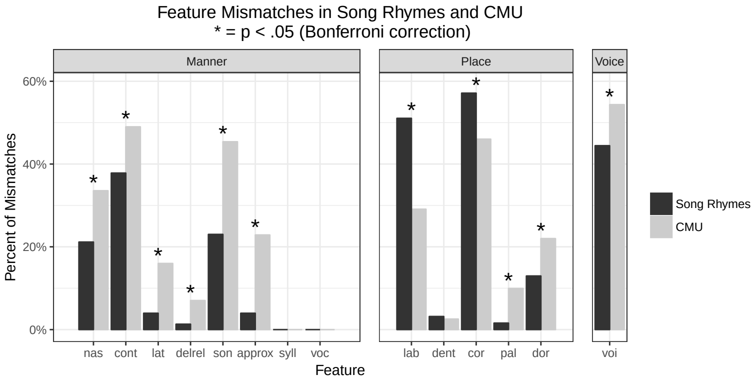
- If exactly two features mismatch:



Not All Features are Equal

- Some mismatch more than others.
- To ensure this isn't simply a reflection of consonantal frequency, we did the same analysis on the portion of the CMU dictionary that also occurs in CELEX (Baayen et al. 1995) to weed out low-frequency items:
  - Match each final-stress word to all other words with the same final vowel and same number of consonants
  - Compare coda consonants as before

Our Data vs. CMU/CELEX



- Over represented: [lab, cor]
- Under represented: nearly everything else
- Mismatches on [lab, cor] are more acceptable. Perhaps differences along these dimensions are "smaller" than differences along other dimensions.

What's up with [lab] & [cor]?

- [m]∼[n]: 31.1% (60/193) of all [lab] mismatches; 27.8% (60/216) of [cor] mismatches.
- This accounts entirely for the prevalence of [lab] and [cor] mismatches.
- We can't explain the high frequency of [m]∼[n] merely on the grounds that place cues for nasals are weak: why are [n]∼[ŋ] and [m]∼[ŋ] infrequent?
  - 9 tokens of [n]∼[ŋ]; 18.4% of [dor] mismatches, 4.2% of [cor] mismatches
  - 1 token of [m]∼[ŋ]; 2.0% of [dor] mismatches, .5% of [lab] mismatches
- It looks like a combination of nasal place weakness and a preference for [lab]/[cor].

Implications

What this might mean:

- Certain feature (mis)matches are more significant than others, as are certain combinations.
- E.g. labials and coronals are judged as more similar than, say, labials and dentals, stops and fricatives, etc.

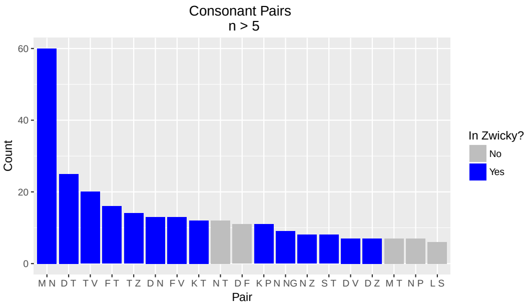
Implications

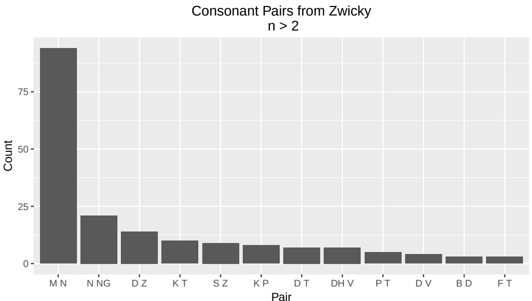
In phonological systems:

- If featural asymmetries matter to grammars, they should arise in the typology of ABC/OCP systems.
  - Cooccurrence of similar consonants is disfavored in $C_1C_2C_3$ Arabic roots. Frisch et al. (2004): all combinations of non-identical place features in C_1 and C_3 are over represented, but labial/dorsal combinations are less over represented than others.
  - Not so for C_1 and C_2 though
- But maybe grammars don't care about these asymmetries. Grammars are a step removed from phonetic detail in other ways.

Comparison with Zwicky (1976)

Most Common Consonant Pairs





Most Common Consonant Pairs

- [m]∼[n] is the most common pair in both analyses, but:
  - It is 39.8% of all pairs in Zwicky
  - Only 15.9% in our data (60/378)
- [n]∼[ŋ] is second most common for Zwicky (8.9%)
  - 12th on our list (2.4%; 9/378)

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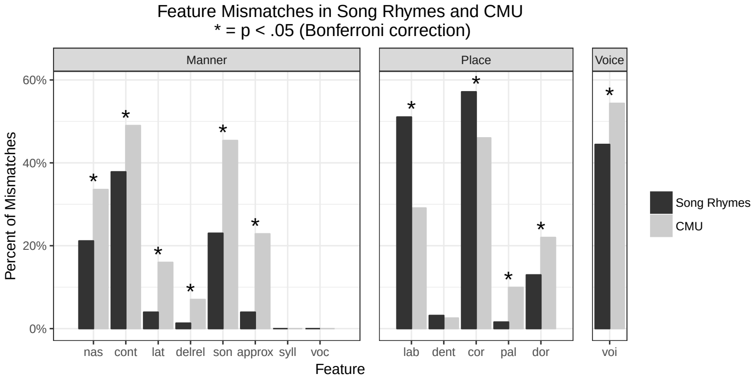

Zwicky's (1976) results (for feature mismatches $\geq$ 10):

- [dor] 148
- [lab] 138
- [cor] 70
- [cont] 49
- [voi] 19
- [pal] 10

Conclusion

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- Generally, fewer featural differences between consonants makes them more likely to be paired in rhymes.
- Except for place features, counting features is a plausible model of speakers' similarity judgments.
- But the particular features involved matters, too: do some they represent smaller differences?

Next Steps

- Vowels
- Differences in number of consonants
- Compare specific feature systems
- Morphology (Zwicky 1976): e.g. does past-tense /d/ behave differently from other /d/?
- Genre & year differences

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