

## 借用語の適応から見た音声知覚と音韻論

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### Implications of loanword adaptation for speech perception and phonology

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#### I. Why loanword adaptation is relevant for theories of UG

(1) **Loanword**

(a) A word from one language — the **source language (L<sub>s</sub>)**

...is used by speakers of another — the **borrowing language (L<sub>b</sub>)**

(b) Example:    L<sub>s</sub>/English        *cream*        [kʁi:m]

                  L<sub>b</sub>/Japanese      クリーム      [kɯ.ri:.mɯ] 'cream'

(2) **Loanword adaptation (LWA):**    Phonological alterations that make a loanword **compatible with the phonology of L<sub>b</sub>**

(3) **Example** of LWA:

• Eng (L<sub>s</sub>) *cream* [kʁi:m] → violates several Jpn (L<sub>b</sub>) phonotactic constraints

(a) **Onset clusters** not permitted: \*[kr]

(b) Non-geminate, non-/N/ **codas** not permitted: \*[m]

(c) In the adapted L<sub>b</sub> form, **epenthesis** [ɯ]s avoid these problems

▶ [kɯ.ri:.mɯ]

(4) Where does LWA **interface with the grammar** of L<sub>b</sub>?

(a) In the regular L<sub>b</sub> phonology?

▶ If so, then how can the L<sub>b</sub> grammar "know what to do" to an L<sub>s</sub> structure that never appears in L<sub>b</sub> underlying forms?

(b) With loanword-specific phonological rules or constraints?

▶ If so, then where do these come from? What are their formal properties?

(c) As part of the speech perception system?

▶ If so, then is there no actual "phonology" of loanwords at all?

(5) Outline of talk

- §II Lb phonology and loanword adaptation
- §III Loanword-specific repair strategies
- §IV "Perceptual assimilation" and the Peperkamp & Dupoux (2003) model
- §V Proposal: An OO-FAITH model of loanword adaptation
- §VI Conclusions and implications

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**II. Lb phonology and loanword adaptation**

(6) Informal insight concerning LWA:

When a loanword contains elements that are not found in the native-language phonology, it often undergoes adaptation to repair those elements

- ▶ Not *always* the case — sometimes non-native forms are retained in loanwords. See §VI for further discussion.

(7) Under a rule-based system, it is difficult to formalize the notion that LWA brings words into conformity with the Lb phonology

- ▶ Problem: How can we say there are defaults at work in the adaptation process if "extra rules" are needed for LWA?

(a) Example: French [y ø] adapted as Mauritian Creole (MC) [i e]

- MC has no front rounded vowels (Jacobs & Gussenhoven 2000)

Ls/French		Lb/MC
<i>cheveux</i>	[ʃəvø]	[seve]
<i>plumeau</i>	[plymo]	[plimo]

(b) Rule? [-cons, -bk, +rd] → [-rd]

- ▶ but this rule is not needed in the non-loan phonology of MC, because there are no active alternations

(8) Under a constraint-based system, this basic insight is easily accounted for (Yip 1993; Jacobs & Gussenhoven 2000; Shinohara 2004; see also Lovins 1975)

(a) Whenever some phonological element is systematically absent from a language, we conclude that **M** >> **F**

- **M**: at least one markedness constraint penalizing that element
- **F**: at least one faithfulness constraint protecting that element from alteration

(b) The same **M>>F** ranking may be all that is needed to drive LWA

MC ranking:      \*FRV                              >>      IDENT[round]  
                          'no front round V'                              'no change in [±round] specification'

/plymo/	*FRV	IDENT[round]
a. plymo	*!	
▶ b. plimo		*

(9) Summary of this section

- (a) LWA brings loanwords into conformity with the Lb phonology
- (b) Under a constraint-based model, this effect is driven by **M** constraints that are independently needed to be high-ranking in the Lb grammar
- (c) Under a rule-based model, "phonotactically based repair strategies" would be loanword-specific, since they do not correspond to any active alternations in the Lb phonology

(10) Implications of loanword phonology for our understanding of UG

- **Implication #1:** LWA can be a source of external evidence that a certain phonological structure is **systematically absent** from the regular phonology of Lb (as opposed to being an accidental gap)
- **Implication #2: Constraint-based approaches** to LWA reduce the number of loanword-specific devices that the phonology has to include
  - ▶ However, it is not possible to get rid of *all* loanword-specific phonological constraints (counter to the claim in Jacobs & Gussenhoven 2000) —> §III.

### III. Loanword-specific repair strategies

(11) We have seen: The fact that loanwords are adapted in the absence of Lb alternations is straightforwardly handled by independently needed, high-ranking **M** constraints

However, the question of *how* loanwords are adapted is not as straightforward

- ▶ Sometimes, the **chosen repair strategy** is loanword-specific

Example: Japanese (Smith 2004a)

- Other examples in Yip (2002), Peperkamp (to appear)

(12) Repair strategy for loanwords in Japanese: **epenthesis**

- (a) Examples:     $L_s$  [kɹi:m] —>     $L_b$  [kw.ri:.mɯ],      \*[\_ ri:] 'cream'
- $L_s$  [best] —>     $L_b$  [be.sɯ.to],      \*[be\_\_] 'best'
- $L_s$  [stɹɹk] —>     $L_b$  [sɯ.to.rɹi.kɯ],    \*[\_ \_rɹi\_] 'strike'

(b) As seen above, LWA occurs to avoid structures that are impossible in Lb

(13) Constraint ranking for epenthesis in LWA: MAX >> DEP

• Ranking: { \*CMPONS, CODACOND, MAX } >> DEP

/kri:m/	*CMPONS	CODACOND	MAX	DEP
a. kri:m	*(!)	*(!)		
▶ b. kʷ.ri:.mʷ				**
c. _ri:_			*!*	

**Constraint definitions**

- \*COMPLEXONSET Onset clusters are prohibited (Prince & Smolensky 1993)
- CODACOND Codas with non-shared Place features are prohibited (Itô 1989)
- DEP Output segments have input correspondents (McCarthy & Prince 1995)
- MAX Input segments have output correspondents (McCarthy & Prince 1995)

(14) However — Repair strategy for non-loans in Japanese: arguably **deletion** (McCawley 1968)

(a) Vowel-final verbs: Suffixes surface unchanged

	<i>nonpast</i> /-rʷ/		<i>causative</i> /-sase/	
'see'	/mi-rʷ/	[mi.rʷ]	/mi-sase/	[mi.sa.se]
'eat'	/tabe-rʷ/	[ta.be.rʷ]	/tabe-sase/	[ta.be.sa.se]

(b) Consonant-final verbs: Suffix consonants delete

'read'	/jom-rʷ/	[jo.m_ʷ]	/jom-sase/	[jo.m_a.se]
'fly'	/tob-rʷ/	[to.b_ʷ]	/tob-sase/	[to.b_a.se]
'wait'	/mat-rʷ/	[ma.t <sup>s</sup> _ʷ]	/mat-sase/	[ma.t_a.se]

(15) So, the **opposite** ranking is motivated for non-loans: DEP >> MAX

• Ranking: { \*CMPONS, CODACOND, DEP } >> MAX

/jom-sase/ 'read-CAUS'	*CMPONS	CODACOND	DEP	MAX
a. jom.sa.se		*!		
b. jo.mV.sa.se			*!	
▶ c. jo.m_a.se				*

- (16) This is an example of a more general phenomenon:
- ▶ There is an *epenthesis preference* in LWA (Paradis & LaCharité 1997)
  - (a) Cross-linguistically,  $L_s$  consonants that don't fit  $L_b$  phonotactics are much more likely to be repaired by V epenthesis than by C deletion
  - (b) Consequence: Some languages have C deletion in  $L_b$ -internal phonology, but V epenthesis in loanword adaptation (Yip 2002, Smith 2004a, Peperkamp to appear)
  - (c) Languages with epenthesis only for loanwords show that the regular  $L_b$  phonology cannot be the only mechanism in loanword adaptation
- (17) Formal problem posed by the Preservation Principle (Paradis 1995)
- (a) Epenthesis and deletion *both* violate faithfulness constraints
  - (b) Formally, there is no sense that epenthesis is "more faithful" than deletion
    - Both have the potential to neutralize contrasts
    - Both make the output less similar to the input
  - (c) We could propose a universal default ranking,  $MAX \gg DEP$ ; but...
    - What would motivate such a fixed ranking?
    - What about languages that show  $DEP \gg MAX$  *except* in LWA?
- (18) Summary of this section
- (a) LWA is generally a response to a high-ranking **M** constraint in the  $L_b$  phonology
  - (b) But, the repair strategy that is used to satisfy that **M** constraint may be loanword-specific
  - (c) In particular, there seems to be a strong preference for epenthesis in LWA
- (19) Implications of loanword phonology for our understanding of UG
- **Implication #3:** Some repair strategies are loanword-specific, which shows that some faithfulness constraints are in a loanword-specific ranking
    - ▶ Or, are they? An alternative model of LWA has been proposed, in which the phonology is not responsible for loanword "repairs" at all —> §IV.

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#### IV. Perceptual assimilation and the Peperkamp & Dupoux (2003) model

- (20) Traditional view of LWA (as assumed so far in this discussion as well)
- (a) The underlying representation (UR) in  $L_b$  closely resembles the  $L_s$  form
    - at least for speakers who actually borrow a word, in contact with  $L_s$
  - (b) The **phonological grammar** of  $L_b$  then maps that UR to a surface representation (SR) that conforms to  $L_b$  phonology

(21) Some models of LWA include a "perceptual scan" stage, where segments in the Ls form that are not perceptually salient are deleted or otherwise penalized (Silverman 1992; Yip 1993; see also Yip 2002)

(22) Peperkamp & Dupoux (P&D) model: strongest version of this approach

• LWA is *entirely a perceptual effect*

(Peperkamp & Dupoux 2003, Peperkamp to appear)

(a) Psycholinguistic experiments show that speech perception can be distorted by the listener's native phonological system

(Massaro & Cohen 1983, Best 1994, Hallé et al. 1998, Dupoux et al. 1999, Moreton & Amano 1999, Mielke 2003, Kabak 2003...)

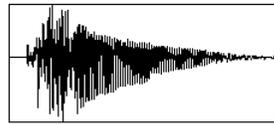
(b) Peperkamp & Dupoux's proposal

▶ L<sub>b</sub> phonology influences how L<sub>s</sub> words are (mis)perceived, but there is no UR→SR mapping in loanword adaptation

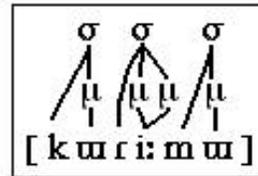
▶ All adaptation occurs **during perception**

(23) Example to illustrate this model

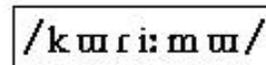
(a) L<sub>s</sub> acoustic signal (English *cream*)



(b) L<sub>b</sub> speaker's **phonetic decoding module** maps the acoustic signal to a surface phonetic representation



(c) L<sub>b</sub> speaker's **phonological decoding module** maps the surface phonetic representation onto a corresponding underlying representation



(24) Phonetic decoding in the P&D model (emphasis added)

(a) The phonetic decoding module maps acoustic information onto the **closest native phonetic category**

(b) "With respect to nonnative sounds, this mapping is of course **massively unfaithful**, since the phonetic categories to which these sounds are mapped in the foreign language can simply be absent from the native one." (Peperkamp & Dupoux 2003: 368)

- (c) "The phonetic decoder takes not only the inventory of segments into account but also those of suprasegments and syllables. Hence, **nonnative suprasegments and syllable types are mapped onto the closest native ones.**" (Peperkamp & Dupoux 2003: 369)

(25) Some predictions of the P&D model

- (a) In languages with a loanword-specific repair strategy, that strategy is a consequence of perceptual assimilation
- (b) Segments with high perceptual salience, such as sibilants, should always be perceptible; therefore, they should never be deleted in LWA
- (c) Because the "repair strategy" occurs as part of the Lb speaker's perception of the Ls form, it should never interact with other phonological constraints

Counter-argument (a): Epenthesis in Japanese LWA not (always) from perception

(26) Loanwords with **less orthographic influence** often show deletion repairs (Smith 2004b)

(a) English phrasebooks for 19th-century merchants (Kamei et al. 1965)

i. Final coda deletion

Item: ワリワン [wa.ri.waŋ\_] K:147

Gloss: *nan de gozaru* 'what is it?'

Probable source: < *what [do] you want*

Item: ナイ [nai\_] K:148, < *Nihon gaikoku shounin dokutsuushi*

Gloss: *yoru* 'evening, night'

Probable source: < *night*; cf. [nai.to] (Arakawa 1977)

ii. Medial coda (geminate) simplification by deletion

Item: コゝ - テゝ - ム [goo\_dee.mu] K:148, < *Nihon gaikoku shounin dokutsuushi*

Gloss: *okoru* 'become angry'

Probable source: < *goddamn*; cf. [god.do] 'god', [god.de.mu] 'goddamn' (Arakawa 1977)

(b) Other cases — see Smith (2004b) for more examples

- Data from Arakawa 1977, Ichikawa 1929, Miura 1993

i. Onset cluster simplification by deletion

*doublet form with epenthesis*

[\_ri.su.riŋ] *glycerine* 'glycerine' I:25

[gu.ri.se.riŋ]

[\_wai.ʃa.tʰu] *white shirt* 'white/dress shirt' I:8

[ho.wai.to]

ii. Final coda deletion

*doublet form with epenthesis*

[dʰi.ru.ba\_] *jitterbug* 'jitterbug' A:577

[dʰit.ta:.bag.gu]

[pok.ke\_] *pocket* 'pocket' I:7

[po.ket.to]

iii. Final coda-cluster simplification by deletion

*doublet form with epenthesis*

[ka.raN_]	<i>crank</i>	'crank' I:26	[kʷ.raN.kʷ]
[ne.ba: ma.iN_]	<i>never mind</i>	(to encourage teammate) M:28	[ne.ba: ma.iN.do]
[semeN_]	<i>cement</i>	'cement' I:26	[se.meN.to]

iv. Medial coda deletion

*doublet form with epenthesis*

[he_.boN]	<i>Hepburn</i>	'(JC) Hepburn' M:58	Katherine, Audrey [hep.pʷ.ba:n]
[wai_.ʃat <sup>s</sup> ʷ]	<i>white shirt</i>	'white/dress shirt' I:8	[ho.wai.to]

(27) Loanwords in Japanese **hip-hop** often show deletion repairs (S. Kawahara, p.c.)  
From "Kookai Shokei" by King Gidra:

(a) nanka chikagoro saikin **saa**  
rappu huetekita topputen <**chart**>

Kawahara's comment: "*chart* rhymes with *saa*, and I think he pronounces it like *chaa*."

(b) eigo bakkari tsukau **mukokuseki** <**rap**>  
nihongo ni kokoro **ugoku beki da**

Kawahara's comment: "This is a very skillful rhyme in which six vowels coincide with each other. What's more important however is that *rap* corresponds to *da*."

► For more on the phonology of Japanese rap, see Kawahara (2002).

Counter-argument (b): Deletion of sibilants in Finnish LWA

(28) Lb = Finnish; [s]-deletion in clusters

(a) Loanwords in Finland Finnish (Campbell 1998: 61-2)

"...Finnish, with no initial consonant clusters in native words, eliminated all but the last consonant of initial consonant clusters in loanwords..."

Lb/Finnish		Ls	
<i>Ranska</i>	'French'	< Swedish	<i>Franska</i> 'French'
<i>risti</i>	'cross'	< Old Russian	<i>kristi</i> ['cross', presumably? —JLS]
<i>ruuvi</i>	'screw'	< <b>Swedish</b>	<i>skruv</i> ' <b>screw</b> '

(b) Loanwords in American Finnish (Kolehmainen 1937: 62, 64)

Lb/Finnish		Ls/Am. English
toori	<	store
touvi	<	stove

Counter-argument (c): Repair strategy may interact with phonology

• See also: Yip (2002) for related arguments from Cantonese and Mandarin  
Kenstowicz (2003) on Fijian; (2004) on Thai

• **Huave:** LWA interacts with phonological constraints

(29) Lb = Huave (language isolate of Oaxaca, Mexico) Davidson & Noyer (1997)  
 Ls = Spanish

Main generalization: When all else is equal, **epenthesis** is the preferred repair. However, under pressure from certain phonotactic constraints, **deletion** is also found.

Another complication: Different loanwords have more or less adaptation

- Davidson & Noyer (1997) show that the patterns follow from an effect similar to lexical strata (e.g., Fukazawa, Kitahara, & Ota 1998; Ito & Mester 1999)

(30) Important constraints in LWA (according to D&N analysis; rephrased here)

- (a) MATCH-STRESS      The Lb correspondent of a stressed Ls V is stressed
- (b) STRESS              (conflation of constraints responsible for stress placement)
- (c) FREE-V              No final open syllables
- (d) \*COMPLEXONSET    No onset clusters
- (e) MAX >> DEP        ▶ epenthesis is usually the preferred repair

(31) Deletion occurs to satisfy prosodic constraints like MATCH-STRESS, STRESS, FREE-V  
 ▶ Note: MATCH-STRESS is never violated in loanwords, although STRESS and FREE-V may be violated in "less nativized" loanwords

- (a) "Most nativized grammar" (D&N 1997: 70)
  - ▶ MATCH-STRESS >> STRESS >> FREE-V >> MAX
  - ▶ Result: apocope and even consonant loss if Ls form had antepenultimate stress

(b) Ls ['i.ga.do] → Lb ['ik] 'liver' (D&N 1997: 68-70)

'i.ga.do	'liver'	MATCH-STRESS	STRESS	FREE-V	MAX
a. i.'ga.du		*!		*	
b. 'i.ga.du			*!	*	
c. 'i.ga				*!	**
▶ d. 'ik					***

(32) Problem for P&D model of LWA: Can a whole [...VCV] sequence fail to be perceived?

(33) Onset clusters from Ls forms are usually repaired by epenthesis, but **post-tonic clusters** are preserved intact because of stress-related constraints (D&N 1997:76)

- (34) Pre-tonic clusters repaired by epenthesis
- ▶ Note: Cluster repair is variable (by lexeme?)
    - Ls ['pla.to] 'plate' → Lb [po.'lat]
    - Ls ['pla.sa] 'plaza' → Lb ['plas]
  - ▶ Variability comes from promotion of DEP over \*COMPLEXONSET

(35) Ranking (for epenthesis case): { MAX, \*COMPLEXONSET } >> DEP

['pla.to] 'plate'	MATCH-STRESS	STRESS	FREE-V	MAX	*COMPLEXONSET	DEP
a. 'plat					*!	
b. 'lat, 'pat				*!		
▶ c. po.'lat						*

(36) Post-tonic clusters are never repaired [\*\*\*example here somewhat reconstructed—JLS]

(a) Ls ['sjem.pre] 'always' → [pre] syllable preserved intact in Lb

(b) Ranking: { MAX, \*COMPLEXONSET } >> DEP

- ▶ Separate point: This word also has "less nativized" ranking MAX >> FREE-V

['sjem.pre] 'always'	MATCH-STRESS	STRESS	MAX	FREE-V	*COMPLEXONSET	DEP
▶ a. '...em.pre				*	*	
b. '...em.po.re		*!		*		*
c. ...em.'po.re	*!			*		*
d. '...em.pe			*!	*		

(37) Problem for P&D model of LWA:

(a) CC clusters in Ls forms are clearly perceived by Lb speakers

- repair of pre-tonic CC clusters is variable/optional
- post-tonic CC clusters are never repaired, for phonological reasons

(b) Therefore, when CC clusters are repaired, this must be **under the control of the Lb phonology**

(38) Summary of this section

(a) Native-language phonology influences perception of non-native forms

(b) P&D model: All LWA happens at the stage of perception, not in the phonology

- ▶ Would be a nice explanation for the problem of loanword-specific repair strategies

- (c) Evidence against the P&D model:
  - i. Japanese perception of  $L_s$  forms sometimes involves deletion, not always epenthesis
  - ii. Highly perceptually salient segments like [s] may be deleted in LWA
  - iii. LWA sometimes interacts with other phonological processes in  $L_b$ , so it must be under the control of the grammar

- (39) Implications of loanword phonology for our understanding of UG
  - **Implication #4:** We cannot rely on automatic perceptual effects to account for all LWA

## V. Proposal: An OO-FAITH model of loanword adaptation

- (40) Similarity as faithfulness
  - (a) Several recent proposals address loan/non-loan repair differences (and other loanword phenomena) by positing loanword-specific "preservation" or "similarity" constraints (e.g., Yip 2002; Kang 2003; see also Paradis & LaCharité 1997)
  - (b) Such constraints are usually justified on the grounds that loanwords, unlike non-loans, have  $L_s$  forms that  $L_b$  speakers are trying to reflect
  - (c) However, this  $L_s$ - $L_b$  similarity relationship has not been explicitly formalized, and the proposed loanword-specific constraints are often quite unlike established OT constraints
- (41) I propose that loanword-specific "preservation" constraints can be straightforwardly unified with the non-loan phonological model under Correspondence Theory
  - (a) There is a **correspondence relation** (CR; McCarthy & Prince 1995) between the  $L_s$  source form and the  $L_b$  output form
    - Call it the **SB relation** ("source language <—> borrowing language")
  - (b) The  $L_s$  form and the  $L_b$  form both have the phonological status of surface forms, so the SB relation is an **output-output** CR (Benua 1997)
  - (c) The  $L_s$  form in the SB relation is the  $L_b$  speaker's **perceived representation** ( $pL_s$ ) of the  $L_s$  acoustic output
    - This aspect of the proposal allows us to incorporate the finding that perception is distorted by native-language phonology, without attributing all of LWA to perception
    - Crucially, similarity between the  $pL_s$  form and the  $L_b$  form is driven by **violable constraints**, so we correctly predict that they can interact with other constraints

(42) How the model works

(a) For each CR, there is a family of faithfulness constraints

(b) Thus, there are now SB-FAITH constraints in the constraint set

- One of these is MAX-SB, 'L<sub>s</sub> segments are not deleted in L<sub>b</sub> forms'
- This constraint is important in languages that have epenthesis only in loanwords

(43) Example: SB-FAITH constraints and the loanword-specific repair strategy in Japanese

(a) With the ranking MAX-SB >> DEP >> MAX, loanwords have epenthesis repairs because of MAX-SB >> DEP

I: / best / 'best' <i>pL<sub>s</sub></i> form: <Eng [ bɛst]	CODA COND	MAX-SB	DEP-IO	MAX-IO
a. bɛst	*!			
b. be_ _		*!		*
▶ c. be.su.to			*	

(b) But non-loans never violate SB-FAITH constraints, since they have no L<sub>s</sub> form to be faithful to—thus, non-loans are only affected by DEP >> MAX, leading to deletion.

I: / jom-sase / 'read-CAUS' <i>pL<sub>s</sub></i> form: <i>none</i>	CODA COND	MAX-SB	DEP-IO	MAX-IO
a. jom.sa.se	*!			
▶ b. jo.m_a.se				*
c. jo.mu.sa.se			*!	

- Similar analyses are possible for other cases.

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## VI. Conclusions and implications

(44) Factors involved in LWA — and how this model addresses them

(a) Many aspects of LWA are driven by the L<sub>b</sub> phonology

- ▶ Evidence for a constraint-based view of phonology [e.g., OT]

(b) However, some faithfulness constraints are loanword-specific

- ▶ SB-Faith constraints are automatically loanword-specific as a minimal extension to the independently necessary system of output-output faithfulness constraints

- (c) LWA often preserves perceptual similarity to the  $L_s$  form, but constraints enforcing perceptual similarity can be violated
- ▶ Since the SB-Faith constraints are part of the  $L_b$  phonological system, they can be dominated by other constraints and therefore violated

(45) Other advantages of this model

- (a) **Orthography** can also influence LWA (see Smith 2004b for Japanese loan "doublets")
- ▶ Orthographic information can be incorporated into the  $pL_s$  representation
- (b) This model provides a way to understand the transition between (initial) loanword adaptation and the development of **lexical stratification** in subsequent generations of  $L_b$  speakers (work in progress)
- (c) **Sociolinguistic** factors
- Loanword phonology may span a range from drastic nativization to the wholesale introduction of non-native structures into  $L_b$
  - The degree of nativization may change over time, and may reflect attitudes of  $L_b$  speakers toward  $L_s$  culture as well as language
  - If adaptation is the result of constraint interaction, then changes in nativization patterns can be modeled as changes in constraint rankings (rather than sudden changes in perceptual ability, as the P&D model would have to propose)

(46) Open question: Why the epenthesis preference?

My answer: This too is some kind of sociolinguistic effect.

- ▶ It is not an absolute pattern, just a (very large) trend
- ▶ In creole formation, deletion repairs are also used (Alber & Plag 2001)
- ▶ LWA with deletion repairs: Hmong (Golston & Yang 2001), as well as Japanese/Finnish/Huave cases discussed above

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