Reconciling CV phonotactics and high vowel deletion in Japanese

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1. Introduction

- Phonotactic restriction against tautosyllabic clusters (Ito 1986, Ito & Mester 2015).
  - /ʃit + ren/ → [ʃi.tsu.ren] 'heartbreak'
  - /stɑɹ/ → [su.taa] 'star (loan)'
  - Perception studies also suggest strong CVCV bias (Dupoux et al. 1999; [ebzo] → /ebuzo/)
- Previously argued high vowel devoicing (HVD) only results in loss of phonation (Hirayama 2009, Tsuchida 1997).
- Recent production studies suggest voiceless consonant clusters do result from high vowel deletion (Pinto 2015; Whang 2018).
  - /masutaa/ → [mas_taa] 'master'
  - /ɸukoo/ → [ɸ_koo] 'unhappiness'
- Deletion is categorical (Shaw & Kawahara 2018a).

2. Proposal & Evidence

- Both underlying and epenthetic vowels get targeted for high vowel devoicing.
  - /ku + too/ → ⟨ku.too⟩ → [k_.too] 'hard fight'
  - /kak + too/ → ⟨ka.ku.too⟩ → [ka.k_.too] 'definitive answer'
  - /ʧɪkɪn/ → ⟨ʧi.kiɴ⟩ → [ʧ_.kiɴ] 'Fried chicken'
- Repair of phonotactic violations in both /underlying/ forms (production) and [overt] forms (perception).
- Separate "phonetic" and "structural" processes (Hayes 1999; Boersma 2011; Tesar & Smolensky 2000).

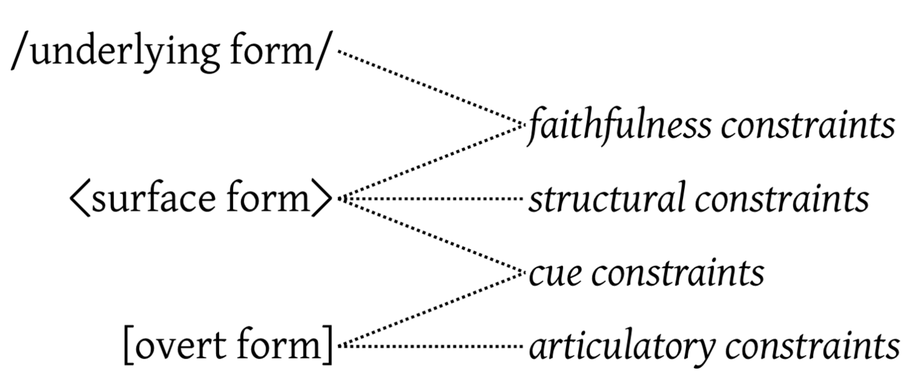

Fig 1: Multilevel phonological representation (OT learnability).

3. Production

- /underlying/ → ⟨surface⟩ : *faithfulness* + *structural* constraints.
  - CODACONDITION: penalize coda consonant with independent place.
  - *COMPLEX: penalize every tautosyllabic cluster.

/kak + too/	CODACOND	*COMPLEX	IDENT-IO	DEP-IO
☞ ⟨ka.ku.too⟩				*!
⟨kak.too⟩	*!			
⟨ka.ktoo⟩		*!		
⟨kat.too⟩			*!	

- ⟨surface⟩ → [overt]: *cue* + *articulatory* constraints.
  - *⟨k⟩ [ ] : penalize ⟨k⟩ not represented in overt form.
  - *⟨u⟩ [ ] : penalize ⟨u⟩ not represented in overt form.
  - *[s.g][V̆, c.g.][s.g.]: penalize short, phonated vowel between voiceless segments.
  - *[V, s.g.]: penalize unphonated vowel.

⟨ka.ku.too⟩	*⟨k⟩ [ ]	*[s.g][V̆, c.g.][s.g.]	*⟨u⟩ [ ]	*[V, s.g.]
☞ [ka.k_.too]			*!	
☞ [ka.kṵ.too]				*!
[ka.ku.too]		*!		
[ka.u.too]	*!			

4. Perception

- [overt] → ⟨surface⟩ : *structural* + *cue* constraints.
  - *⟨o⟩ [ ] : penalize ⟨o⟩ not represented in overt form.
  - *⟨ ⟩ [k] : penalize [k] not represented in surface form.

[tak]	CODACOND	*⟨ ⟩ [s]	*⟨o⟩ [ ]	*⟨u⟩ [ ]
☞ ⟨ta.ku⟩				*!
⟨tak⟩	*!			
⟨ta_⟩		*!		
⟨ta.ko⟩			*!	

adapted from Boersma (2009)

5. Conclusion

- Multilevel phonological representation reconciles seemingly contradictory treatment of high vowels in Japanese.
  - CV preference = surface level.
  - High vowel devoicing = overt level.
- Clusters from high vowel deletion not structurally reevaluated.
  - Predicts no resyllabification of overt clusters (*contra* Kondo 2005).
  - I.e., stranded onset consonants form consonantal syllables.
- Supported by Shaw and Kawahara (2018b).
  - No c-center effects evident in stranded onset consonants, contra expectation in case of resyllabification.

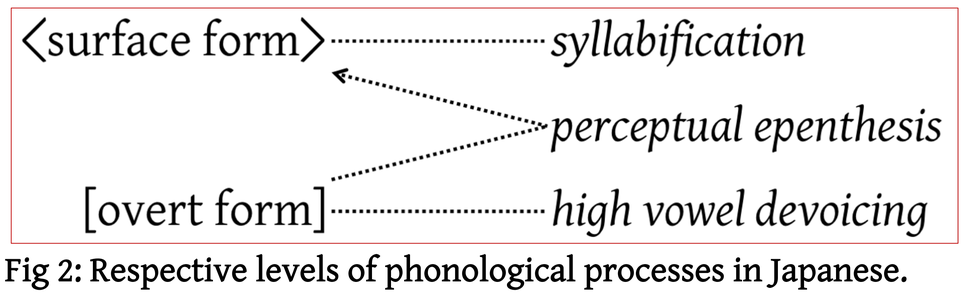

Fig 2: Respective levels of phonological processes in Japanese.

Boersma (2011) A programme for bidirectional phonology and phonetics and their acquisition and evolution. *Bidirectional optimality theory*. **Hayes** (1999) Phonetically driven phonology: The role of Optimality Theory and inductive grounding. *Functionalism and Formalism in Linguistics* . **Ito** (1986) *Syllable Theory in Prosodic Phonology*. **Kondo** (2005) Syllable structure and its acoustic effects on vowels in devoicing. *Voicing in Japanese.* **Pinto** (2015) High vowels devoicing and elision in Japanese: A diachronic approach. *ICPhS 18*. **Shaw & Kawahara** (2018a) The lingual articulation of devoiced /u/ in Tokyo Japanese. *J. Phon.* **Shaw & Kawahara** (2018b) Consequences of high vowel deletion for syllabification in Japanese. *AMP 2017.* **Tesar & Smolensky** (2000) *Learnability in Optimality Theory*. **Tsuchida** (1997) *Phonetics and phonology of Japanese vowel devoicing*. **Whang** (2018) Recoverability-driven coarticulation: Acoustic evidence from Japanese high vowel devoicing. *JASA.*