Incomplete Neutralization

Via Paradigm Uniformity and Weighted Constraints

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Introduction

- Incomplete neutralization (IN):
  Two underlyingly distinct segments become *nearly* identical on the surface ([9],[14]).
- Challenge for classical architectures (e.g., [3],[7]):
  IN creates sub-phonemic distinctions, which require reference to UR contrasts unavailable to phonetics.
- We combine two independently motivated mechanisms—paradigm uniformity ([2],[17]) and weighted phonetic constraints ([8],[13],[21])—to account for IN patterns.

Two Generalizations

Directionality: IN's subphonemic distinctions trend in the direction of the full contrast.
E.g., in IN of German final devoicing, the vowel in /ʁad/ 'wheel' is longer than in /ʁat/ 'advice'. This is the same direction (but smaller magnitude) as in non-neutralizing contexts cross-linguistically ([6]).

Magnitude continuum: The magnitude of surface distinctions in IN varies across languages and situations:

- Am.E. flapping: ~5–10 ms. ([4],[10])
- German final devoicing: ~10–15 ms. ([9],[14])

Weighted Phonetic Constraints

We use a phonetic grammar whose constraints refer to phonetic details ([8]) to formalize the tradeoff between neutralization and identity to a base.

IN of Japanese Vowel Length

Japanese monomoraic nouns lengthen to meet a bimoraicity requirement ([11],[15]), but these lengthened nouns are shorter than underlyingly long nouns ([5]).

Schematic example (values rounded):

	Example	Mean Dur.
(a) Unlengthened (short)	[ki mo] nakushita yo	50 ms.
(b) Lengthened (/short/)	[ki Ø] nakushita yo	125 ms.
(c) Long (/long/)	[kii Ø] nakushita yo	150 ms.

The Model: Targets & Constraints

Dur(base)
Actual base duration (here, unlengthened as in (a))

TargetDur(μ) and *TargetDur(μμ)*
Canonical vowel duration targets

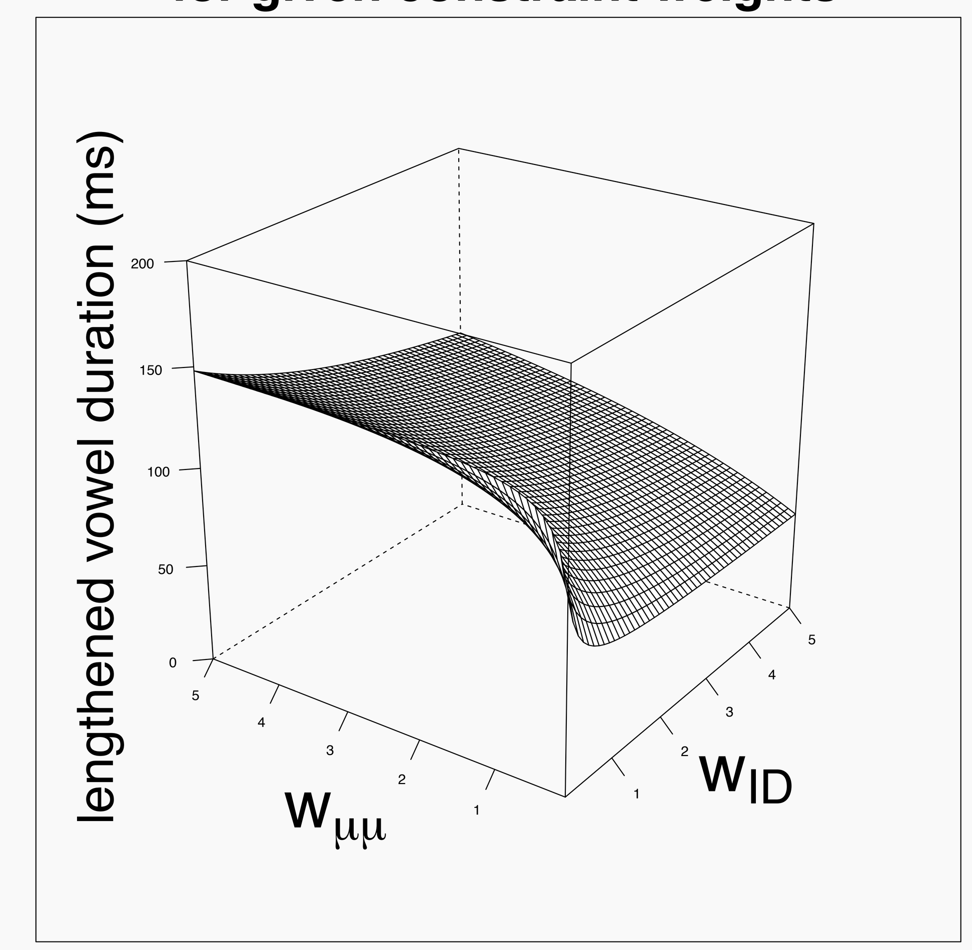
Dur(μμ) cost: $w_{\mu\mu}(TargetDur(\mu\mu) - Dur(Cand))^2$
Bimoraic vowels approximate target duration

OO-ID-Dur(μμ) cost: $w_{ID}(Dur(Cand) - Dur(Base))^2$
Candidate durations approximate base duration

Lengthened Vowel Duration	Cost of OO-ID-Dur($\mu\mu$)	Cost of Dur($\mu\mu$)	Total Cost
(a) 100	$1(100–50)^2$ = 2,500	$3(150-100)^2$ = 7,500	10,000
(b) 125	$1(125–50)^2$ = 5,625	$3(150-125)^2$ = 1,875	7500
(c) 150	$1(150–50)^2$ = 10,000	$3(150-150)^2$ = 0	10,000

Discussion

Predicted duration of lengthened vowels for given constraint weights



TargetDur(μ)=50 ms, TargetDur(μμ)=150 ms

Conclusions: Two individually motivated mechanisms account for both Directionality and the Magnitude Continuum. Lengthened vowels cannot become longer than underlyingly long vowels since no weightings prefer this situation (see figure above). With appropriate weightings, the model can account for a wide range of durations.

Remaining issues: We assume bases may be selected on the basis of (a) frequency, (b) morphology, or (c) canonical realization.

In monomorphemic, morpheme-internal IN (e.g. English *ladder* vs. *latter*) a word serves as its own base after the application of canonical phonetic and phonological processes (see [12] and [16] on faithfulness to canonical/natural forms). A research question: what counts as canonical phonetics and phonology?

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