Phonology is phonetically grounded but not phonetically detailed
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Research question

How fine-grained are phonological representations?

Low-tone spread in San Martín Peras Mixtec (SMPM, Otomanguean) suggests that phonological representations and constraints are defined at a more abstract level than phonetic detail.

Low-tone spread

In SMPM, some initial high (H) tones become rises (LH) when preceded by low (L) tones.

(1) Baseline

lloo kà-nà
rabíl ñíg
“A big rabbit.”

(2) Sandhi

kìnì kà-nà
pig. ñíg
“A big pig.”

This only applies to words whose first vowel is low, laryngealized, and H-toned.

(3) Not laryngealized

kìnì ñíg
“pig with rabbits”

(4) Non-low vowel

kìnì ñíg
“A blue pig.”

(5) Not high-toned

jìntà ñá/a
meeting sterile
“An early meeting.”

Phonetic grounding

Laryngealization lowers f0

Pitch (Hz) for laryngealized and modal vowels with an H tone (26 Creaky, 31 Modal) and an L tone (27 Creaky, 24 Modal)

"A pig with rabies."

"A big rabbit."

pig kìnì
sá

Low tone spread is phonological

• Involves a shift in tonal category from H to LH (neutralizing).

(6) Underlying form

ma:nà
‘Sleepless/tired.’

(7) Underlying form

ka:nà
‘Big’

(8) Sandhi form

kà:nà
‘Big’

• Laryngealization lowers f0 by ~20Hz, vowel quality lowers f0 by ~10Hz, but beginning f0 in sandhi context is lowered by ~50-70Hz.

What type of phonological framework best accounts for this?

Similar ‘sub-phonemic teamwork’ effects (Lionnet, 2016) have been used to argue for fine-grained phonetic detail in phonology (i.e., Lionnet, 2017), but also for its exclusion from phonology (i.e., Lionnet, 2017).

Direct phonetics

• Phonological units involve fine-grained phonetic detail.

• Phonological constraints evaluate candidates based on those units.

Indirect phonetics

• Phonological units are more abstract than fine-grained phonetic detail.

• Phonological constraints evaluate candidates at this abstract level.

Potential explanations

The life cycle of sound patterns (Bermúdez-Otero, 2007)

Phonetic pressures

Phonologization

Morphologization

Phonological constraint induction (Hayes, 1999)

Phonological experience

Constraint comparison

 Constraint interaction

Conclusion

Phonology is more abstract than phonetics

Low tone spread cannot be analyzed at a level of fine-grained phonetic detail.

At an abstract level, low tone spread and the constraints that drive it are phonetically grounded.

The interaction of these constraints with the rest of the grammar can lead to non-phonetically-optimizing outcomes (c.f., Smith, 2005).

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