Phonological perception in loanword adaptation

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Loanword phonology

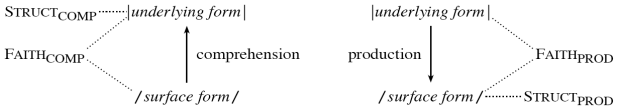
Three approaches:

- Adaptation is perceptual, similarity between loan and native segments determines integration (e.g. Peperkamp & Dupoux 2003)
- Adaptation is phonological only, and performed by bilinguals (e.g. Paradis 1996)
- Adaptation involves native phonology *and* phonetic similarity between loan and native segments (e.g. Silverman 1992, Kenstowicz 2001, Broselow 2003, Yip 2006)

Our proposal: phonological perception

- Loan adaptation involves your L1 (and possibly your L2) perception, and no loanword-specific devices
- Speech perception is the construction of an abstract phonological surface form from raw auditory material
- Speech perception is constrained by the familiar *language-specific structural constraints*

Bidirectional two-level OT models of loanword adaptation

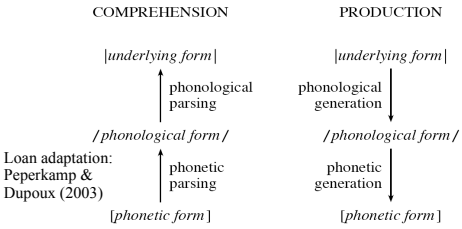


Problems:

- loanword-specific device: different FAITH constraints in comprehension and production (e.g. MATCH by Davidson & Noyer 1996, MIMIC by Yip 2006)
- loanword-specific device: STRUCTURAL constraints work on different representations (e.g. Broselow 2003)
- general problem for two-level grammar models: is the surface form abstract or phonetically detailed?

Psycholinguistic three-level model

(Levelt 1989, McQueen & Cutler 1997)

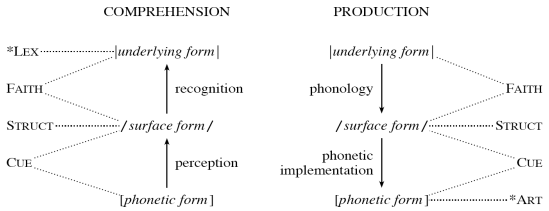


"All loanword adaptations are phonetically minimal transformations that apply in perception"

Problem: how is the similarity between loan and native segment determined? No formalization

Present approach: three-level OT

Use existing model for bidirectional L1 phonology & phonetics (Boersma 1998: serial comprehension; 2005: parallel production), without any loanword-specific constraints or modules



- Explicit formalization
- Same constraints in both directions
- Same constraints for the same forms

Japanese: final consonants

Polivanov (1931): Japanese listeners perceive the Russian word *tak* 'so' [tak] as /.ta.ku./
(modelled in OT by Escudero & Boersma 2004)

[ta{*velar,burst*}]	CODA COND	*[*burst*] / /	*[ ] /o/	*[ ] /u/
/.tak./	*!			
/.ta./		*!		
/.ta.ko./			*!	
☞ /.ta.ku./				*

No similarity calculations between loan and native segments!
Loan segment is categorized via native constraint rankings (acquired on the basis of L1 input)

Japanese: initial clusters

Russian [drama] is perceived as /.do.ra.ma./ (Polivanov 1931)

[{*alv,burst*}rama]	*/.CC/	*[*burst*] / /	*/du/	*[*alv*] /*vel*/	*[*burst*] /*fric*/	*[ ] /o/	*[ ] /u/
/.dra.ma./	*!						
/.ɾa.ma./		*!					
/.du.ɾa.ma./			*!				*
/.zu.ɾa.ma./					*!		*
☞ /.do.ɾa.ma./						*	
/.gu.ɾa.ma./				*!			*

See also the findings by Dupoux et al. (1999): Japanese listeners perceive both [ebzo] and [ebuzo] as /.e.bu.zo./

Structural and cue constraints

We use no loanword-specific devices:

1. structural and cue constraints are independently needed for native-language perception;

2. structural constraints are independently needed in production.

Empirical prediction: we should find cases of crucial intertwining of structural and cue constraints.

Cue constraints can override structural constraints

Example: Dutch adaptation of English long high vowels as in *team*

[tʰi{*long*}m]	*[*long*] /*μ*/	*/high, long/
/.tim./	*!	
☞ /.tiːm./		*

Borrowing creates new phonotactics!

Cantonese: final consonant clusters

Data from Silverman (1992) and Yip (1993, 2002).
Adaptation of English *tips* as [tʰiːpsiː] and *send* as [sɛːn]

[tɯp{*fric*}]	*/CC./	*/F./	*[*fric*] / /	*[ ] /V/
/.tʰips./	*!	*		
/.tʰis./		*!		
/.tʰip./			*!	
☞ /.tʰip.si./				*

Cantonese: final consonant clusters

[sɛ{*nas*}{^{d}}]	*/CC./	*/F./	*[*nas*] / /	*[*fric*] / /	*[ ] /V/	*[^{d}] / /
/.sɛnd./	*!					
/.sɛn.di./					*!	
/.sɛd./			*!			
☞ /.sɛn./						*

Yip (1993, 2002): difference between auditory salience of [tɪpsˌ] and [sɛnd̲] causes difference in *production* via PARSE(salient) or MIMIC-SALIENT.
Simpler proposal: locus is in *perception*, as here.

Cantonese: liquids

Adaptation of English *plum* as [powlɐm] but *freezer* as [fi:sa:]

[p{*liquid*}ʌm]	*/.CC/	* /ω/ / σσσ/	*[*liquid*] / /	*[ ] /V/
/.plɐm./	*!			
/.pɐm./			*!	
☞ /.pow.lɐm./				*

[f{*liquid*}i:zə]	*/.CC/	* /ω/ / σσσ/	*[*liquid*] / /	*[ ] /V/
/.fli.sa./	*!			
/.fi.li.sa./		*!		*
☞ /.fi.sa./			*	

Cantonese: tone of epenthetic vowels

[plʌ{*hi*}m]	*/∅/ / σ/	*[ ] /M/	*[ ] /L/
H p o w l ɐ m	*!		
☞ L H p o w l ɐ m			*
M H p o w l ɐ m		*!	

Silverman (1992: 303): At the Operative Level, "a L tone (the least prominent tone) is provided, since its **acoustic properties most closely correspond** to those of the input."

More natural locus: a L tone is provided in *perception*.

Desano

Data from Kaye (1971), analysis from Boersma (2000/2003)

Adaptation of Portuguese [ʒwɐ̃w̃] 'John' as /ɲũ/

[ʒwɐ̃w̃]	*/∅N/ / CV/	*/∅N/ / σσ/	*[V±nas] /V±nas/	*[C±nas] /C±nas/
N ʒ u	*!			
N ʒ u a		*!		
☞ N ɲ u				*
ʒ u			*!	

Desano

Adaptation of [sɐbɐ̃w̃] 'soap' as /.sa.bo./

[sɐbɐ̃w̃]	*/∅N/ / CV/	*/∅N/ / σσ/	*[V±nas] /V±nas/	*[C±nas] /C±nas/
N s a b o	*!			
N s a m o		*!		*
N n a m o			*	*!*
☞ s a b o			*	

Conclusions

- Loanword adaptation uses already available perception grammar(s)
- OT structural constraints guide perception
- OT cue constraints are ranked by cue reliability

Not needed:

- loanword-specific modules or constraints
- loanword-specific rankings (e.g. Max >> Dep)

Assumptions required:

- bidirectionality, phonological & phonetic levels

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