


What we can learn from comparing gradient and categorical patterns



Statistics Colloquium

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Phonology versus phonetics



- ✓ A pattern that may be productive and categorical in one language often has gradient, less productive correlates in others.

Obligatory Contour Principle in Arabic versus English

- ✓ Arabic categorically forbids adjacent identical consonants within stems. Productive?
- ✓ English displays the same phenomenon, but gradiently and non-productively:
 - ✓ Words like *pup*, *dad*, *rare* are phonologically well-formed, but significantly less well represented in the lexicon than would be expected by chance (Frisch1996).
 - ✓ How did we find this out? By counting and applying statistics.

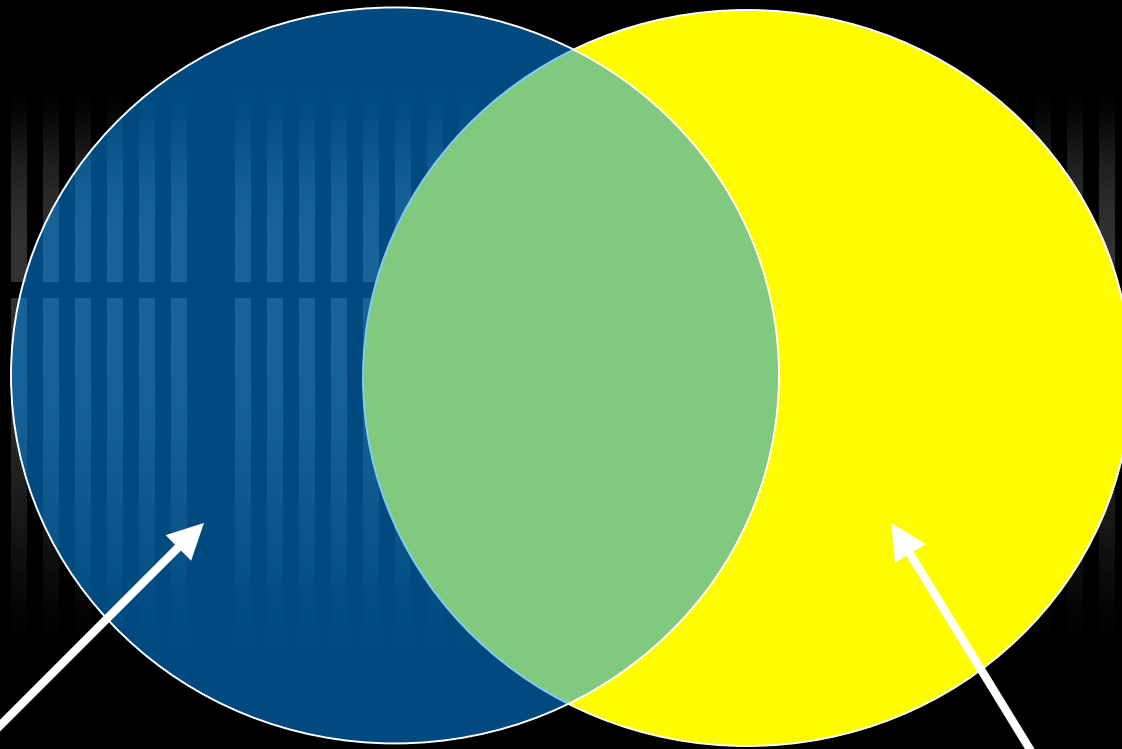
Implications



- ✓ Consistent with models of grammar in which ‘phonologization’ proceeds by recognizing and transforming independently caused gradient patterns in the data (e.g., Barnes, Bybee).
- ✓ By comparing grammatical patterns to their phonetic sources, we can learn more about both.


Gradient, phonetic pattern

Derived phonological pattern



Non-phonologized, phonetic residue

Contribution of grammar

Quantity-sensitivity and acoustic energy of the rime.

- ✓ Most quantity sensitive weight systems count as heavy either:
 - ✓ CVV alone
 - ✓ CVV + CVC
- ✓ Gordon (1999, 2002) looks for correlations in weight-system patterns and phonetic factors: uses statistics!
- ✓ Shows that total acoustic energy of the rime is strongly correlated with weight, suggesting a causal relationship.

But the mapping isn't perfect...

- ✓ Sonorant codas are high energy
- ✓ Obstruent codas are low energy
- ✓ Very few languages develop quantity sensitive systems that count only CVV, CV[+son] as heavy.

But the mapping isn't perfect...

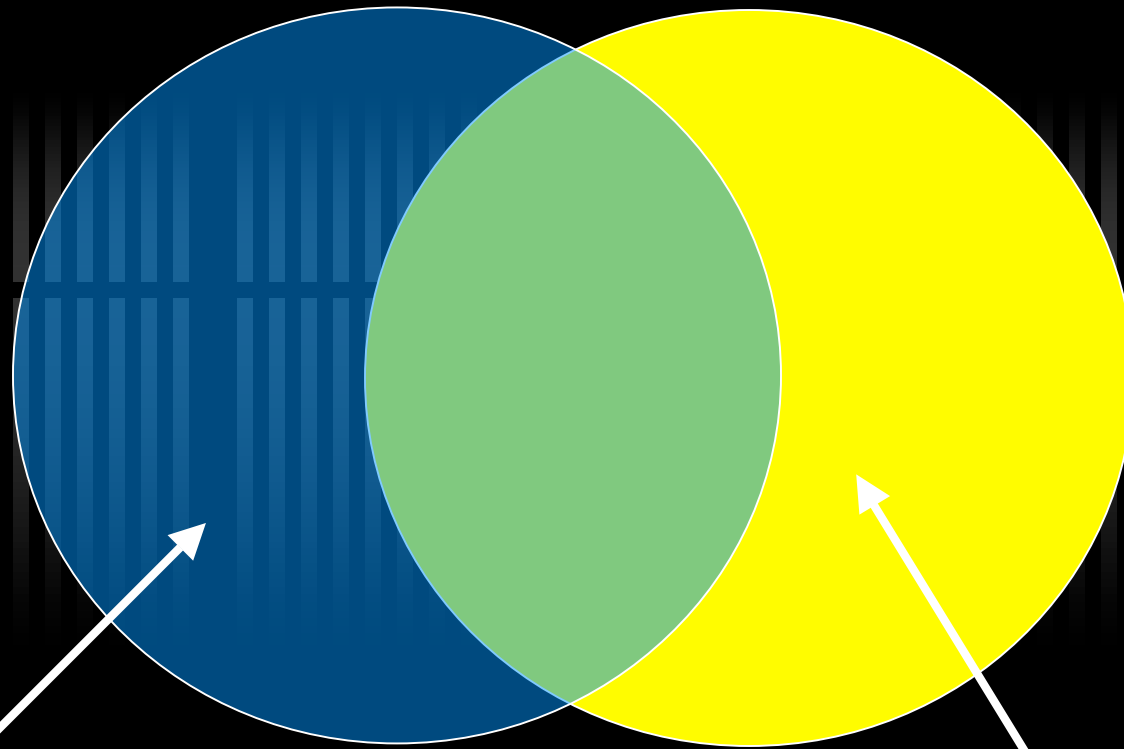
- ✓ Instead, languages with more sonorants than obstruents in their coda inventories count CVV, CVC as heavy
- ✓ Languages with more obstruents than sonorants in their coda inventories count only CVV.
- ✓ How does he know? Counting plus statistics!
- ✓ Consistent with a simplicity filter in phonologization

(Gordon 2002, Pierrehumbert 2002, Wedel 2004).

Mapping this study onto our diagram:

Gradient energy differences

CVV versus CVV, CVC weight systems



High energy, not heavy
Low energy, heavy

Generalization on the basis
of the feature C