Modeling loanword adaptation: Evidence from Japanese

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1. Introduction

- Japanese loanwords have been influential in the development of phonological theory, especially **lexical stratification** (McCawley 1968; Lovins 1975; Itô & Mester 1995, 1999)
- Focus of this talk: What does evidence from Japanese show about the process of **loanword adaptation** specifically?

(1) Loanword adaptation

(a) A form from the **source language (Ls)**
- undergoes phonological adjustment in "real time"
- in order to be incorporated into the **borrowing language (Lb)**

(b) Adaptation is performed by an Lb speaker with some degree of exposure to Ls
- Amount of exposure to Ls can vary widely

(2) Controversies over loanword adaptation —> Evidence from Japanese

(a) Is there a phonological (production) grammar involved? ***yes***
(b) Can it be different from the non-loan phonological grammar? ***yes***
(c) Is it different from the resulting stratified phonology? ***yes***

(d) Is loanword adaptation phonetic, or phonological? ***both***
(e) Does it involve perceptual similarity? Orthography? ***both***

(3) Proposal: **SB correspondence model** of loanword adaptation (Smith 2006, to appear-a,b)

(a) pLs representation

(b) SB correspondence relation (faithfulness/similarity to the pLs representation)

(4) **pLs representation** = posited source-language (Ls) representation

(a) Encodes the Lb speaker's **knowledge of the Ls form**

(b) Available sources of this knowledge may include:
- auditory perception
- orthography
- explicit knowledge of Ls grammar (phonology, morphology, ...)

—> Depends on the nature of the language contact situation

(5) Implications of the SB correspondence model for the questions in (2)

(a) The SBcorr model is a ***phonological*** model of loanword adaptation
- as with the non-loan phonology, a winning candidate is chosen through parallel evaluation by ranked constraints

(b) ***Differs from the non-loan phonology*** by including adaptation-specific elements
- an adaptation-specific phonological representation (pLs representation)
- an adaptation-specific correspondence relation (SB correspondence)

(c) ***Differs from the post-borrowing grammar of Lb*** (which may be a stratified phonology)
- the pLs representation is part of an Lb speaker's mental grammar only when the speaker is actually modeling a foreign source for the loanword
- subsequent generations of Lb speakers learning Lb will likely *not* posit pLs representations for already existing (adapted) loanwords

(d) Loanword adaptation is ***both phonetic and phonological***
(e) Loanword adaptation involves ***both perceptual similarity and orthography***
- all of these factors can play a role in establishing the pLs representation
- sometimes "phonetic" vs. "phonological" merely reflects different ways of ranking the same set of constraints — the distinction between IO and SB correspondence constraints is useful here

(6) Outline of the talk

§2 The phonological model
2.1 Background
2.2 The SB correspondence model
§3 A phonological grammar for loanword adaptation
3.1 Adaptation grammar may be distinct from non-loan phonology
3.2 Importation
3.3 Adaptation-specific phonological processes
§4 The pLs representation
4.1 About the pLs representation
4.2 Orthographic/auditory loan doublets in Japanese
§5 Further questions
§6 Conclusions

- Japanese loanword examples are from Arakawa (1977) unless otherwise noted

2. The phonological model

2.1 Background: Markedness, faithfulness, and correspondence in OT

- Two general constraint families in Optimality Theory (OT; Prince & Smolensky 1993)

(7) **Markedness constraints (M):** penalize marked structures in surface forms
- Many M constraints are functionally grounded (Archangeli & Pulleyblank 1994) and/or formally encode typological markedness relations

(8) **Faithfulness constraints (F):** enforce identity (similarity) between phonological forms standing in **correspondence** (McCarthy & Prince 1995)

(a) Distinct F constraints penalize non-identity of different types
- epenthesis
- featural change (each feature)
- deletion
- metathesis
- ...etc.

(b) Multiple correspondence relations exist
- IO input-output (McCarthy & Prince 1995)
- OO output-(derivationally related) output (Benua 1997)
- BR base-reduplicant (McCarthy & Prince 1995)
- CC consonants with long-distance agreement (S. Rose & Walker 2004)

(c) Constraints on different corr relations can be ranked independently

(9) Important postulate of OT: **richness of the base** (Prince & Smolensky 1993)
- There are no language-particular restrictions on input forms

(a) RotB ensures that predictable patterns in language L are enforced by its constraint ranking — the constraint ranking **models phonological competence**

(b) In practice, this means that a formally adequate constraint ranking for L must produce an L-appropriate output, given *any* cross-linguistically possible input

2.2 Overview of the SBcorr model of loanword adaptation

(10) Insight: "Maintaining similarity" to Ls form is a factor in loanword phonology
(e.g., Haugen 1950: 216; Lovins 1975: 38; Kim 1982: 446; Paradis & LaCharité 1997; Steriade 2001)

(a) Many loanword-specific phonological effects can be attributed to loans maintaining similarity to their Ls source forms
- perhaps at the expense of Lb phonotactics or Lb default processes

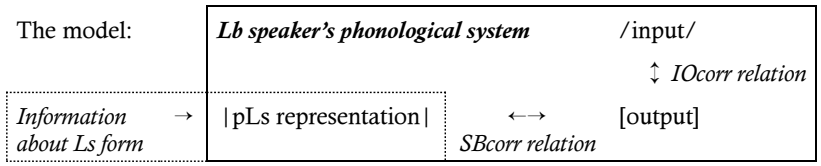
(b) Non-loans are not involved because they have no Ls counterparts

(11) Correspondence relations (McCarthy & Prince 1995) in loanword adaptation
- Correspondence constraints enforce phonological similarity

(a) Input-output (**IO**) correspondence relation (McCarthy & Prince 1995)
inputs (URs) <—> outputs (SRs)

(b) **Ls-Lb (SB) correspondence relation**
pLs form <—> Lb output

(c) The model:



(12) Related proposals

(a) MIMIC (Yip 2002: 5) "MIMIC is the OT instantiation of active loan word incorporation, and enforces faithfulness to the percept. ... MIMIC is a faithfulness constraint, but it relates the output to a specific sub-type of input, a demonstrably foreign form."

(b) Proposals that explicitly model Ls-Lb similarity in **correspondence theory**
- Loanwords: Kawu 1999; Kang 2003; Kenstowicz 2005; Adler 2006; Kenstowicz & Suchato 2006; Y. Rose & Demuth 2006; Smith 2006, to appear-a,b
- Creoles: Alber & Plag 2001

(13) How the SBcorr model is different
—> explicit model of the "Ls source form": the pLs representation

3. A phonological grammar for loanword adaptation

3.1 Adaptation grammar may differ from non-loan phonology: evidence

(14) ***importation*** of Ls structures into Lb (Haugen 1950)

(a) Lb-illicit structures are allowed to persist in loanword adaptation

(b) Example: Non-loan phonology of Japanese prohibits *[ti] (/ti/ —> [tʃi])
Loanwords may retain [ti]: [**tii**potto] < *teapot*
[ripusu**ti**kku] < *lipstick*

(c) For subsequent generations of Lb learners, this may lead to:
(i) stratified lexicon (Fukazawa et al. 1998; Itô & Mester 1999; Ota 2004; Pater 2005)
(ii) reanalysis of core Lb grammar (Rice 2006)

—> But we also need to consider the grammar of adaptation itself

(15) ***adaptation-specific phonological processes***

(a) The unfaithful mapping ("phonological process") used to avoid a prohibited structure in adaptation may differ from what is used in non-loan phonology
- Examples:
  - Korean (Kim 1982; Kang 2003)
  - Swahili (Kraska-Szlenk 1999)
  - Thai (Kenstowicz & Suchato 2006)
  - Maori (Yip 2002)
  - Japanese (Smith 2006; Peperkamp to appear)

(b) Example: Unsyllabifiable Cs (codas, clusters) in Japanese
- Non-loans: **deletion** /ka**k**-**r**u/ —> [ka.**k**_u] 'write-NONPAST'
- Adaptation: **epenthesis** |**kr**iim| —> [**ku**.**r**ii.mu] 'cream'

(c) For subsequent generations of Lb learners, forms like *kuriimu* are already legal

—> The phonological process used to adapt these forms plays no role in the non-loan phonology once adaptation has occurred

(16) Are these phenomena in fact phonological? Yes: see §4 below

3.2 Importation and the SBcorr model

(17) Example of **importation:** Japanese [t] / [tʃ]
- contrastive in loanwords
- predictable distribution in non-loans

(18) SBcorr model solves the apparent "ranking paradox" presented by importation

(a) Adaptation: **Contrastive** distribution requires **F >> M1** and **F >> M2**
(b) Non-loans: **Complementary** distribution requires **M1 >> M2 >> F**

(c) Proposal:

F-SB >>	M1 >> M2	>> **F-IO**	*Relevant for adaptation*
F-SB >>	M1 >> M2	>> **F-IO**	*Relevant for non-loans*

(19) Non-loans: Predictable distribution

(a) Complementary distribution
- [tʃ] appears only before [i] (and [j], assumed here to be featurally identical to [i])
- [ts] appears before [u] — not further discussed here
- [t] appears in the elsewhere environment

(b) Alternations seen in verb morphology

kat-eba	'win-CONDITIONAL'	katʃ-itai	'win-DESIDERATIVE'
kat-anai	'win-NEGATIVE'	katʃ-imasu	'win-POLITE'
kat-oo	'win-HORTATIVE'		

(20) Non-loans: Ranking motivated for complementary distribution pattern, [t]~[tʃ]

(a)

M1	*[ti]	Violated by each [ti] sequence in output forms (= a palatalization constraint)
M2	*[tʃ]	Violated by each [tʃ] in output forms ([tʃ] = marked segment)
F	IDENT[ANT]	Violated when corresponding (input/output) segments differ in [±anterior] specification (McCarthy & Prince 1995)

(b) Ranking: *[ti] >> *[tʃ] >> IDENT[ANT]

(21) Non-loans: How the analysis works

—> For the grammar to enforce the **predictable distribution** of [t] and [tʃ], potential inputs /t/ and /tʃ/ must map to [tʃ] before [i], and to [t] elsewhere

(a) Elsewhere context:
- /t/ maps to [t] ([t] violates no relevant constraints)
- /tʃ/ maps to [t] *[tʃ] >> IDENT[ANT]-IO

(b) When [i] follows:
- /tʃi/ maps to [tʃi] *[ti] >> *[tʃ]
- /ti/ maps to [tʃi] *[ti] >> *[tʃ]
  *[ti] >> IDENT[ANT]-IO

(c) Faithfulness to input value of [±anterior] always overridden
—> predictable distribution of [t]~[tʃ]

(22) Adaptation: Contrastive distribution

(a) [t]/[tʃ] distribution unpredictable in loans (Lovins 1975, Vance 1987, Itô & Mester 1995)
- Source-language [t] is maintained in Japanese loans before all vowels
- Source-language [tʃ] appears before all vowels as well

(b) Examples (Vance 1987; Arakawa 1977)

_[i]	**ti**pikaru	'typical'		**tʃi**ppu	'(potato) chips'
	aisu**tii**	'iced tea'		**tʃii**zu	'cheese'
_[e]	**te**kku	'technical center'		**tʃe**kku	'check'
	tero	'terrorism'		**tʃe**ro	'cello'
	karu**te**	'clinical record' <Ger. *Karte*		doru**tʃe**	'*dolce* (musical term)' <Ital.

- The pre-[e] environment is the only one that can confirm the non-native distribution of [tʃ], because surface [tʃa tʃu tʃo] can also be analyzed as Lb-compatible /tja tju tjo/

(23) Adaptation: Ranking motivated for contrastive distribution pattern

(a) For [t] and [tʃ] to be **contrastive**:
- /t/ must map to [t]
- /tʃ/ must map to [tʃ]

(b) Ranking: IDENT[ANT] >> { *[ti], *[tʃ] }

(24) Adaptation: How the analysis works
- With IDENT[ANT] highest ranked, both [t] and [tʃ] can appear in any context

(25) Crucial difference between adaptation and non-loan phonologies

(a) Ranking paradox ... ?
- Loan ranking: IDENT[ANT] >> { *[ti], *[tʃ] }
- Non-loan ranking: *[ti] >> *[tʃ] >> IDENT[ANT]

—> Loan and non-loan phonologies differ in the relative ranking of IDENT[ANT] with respect to *[ti] (>>) *[tʃ]

(b) The SBcorr model provides a solution
IDENT[ANT]-SB >> *[ti] >> *[tʃ] >> **IDENT[ANT]-IO**

(26) Demonstration of non-loan phonology: [t] and [tʃ] neutralized
- No pLs form; SBcorr constraints all vacuously satisfied

(a)

/kat-itai/ 'win-DES' *(no pLs form)*	ID[ANT]-SB	***[ti]**	**[tʃ]**	**ID[ANT]-IO**
i. katitai	*satisfied*	*!		
☞ ii. katʃitai	*satisfied*		*	*

(b)

/katʃ-eba/ 'win-COND' *(no pLs form)*	ID[ANT]-SB	***[ti]**	**[tʃ]**	**ID[ANT]-IO**
☞ i. kateba	*satisfied*			*
ii. katʃeba	*satisfied*		*!	

- Hypothetical input containing /tʃ/ — has to be considered, because the constraint ranking must correctly eliminate "wrong" allophones in a language with complementary distribution

(27) Demonstration of adaptation grammar: [t] / [tʃ] contrast preserved
- pLs form exists; SBcorr constraints are active in choosing the winner

(a) Implementation question: **What is the input** in loanword adaptation?
- Before a loanword is adapted, there is no UR/lexical entry in Lb
- Assumption: The pLs representation is "copied" as the input
  —> like L1 acquisition: adult output=learner's input (Tesar & Smolensky 2000)
- Does the IOcorr relation do any work in adaptation? See §5.2 below.

(b)

/tii/ 'tea' *pLs form:* |tii|	**ID[ANT]-SB**	***[ti]**	***[tʃ]**	ID[ANT]-IO
☞ i. tii		*		
ii. tʃii	*!		*	*

(c)

/tʃelo/ 'cello' *pLs:* |tʃelo|	**ID[ANT]-SB**	***[ti]**	***[tʃ]**	ID[ANT]-IO
i. tero	*!			*
☞ ii. tʃero			*	

(28) Summary: Importation of Lb-illicit structures in adaptation...
(a) cannot be handled by the Lb non-loan grammar alone
(b) motivates high-ranking, **adaptation-specific faithfulness constraints**
—> SBcorr constraints fill this role

3.3 Adaptation-specific phonological processes and the SBcorr model

(29) Example: Unsyllabifiable Cs (codas, clusters) in Japanese
(a) Non-loans: **deletion** /ka**k**-**r**u/ —> [ka.**k**_u] 'write-NONPAST'
(b) Adaptation: **epenthesis** |**kr**ii**m**| —> [**ku**.**r**ii.**mu**] 'cream'

(30) SBcorr solves the apparent "ranking paradox" for adaptation-specific processes
(a) Crucial faithfulness constraints (McCarthy & Prince 1995)
DEP No epenthesis (Output segments have input correspondents)
MAX No deletion (Input segments have output correspondents)
(b) Non-loans: **Deletion** requires **DEP >> MAX**
(c) Adaptation: **Epenthesis** requires **MAX >> DEP**
(d) Proposal:

MAX-SB >> { DEP-SB, DEP-IO } >> **MAX-IO** *Deletion in non-loans*
MAX-SB >> { DEP-SB, DEP-IO } >> **MAX-IO** *Epenthesis in adaptation*

(31) Syllable structure constraints active in Japanese
*COMPLEXONSET Onset clusters are prohibited (Prince & Smolensky 1993)
CODACOND Codas with non-shared Place features are prohibited (Itô 1989)
—> encapsulated/abbreviated in tableaux as SYLLSTRUC

(32) Non-loans: SYLLSTRUC violations avoided through deletion
(a) Ranking: { SYLLSTRUC, DEP } >> MAX
(b) How the analysis works
- Deletion preferred to cluster or illicit coda SYLLSTRUC >> MAX
- Deletion preferred to epenthesis DEP >> MAX

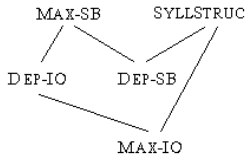
(33) Adaptation: SYLLSTRUC violations avoided through epenthesis
(a) Ranking: { SYLLSTRUC, MAX } >> DEP
(b) How the analysis works
- Epenthesis preferred to cluster or illicit coda SYLLSTRUC >> DEP
- Epenthesis preferred to deletion MAX >> DEP

(34) Crucial difference between adaptation and non-loan phonologies

(a) Ranking paradox ... ?
- Loan ranking: MAX >> DEP
- Non-loan ranking: DEP >> MAX

(b) The SBcorr model provides a solution
MAX-SB >> { DEP-SB, DEP-IO } >> **MAX-IO**

(35) Ranking, including SYLLSTRUC:



(36) Demonstration

(a) Non-loan phonology: No pLs form; DEP-IO >> MAX-IO drives deletion

/ka**k**-**r**u/ 'write-NONPAST'	SYLL STRUC	MAX-SB	DEP-SB	**DEP-IO**	**MAX-IO**
☞ i. ka.**k**_u		*satisfied*	*satisfied*		*
ii. ka**k**.**r**u	*!	*satisfied*	*satisfied*		
iii. ka.**kr**u	*!	*satisfied*	*satisfied*		
iv. ka.**ku**.**r**u		*satisfied*	*satisfied*	*!	

(b) Adaptation: pLs form exists; MAX-SB >> { DEP-SB, DEP-IO } drives deletion

/**kr**ii**m**/ 'cream' *pLs form:* |**kr**ii**m**|	SYLL STRUC	**MAX-SB**	**DEP-SB**	**DEP-IO**	MAX-IO
☞ i. **ku**.**r**ii.**mu**			**	**	
ii. _**r**ii_		*!*			**
iii. **k**_ii_		*!*			**
iv. **kr**ii**m**	*!*				

(37) Summary: Adaptation-specific phonological processes...

(a) cannot be handled by the Lb non-loan grammar alone

(b) motivate **adaptation-specific faithfulness constraints** in a different ranking from input-output faithfulness constraints
—> SBcorr constraints perform this function

4. The pLs representation

4.1 About the pLs representation

(38) pLs representation = Lb speaker's posited representation of a loanword's Ls form

(a) Formally: pLs form is a necessary component of the SBcorr model
- Any string standing in a correspondence relation must be **phonologically represented** by the Lb speaker
- Therefore, a source-similarity correspondence relation cannot directly involve a physical Ls surface form

(b) Conceptually: pLs form represents the Lb speaker's awareness that a form from another linguistic system is being borrowed

(c) Allows for a consistent formal treatment of various factors affecting adaptation

(39) Sources of information for the pLs form

(a) Speech perception

(i) **Phonetic details** of pLs form may be accurately perceived
—> phonetic-level similarity effects in adaptation (Yip 2002; Kang 2003)

(ii) Lb phonotactics may cause **perceptual distortion** of non-native structures (Werker & Tees 1984; Best 1994; Hallé et al. 1998; Dupoux et al. 1999; Moreton & Amano 1999; Kabak 2003; Mielke 2003)
—> some "adaptation" effects may come from perception, not the production grammar (Silverman 1992; Yip 2002; Peperkamp & Dupoux 2003)

(b) Orthography (Haugen 1950; Lovins 1975; Vendelin & Peperkamp 2006)

(i) Written form of an Ls word may provide **clues to its phonological or phonetic content** that the Lb speaker would not have perceived auditorily
—> access to orthography can increase similarity to Ls form

(ii) Written Ls form can also be **misinterpreted** by the Lb speaker
—> may lead to pLs representation with entirely different segmental categories from the Ls surface form
- Eng *b**u**zzer* [bʌzəˑ] > Jpn [b**u**zaa] (Miura 1993)
- Eng *bo**mb**erman* [bamə˞mæn] > Jpn [bo**Nb**aamaN] (S. Kawahara, p.c.)

(c) Explicit knowledge of Ls grammar (bilingualism)

Adaptation can be influenced by knowledge of:
(i) Ls phonology (Paradis & LaCharité 1997)
(ii) Ls morphology and syntax (Silverman 1992: 292)

(d) Visual information? (Yip 2002) — i.e., lip rounding

4.2 Orthographic/auditory loan doublets in Japanese

(40) Ls forms with multiple Lb forms in Japanese — evidence that:

(a) Orthography and perception can each contribute information to the pLs form

(b) There is a phonological (production) grammar involved in adaptation — adaptation effects cannot be entirely attributed to perceptual distortion

(41) Loanword doublets, 19th-20th century loans (Arakawa 1977; Ichikawa 1929; Miura 1993)

(a) Onset cluster simplification by deletion — epenthesis doublet form

[_ɾi.su.ɾiɴ]	<*glycerine*	I25	[gɯ.ɾi.se.ɾiɴ]
[_wai.ʃa.t^{s}u]	<*white shirt*	'white/dress shirt' I8	[ho.wai.to]

(b) Final coda deletion

[d^{3}i.ɾu.ba_]	<*jitterbug*	A577	[d^{3}it.taa.bag.gu]
[pok.ke_]	<*pocket*	I7	[po.ket.to]
[ɾa.mu.ne_]	<*lemonade*	'l.flavor drink'I3,M171	[ɾe.mo.nee.do]
[haɴ.ke.t^{f}i_]	<*handkerchief*	I7, M136	[haɴ.ka.t^{f}ii.fu]

(c) Final coda-cluster simplification by deletion

[se.meɴ_]	<*cement*	I26	[se.meɴ.to]
[ne.baa ma.iɴ_]	<*never mind*	(cheer team) M28	[ne.baa ma.iɴ.do]
[ka.ɾaɴ_]	<*crank*	I26	[ku.ɾaɴ.ku]

(d) Coda [ŋ] as [ɴ], not [ɴgu]

[pu.ɾiɴ]	<*pudding*	I3	[pu.diɴ.gu]
[taɴ]	<*tongue*	(food) I4,M177	[o.ku.su taɴ.gu]
[saa.fiɴ]	<*surfing*	M139	[saa.fiɴ.gu]

(e) Medial coda deletion

[bi_.su.te.ki]	<*beefsteak*	I2	[bii.fu.su.tee.ki]
[wai_.ʃat^{s}u]	<*white shirt*	'white/dress shirt' I8	[ho.wai.to]
[he_.boɴ]	<*Hepburn*	'(J.C.) Hepburn' M58	[hep.pu.baaɴ] (Katharine, Audrey)

(42) Supporting evidence that deletion loans have auditory sources

(a) Ls (=Eng) reduced vowels
- Deletion loans often have [u] — *glyc<u>e</u>rine* > [_ɾi.s<u>u</u>.ɾiɴ]
- Epenthesis counterparts match orthography [gu.ɾi.s<u>e</u>.ɾiɴ]

(b) Ls (=AmEng) flap allophone of /t/ or /d/
- Deletion loans tend to have [ɾ] — *ji<u>tt</u>erbug* > [d^{3}i.<u>ɾ</u>u.ba_]
- Epenthesis counterparts have stop [d^{3}i<u>t</u>.<u>t</u>aa.bag.gu]
  - cf. Paradis & LaCharité (1997), LaCharité & Paradis (2005), Kenstowicz (2005) on lack or rarity of Eng flap > [ɾ]/liquid in Lb = Quebec French, Mexican Spanish, Korean

(43) More examples supporting a correlation between auditory source / deletion

- English loanwords in Hawai'ian Japanese (Higa 1970)

(a) Deletion of final voiced stop, V_# (H137)

[iɴ.sai_]	<*inside*	cf. [iɴ.sai.<u>d</u>o]
[au.sai_]	<*outside*	cf. [au.to.sai.<u>d</u>o]

(b) Deletion of final voiced stop, N_# (H131)

[ha.zu.beɴ_]	<*husband*	cf. [ha.zu.baɴ.<u>d</u>o]

(c) Deletion of final voiceless stop, S_# (H136)

[ne.ki.su_ i.ja]	<*next year*	cf. [ne.ki.su.<u>t</u>o]+*generation*
[ɾa.su_ i.ja]	<*last year*	cf. [ɾa.su.<u>t</u>o]

(d) Deletion of medial-coda voiceless stop (H137)

[au_.sai]	<*outside*	cf. [au.<u>t</u>o.sai.do]

- Items from 19th-century English phrasebooks for merchants, etc. (Kamei et al. 1965)

(a) Final coda deletion

[wa.ɾi.waɴ_]	K147	Gloss: *nan de gozaru* 'what is it?'
	Probable source: <*what [do] you want*	
[nai_]	K148, from *Nihon gaikoku syounin dokutuusi*	Gloss: *yoru* 'evening, night'
	Probable source: <*night*; cf. [nai.<u>t</u>o]	

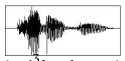
(b) Medial coda (geminate) simplification by deletion

[goo_dee.mu]	K148, from *Nihon gaikoku syounin dokutuusi*	Gloss: *okoru* 'become angry'
	Probable source: <*goddamn*; cf. [go<u>d</u>.de.mu]	

(44) Modeling the doublet from Ls *jitterbug*

(a) **Auditory borrowing**

i. Ls phonetic form [d^{3}ɪɾə·bʌgˀ]

ii. Acoustic form 

iii. pLs form | d^{3}iɾuba_ | ▸ *perception **may** lead to deletion*
▸ *Eng flap > Jpn flap: "phonetic"*

iv. Lb surface form [d^{3}i.ɾu.ba]

(b) **Orthographic borrowing**

i. Ls spelling < jitterbug >

ii. pLs form | d^{3}ittaabag | ▸ *via orthographic decoding*
▸ *Eng* [ɾ] ~ *Jpn* [t]: *"phonological"*

iii. Lb surface form [d^{3}it.taa.bag.gu] ▸ *phonological epenthesis*
- ▸ [g] in Ls form is "perceived" via orthography
- ▸ However, [u] in adapted form is ***not*** provided by orthography
- ▸ This epenthetic vowel is the result of a **UR–>SR mapping**

(45) Once the pLs representations are established, the adaptation grammar is consistent

(a) Auditory pLs form: |dʒiruba|

/dʒiɾuba/ 'jitterbug' *pLs form:* |dʒiɾuba|	SYLL STRUC	MAX-SB	DEP-SB	DEP-IO	MAX-IO
☞ i. dʒi.ɾu.ba					
ii. dʒi.ɾu.ba**g**	*!		*	*	
iii. dʒi.ɾu.ba**g**.**gu**			*(!)*	*(!)*	

• only one DEP violation for [g] in (iii), assuming the geminate is one doubly linked segment

(b) Orthographic pLs form: |dʒittaabag|

/dʒittaabag/ 'jitterbug' *pLs form:* |dʒittaabag|	SYLL STRUC	MAX-SB	DEP-SB	DEP-IO	MAX-IO
i. dʒit.taa.ba_		*!			*
ii. dʒit.taa.bag	*!				
☞ iii. dʒit.taa.bag.g**u**			*	*	

(c) Comparison of (a) and (b)

- [dʒiruba] is a "deletion loan" because "deletion" occurred at the pLs stage — the "deleted" segment was never perceived
- [dʒittaabaggu] is an "epenthesis loan" because epenthesis is the phonological process enforced during adaptation by the high rank of MAX-SB in the adaptation grammar

(46) Most Japanese loanwords originate from written sources (Lovins 1975; Miura 1993)
—> Most Japanese loanwords use epenthesis to avoid syllable-structure problems

(47) Results of this section

(a) Both **perception** and **orthography** can influence the pLs form
(b) Deletion/epenthesis loan doublets —> adaptation is not always perceptual
- only one of the doublet forms can represent the automatic outcome of perceptual distortion; in this case, it is the deletion loans
- the epenthesis loans escape perceptual deletion because of their orthographic information — but orthography cannot account for the appearance of the epenthetic vowels
—> evidence for a phonological (production) grammar in adaptation

(48) Related proposals

(a) Yip (2006: 951) proposes a "non-native percept" as an intermediate stage between the "perceptual module" and the "L1 grammar" in adaptation
- Similar to the role played by the pLs representation in the SBcorr model
- But, pLs representation incorporates factors beyond speech perception

(b) Dohlus (2005) also discusses the connection between availability of orthographic information and "phonological" effects in adaptation

5. Further questions

5.1 How is the ranking of the SBcorr constraints determined?

(49) Observation: Loanword adaptation strategies tend to be conventionalized
- May be highly variable at early stages, but generally become more systematic (Haugen 1950; Plag & Uffmann 2000 [creole]; Crawford to appear)

(50) Proposal (see Smith to appear-b for additional discussion)

(a) One speaker, faced with a new Ls, ranks the SBcorr constraints arbitrarily
- Perceptual salience (Steriade 2001) or the IOcorr ranking may influence this

(b) Over time, a community tends to **converge on a conventional SBcorr ranking** for adapting new loanwords from a given Ls
- Can adults learn the ranking of the SBcorr constraints from one another?
—> May resemble the learning of a language game
- Separating SBcorr from IOcorr may be a way out of the "learnability puzzles" posed by adaptation-specific phonological processes (Golston & Yang 2001; Broselow 2004; Kenstowicz & Suchato 2006)
- Are social factors the source of the epenthesis preference (Paradis & LaCharité 1997) in loanword adaptation?

(c) The same Lb community may use a different SBcorr ranking for loanwords from each Ls (see Dohlus 2005 on Ls = German vs. French for Lb = Japanese)

5.2 Do IOcorr constraints play a role in the adaptation grammar?

(51) Simplest assumption: The adaptation grammar is identical to the Lb grammar except for the addition of the SBcorr constraints —> IOcorr constraints are present

(52) However:
Loanwords may be subject to *stricter* markedness requirements than non-loans (Moreton & Amano 1999; Shinohara 2000, 2004; Golston & Yang 2001; Kawahara et al. 2003; Gelbart & Kawahara 2006; Hsieh & Kenstowicz 2006)

(a) Could support adaptation-specific M constraints... (Karvonen 1998, Pater 2004)
(b) Or: Evidence for absence of IOcorr constraints in the adaptation grammar?

6. Conclusions

6.1 Japanese evidence bears on several controversies about adaptation

(53) Claim: (Yip 1993; Paradis & LaCharité 1997, 2001; Broselow 2000, 2004; Jacobs & Gussenhoven 2000)
Adaptation involves no special phonological mechanisms — only

- the Lb phonological grammar and
- universal defaults / emergence-of-the-unmarked effects / (UG)

(54) Rebuttal: As demonstrated above, we need adaptation-specific constraints to handle **importation** and **adaptation-specific phonological processes**

- although the Lb constraint system, UG (emergence of the unmarked) also matter

(55) Claim: (Peperkamp & Dupoux 2003, Peperkamp to appear)
Adaptation is not caused by a phonological input-output mapping, but by perception

(a) Any mismatch between an Ls source form and its Lb loanword counterpart is an effect of speech perception acting on non-native categories

(b) On this view, there are no adaptation-specific phonological processes

(c) Particularly relevant for discussions of Japanese:
- Japanese-speaking listeners have difficulty distinguishing ...CC... vs. ...C[u]C... (Dupoux et al. 1999; Dehaene-Lambertz et al. 2000)
- So is epenthesis in loanwords actually *perceptual?*

(56) Rebuttal:

(a) Japanese orthographic loanwords demonstrate (some) *phonological* epenthesis in adaptation — not all epenthesis in Japanese adaptation can be perceptual

(b) Additional evidence that (some) adaptation processes are phonological
- Silverman (1992): Adaptation processes may interact with other grammatical factors; e.g., minimal word size affects choice between deletion and epenthesis in adaptation
- Kabak (2003): In Korean, some Lb-illicit forms are accurately perceived
- Mazuka (2006): Even Japanese "perceptual" epenthesis is a higher-level effect
- Smith (to appear-b): Adaptation processes in other languages include deletion of highly perceptually salient segments — not plausibly due to misperception

(57) Claim:
In adaptation, Lb speakers are only/mostly sensitive to ____ information in Ls forms

(a) phonological (Hyman 1970; Paradis & LaCharité 1997, 2001; LaCharité & Paradis 2005)

(b) phonetic (Silverman 1992; Yip 2002; Peperkamp & Dupoux 2003)

(58) Rebuttal: (see also Kang 2003; Dohlus 2005; Y. Rose & Demuth 2006; Uffmann 2006)
Both types of information can be involved in adaptation

		"phonetic" effects	***"phonological" effects***
(a)	pLs form	auditory	orthographic
(b)	M/F ranking	Lb allophones "promoted" • M >> F-IO — predictable • F-SB >> M — contrastive	Lb allophones "enforced" • M >> F-IO — predictable • M >> F-SB — still predictable

6.2 Advantages of the SBcorr model of loanword adaptation

(59) Similarity effects are modeled using **Correspondence Theory**

(a) Minimal formal extension to the model
(b) Related to other similarity effects between phonological forms
(c) Allows for a variety of phonological processes in adaptation (see Smith to appear-b)
(d) Correctly predicts both "phonological" and "phonetic" effects in adaptation

(60) Lb speaker's knowledge of the loan's source is modeled with the **pLs form**

(a) Captures the fact that an Lb speaker must be working with a representation
(b) Allows for the effects of information from a variety of sources

(61) Together, these two aspects of the model give us: ...returning to (2) above

(a) a phonological grammar of adaptation
- modeled as an OT system

(b) which differs from the non-loan phonology
- when SBcorr ranking differs from IOcorr ranking

(c) as well as from the resulting stratified phonology
- the SBcorr relation is only involved when an Ls source is involved

(d) and allows for phonetic *and* phonological,
(e) perceptual *and* orthographic effects
- depending on the nature of the pLs form and the M/F-SB ranking

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References

Adler, Allison N. 2006. Faithfulness and perception in loanword adaptation: A case study from Hawaiian. *Lingua* 116: 1024-1045.

Alber, Birgit, and Ingo Plag. 2001. Epenthesis, deletion, and the emergence of the optimal syllable in creole: The case of Sranan. *Lingua* 111: 811-840.

Arakawa Sôbee. 1977. *Gairaigo jiten,* 2 ed. Tokyo: Kadokawa.

Archangeli, Diana, and Douglas Pulleyblank. 1994. *Grounded Phonology.* Cambridge, MA: MIT Press.

Benua, Laura. 1997. *Transderivational Identity.* Doctoral dissertation, University of Massachusetts. [New York: Garland, 2000.]

Best, Catherine T. 1994. The emergence of native-language phonological influence in infants: A perceptual assimilation model. In Judith C. Goodman and Howard C. Nusbaum, eds., *The Development of Speech Perception: The Transition from Speech Sounds to Spoken Words.* Cambridge, MA: MIT Press, 167-224.

Broselow, Ellen. 2000. Stress, epenthesis, and segment transformation in Selayarese loans. In Steve S. Chang, Lily Liaw, and Josef Ruppenhofer, eds., *Proceedings of BLS 25.* Berkeley: Berkeley Linguistics Society, 211-225.

Broselow, Ellen. 2004. Language contact phonology: Richness of the stimulus, poverty of the base. In Keir Moulton and Matthew Wolf, eds., *Proceedings of NELS 34.* Amherst, MA: GLSA, 1-21.

Crawford, Clifford. To appear. The role of loanword diffusion in changing adaptation patterns: A study of coronal stops in Japanese borrowings. *Working Papers of the Cornell Phonetics Laboratory* 16.

Dehaene-Lambertz, G., E. Dupoux, and A. Gout. 2000. Electrophysiological correlates of phonological processing: A cross-linguistic study. *Journal of Cognitive Neuroscience* 12: 635-647.

Dohlus, Katrin. 2005. Phonetics or phonology: Asymmetries in loanword adaptations - French and German mid front rounded vowels in Japanese. *ZAS Papers in Linguistics* 42: 117-135.

Dupoux, Emmanuel, Kazuhiko Kakehi, Yuki Hirose, Christophe Pallier, and Jacques Mehler. 1999. Epenthetic vowels in Japanese: A perceptual illusion? *Journal of Experimental Psychology: Human Perception and Performance* 25: 1568-1578.

Fukazawa, Haruka, Mafuyu Kitahara, and Mitsuhiko Ota. 1998. Lexical stratification and ranking invariance in constraint-based grammars. *CLS 34* (2): 47-62.

Gelbart, Ben and Shigeto Kawahara 2006. Psychological reality of sublexica in Japanese. Paper presented at Formal Approaches to Japanese Linguistics 4; Osaka; August 18.

Golston, Chris, and Phong Yang. 2001. Hmong loanword phonology. In Caroline Féry, Antony Dubach Green, and Ruben van de Vijver, eds., *Proceedings of HILP 5.* Potsdam: University of Potsdam, 40-57.

Haugen, Einar. 1950. The analysis of linguistic borrowing. *Language* 26: 210-231.

Hallé, Pierre A., Juan Segui, Uli Frauenfelder, and Christine Meunier. 1998. Processing of illegal consonant clusters: A case of perceptual assimilation? *Journal of Experimental Psychology: Human Perception and Performance* 24 (2): 592-608.

Higa, Masanori. 1970. The sociolinguistic significance of borrowed words in the Japanese spoken in Hawaii. *University of Hawaii Working Papers in Linguistics* 2(9): 125-140.

Hsieh, Feng-fan, and Michael Kenstowicz. 2006. Phonetic knowledge in tonal adaptation: Standard Chinese and English loanwords into Lhasa Tibetan. *MIT Working Papers in Linguistics* 52, 29-64

Hyman, Larry. 1970. The role of borrowing in the justification of phonological grammars. *Studies in African Linguistics* 1: 1-48.

Ichikawa, Sanki. 1929. *Foreign Influences on the Japanese Language.* Western Influences in Modern Japan series, vol. 8. Tokyo: Japanese Council Institute of Pacific Relations.

Itô, Junko. 1989. A prosodic theory of epenthesis. *NLLT* 7: 217-259.

Itô, Junko, and Armin Mester. 1995. Japanese phonology. In John Goldsmith, ed., *The Handbook of Phonological Theory.* Cambridge, MA: Blackwell, 817-838.

Itô, Junko, and Armin Mester. 1999. The structure of the phonological lexicon. In Natsuko Tsujimura, ed., *The Handbook of Japanese Linguistics.* Malden, MA: Blackwell, 62-100.

Jacobs, Haike, and Carlos Gussenhoven. 2000. Loan phonology: Perception, salience, the lexicon, and OT. In Jost Dekkers, Frank van der Leeuw, and Jeroen van de Weijer, eds., *Optimality Theory: Phonology, Syntax, and Acquisition.* Oxford: Oxford University Press, 193-209.

Kabak, Baris. 2003. *The Perceptual Processing of Second Language Consonant Clusters.* Doctoral dissertation, University of Delaware.

Kamei Takashi, Ôtô Tokihiko, and Yamada Toshio. 1965. *Atarashii kokugo-e no ayumi.* Tokyo: Heibonsha.

Kang, Yoonjung. 2003. Perceptual similarity in loanword adaptation: English postvocalic word-final stops in Korean. *Phonology* 20(2): 219-273.

Karvonen, Daniel. 1998. Finnish loanword phonology and the core-periphery structure of the lexicon. Ms., UC Santa Cruz.

Kawahara, Shigeto, Kohei Nishimura, and Hajime Ono. 2003. Unveiling the unmarkedness of Sino-Japanese. In William McClure, ed., *Japanese/Korean Linguistics, Volume 12.* Stanford: CSLI, 140-151.

Kawu, Ahmadu Ndanusa. 1999. Faithfulness and markedness in loan vocabulary. Paper presented at Rutgers-UMass OT workshop [RumJClam] IV, Rutgers University, March 28.

Kenstowicz, Michael. 2005. The phonetics and phonology of Korean loanword adaptation. To appear in S-J. Rhee, ed., *Proceedings of the First European Conference on Korean Linguistics.*

Kenstowicz, Michael, and Atiwong Suchato. 2006. Issues in loanword adaptation: A case study from Thai. *Lingua* 116: 921-949.

Kim, Chin-W. 1982. Epenthesis and elision in metrical phonology. In Linguistic Society of Korea, ed., *Linguistics in the Morning Calm.* Seoul: Hanshin, 439-452.

Kraska-Szlenk, Iwona. 1999. Syllable structure constraints in exceptions. In John R. Rennison and Klaus Kühnhammer, eds., *Phonologica 1996: Syllables!?.* The Hague: Thesus, 113-131.

LaCharité, Darlene, and Carole Paradis. 2005. Category preservation and proximity versus phonetic approximation in loanword adaptation. *Linguistic Inquiry* 36: 223-258.

Lovins, Julie B. 1975. *Loanwords and the Phonological Structure of Japanese.* Bloomington: IULC.

Mazuka, Reiko. 2006. Can Japanese speakers really not tell “ebzo” from “ebuzo”? The perception of epenthesized vowels in Japanese and Spanish. Talk presented at U Maryland, October 16.

McCarthy, John, and Alan Prince. 1995. Faithfulness and reduplicative identity. In Jill N. Beckman, Laura Walsh Dickey, and Suzanne Urbanczyk, eds., *Papers in Optimality Theory.* Amherst, MA: GLSA, 250-384.

McCawley, James D. 1968. *The Phonological Component of a Grammar of Japanese.* The Hague: Mouton.

Mielke, Jeff. 2003. The interplay of speech perception and phonology: Experimental evidence from Turkish. *Phonetica* 60:208-229.

Miura, Akira. 1993. *English in Japanese.* New York: Weatherhill.

Moreton, Elliott, and Shigeaki Amano. 1999. Phonotactics in the perception of Japanese vowel length: Evidence for long-distance dependencies. *Proceedings of EuroSpeech 6,* Budapest.

Ota, Mitsuhiko. 2004. The learnability of the stratified phonological lexicon. *Journal of Japanese Linguistics* 20: 19-40.

Paradis, Carole, and Darlene LaCharité. 1997. Preservation and minimality in loanword adaptation. *Journal of Linguistics* 33(2): 379-430.

Paradis, Carole, and Darlene LaCharité. 2001. Guttural deletion in loanwords. *Phonology* 18: 255-300.

Pater, Joe. 2004. Exceptions in Optimality Theory: Typology and learnability. Handout from presentation at the Conference on Redefining Elicitation: Novel Data in Phonological Theory. New York University, April 9.

Pater, Joe. 2005. Learning a stratified grammar. *BUCLD* 29: 482-492.

Peperkamp, Sharon. To appear. A psycholinguistic theory of loanword adaptations. *Proceedings of the 30th Annual Meeting of the Berkeley Linguistics Society.*

Peperkamp, Sharon, and Emmanuel Dupoux. 2003. Reinterpreting loanword adaptations: the role of perception. *Proceedings of the 15th International Congress of Phonetic Sciences,* 367-370.

Plag, Ingo, and Christian Uffmann. 2000. Phonological restructuring in creole: The development of paragoge in Sranan. In Ingrid Neumann-Holzschuh and Edgar W. Schneider, eds., *Degrees of Restructuring in Creole Languages.* Amsterdam: Benjamins, 309-336.

Prince, Alan S., and Paul Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar.* Ms., Rutgers University and University of Colorado, Boulder. [Malden, MA: Blackwell, 2004.]

Rice, Curt. 2006. Norwegian stress and quantity: Implications of loanwords. *Lingua* 116: 1171-1194.

Rose, Sharon, and Rachel Walker. 2004. A typology of consonant agreement as correspondence. *Language* 80: 475-531.

Rose, Yvan, and Katherine Demuth. 2006. Vowel epenthesis in loanword adaptation: Representational and phonetic considerations. *Lingua* 116: 1112-1139.

Shinohara, Shigeko. 2000. Default accentuation and foot structure in Japanese: Evidence from adaptations of French words. *JEAL* 9:55-96.

Shinohara, Shigeko. 2004. Emergence of Universal Grammar in foreign word adaptations. In René Kager, Joe Pater, and Wim Zonneveld, eds., *Constraints in Phonological Acquisition.* Cambridge: Cambridge University Press, 292-320.

Silverman, Daniel. 1992. Multiple scansions in loanword phonology: Evidence from Cantonese. *Phonology* 9:289–328.

Smith, Jennifer L. 2006. Loan phonology is not all perception: Evidence from Japanese loan doublets. In Timothy J. Vance and Kimberly A. Jones, eds., *Japanese/Korean Linguistics, Volume 14.* Stanford: CSLI, 63-74.

Smith, Jennifer L. To appear (a). Correspondence Theory vs. cyclic OT: Beyond morphological derivation. In Chris Davis, Amy Rose Deal, and Youri Zabbal, eds., *Proceedings of NELS 36.* Amherst, MA: GLSA.

Smith, Jennifer L. To appear (b). Source similarity in loanword adaptation: Correspondence Theory and the posited source-language representation. In Steve Parker, ed., *Phonological Argumentation: Essays on Evidence and Motivation.* London: Equinox.

Steriade, Donca. 2001. Directional asymmetries in place assimilation: A perceptual account. In Elizabeth Hume and Keith Johnson, eds., *The Role of Speech Perception in Phonology.* New York: Academic Press, 219-250.

Tesar, Bruce, and Paul Smolensky. 2000. *Learnability in Optimality Theory.* Cambridge, MA: MIT Press.

Vance, Timothy J. 1987. *An Introduction to Japanese Phonology.* Albany: SUNY Press.

Vendelin, Inga, and Sharon Peperkamp. 2006. The influence of orthography on loanword adaptations. *Lingua* 116: 996-1007.

Werker, Janet F., and Richard C. Tees. 1984. Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development* 7: 49-63.

Yip, Moira. 1993. Cantonese loanword phonology and Optimality Theory. *Journal of East Asian Linguistics* 2(3): 261-291.

Yip, Moira. 2002. Perceptual influences in Cantonese loanword phonology. *Journal of the Phonetic Society of Japan* 6: 4-21.

Yip, Moira. 2006. The symbiosis between perception and grammar in loanword phonology. *Lingua* 116: 950-975.