Loan phonology

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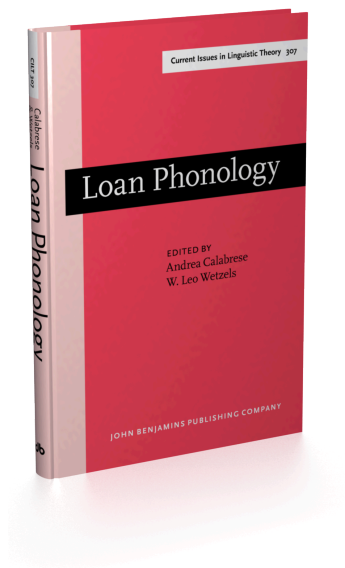**Edited by Andrea Calabrese and W. Leo Wetzels**
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Loan phonology

Issues and controversies

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The past decade has been characterized by a great interest among phonologists as to how the nativization of loanwords occurs. The general consensus is that loanword nativization provides a direct window for studying how acoustic cues are categorized in terms of the distinctive features relevant to the L1 phonological system as well as for studying the true synchronic phonology of L1 by observing its phonological processes in action. The collection of essays in this volume provides an overview of the complex issues phonologists face when investigating this phenomenon and, more generally, the ways in which unfamiliar sounds and sound sequences are adapted to converge with the sound pattern of the native language.

Speakers borrow words from other languages to fill gaps in their own lexical inventory. The reasons for such lexical gaps vary greatly: cultural innovation may introduce objects or actions that do not have a name in the native language; native words may be perceived as non-prestigious; names of foreign cities, institutions, and political figures which were once unknown may have entered the public eye; new words may be introduced for play, etc.

Word borrowing can occur under two different scenarios. In the first, the borrowing may be implemented by a bilingual speaker that fills a gap in one of the languages he knows, L1, the recipient language, by taking a word from the other language he knows, L2, the donor language. In this case, the usual assumption (but see Footnote 1 below, for an alternative) is that the speaker retrieves the underlying representation of the borrowed word from his mental dictionary (the long-term memory storage for lexical items) for L2 and generates its surface representation while speaking L1. If the surface representation of the word is generated by using the phonological, or more generally, the grammatical system of L1, the word undergoes adaptations and adjustments and is nativized according to the grammar of L1.[1] We will call this event nativization-through-production.

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1. The alternative is that the surface representation of the word is generated by using the L2 grammatical system. In this case, the word would be pronounced in its proper L2 shape.

In the other scenario, the borrowing is implemented by a speaker that fills a gap in his language by taking a word from another language he knows poorly or not at all.[2] In this case he needs to learn the relevant word. Once the learned word is uttered publicly or even silently by the speaker to himself, it is a loanword. Given that the speaker does not speak the second language well, the word will display adjustments and adaptations. The hypothesis is that these modifications have already occurred during perception and learning. One can call this scenario nativization-through-perception.[3]

These two scenarios essentially correspond to the two current models of loanword phonology: one essentially assumes that borrowing occurs only in the nativization-through-production scenario; Paradis & Tremblay (this volume) call it the phonological stance model (Hyman 1970; Danesi 1985; LaCharité & Paradis 2005; Paradis & LaCharité 1997; Paradis & Prunet 2000; Jacobs & Gussenhoven 2000; see also Paradis & Tremblay [this volume]).[4] The other model essentially assumes that borrowing occurs only in the nativization-through-perception scenario, referred to by Paradis & Tremblay (this volume) as the perceptual stance model (Silverman 1992; Yip 1993; Kenstowicz 2003b; Peperkamp & Dupoux 2002, 2003; see also the articles by Boersma & Hartman, Kim, and Calabrese in this volume).

The crucial difference between the two models has to do with the input to the nativization process. According to the perceptual stance model, it is the acoustic signal produced by the surface phonetic representation of the word; in contrast, the phonological stance model assumes that it is an abstract long-term memory

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2.   Observe that this situation is the usual one for speakers of indigenous languages during the first stages of contact with the official language, as in the South-American native communities or the aboriginal communities of Papua New Guinea, etc.

3.   Another possibility, most recently discussed by Jacobs & Gussenhoven (2000), is that during perception and learning, the acoustic representations of the non-native segments are faithfully mapped into abstract featural representations, which are then encoded in long-term memory. These faithful featural representations of L2 sounds may obviously contain feature combinations that are characteristic of L2 and not allowed in L1. When this occurs, these feature combinations are modified during production in L1. It is, however, unlikely that such a faithful acquisition of non-native segments is ever possible. Current research starting from Dupoux et al. (1999; but see also Polivanov 1931) demonstrates that all types of modifications of non-native segments and words already occur in perception, which is heavily influenced by L1 grammatical categories.

4.   Calabrese (1988, 1995) and Connelly (1992) adopted a similar perspective in their analysis of loanword nativization.

(i.e., underlying) representation.[5] Another difference between the two models involves the nature of the nativization process: according to the phonological stance model, nativization is by force phonological insofar as the surface shape of the loanword is generated by the phonology of the recipient language. For the perceptual stance model, nativization can be both phonetic and phonological, as discussed below.

This book provides the reader with a collection of works representative of these two models. The phonological stance model is represented by the article "Nondistinctive Features in Loanword Adaptation: The unimportance of English aspiration in Mandarin Chinese phoneme categorization" by Carole Paradis and Antoine Tremblay. It investigates the treatment of stops in loanwords from English into Mandarin Chinese. As mentioned above, the phonological stance model proposes that nativization is brought about by the phonological processes characterizing speech production. According to this view, as earlier formulated by LaCharité & Paradis (2005), adapters always start with underlying representations of L2 words containing the L2 segments, because the adapters are bilingual in L1 and L2. The input to the adaptations is, therefore, always an abstract morphophonemic representation of the L2 word. Repairs to the L2 segments or strings are implemented so as to avoid the production of structures that are illicit in L1. Therefore, speakers should adapt loanwords by operating on a phonological/phonemic level that abstracts away from the details of allophonic and phonetic realization.

Mandarin Chinese (MC) distinguishes voiceless aspirated from voiceless unaspirated stops, yet dominantly adapts both phonetically aspirated (as in 'pie') and unaspirated voiceless stops ('spy') from English as aspirated in MC. Although all voiceless stops in English, regardless of whether they are aspirated or not, systematically yield an aspirated stop in MC, voiced English stops always result in unaspirated MC ones. Therefore, it appears that English stop aspiration, which is phonetic, does not influence phoneme categorization in MC, in spite of the fact that MC has phonemic aspirated stops. In other words, even though their native language predisposes MC speakers to distinguish aspirated from unaspirated stops, they appear not to rely on aspiration/nonaspiration in English to determine phoneme categorization in MC. According to Paradis & Tremblay, this provides evidence against the perceptual stance in loanword phonology which maintains

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5. Obviously this would be possible only for fully bilingual individuals. It follows that bilingual speakers play a fundamental role in the generation of loanwords. This is not to say that the phonological model denies that borrowers have access to the surface L2 representations. See, for example, LaCharité & Paradis (2005), who discuss adaptations based on 'naïve phonetic approximation', and who distinguish between 'naive phonetic approximation' and 'intentional phonetic approximation', where new phonemes are introduced into L1. See also the discussion (Conclusion) of Tremblay & Paradis' contribution to this volume.

that crucial information regarding loanword adaptation is phonetic; instead such data supports the phonological stance, according to which distinctive information exclusively is relevant to loanword adaptation.

As discussed previously, in the perceptual stance model the input to the adaptations is a surface phonetic representation of the L2 word and the nativization process occurs during perception when the new words are learned. The models that adopt this scenario can be divided into two groups. According to the first group, the adaptations observed in loanword nativization are accounted for by processes particular to perception and are fundamentally based on the notion of phonetic approximation/similarity. As for the other group, the adaptations involve the same phonological processes that characterize speech production.

The models assuming that nativization occurs in perception and are based on phonetic approximation/similarity can be traced back to Hermann Paul (1880). In his discussion of loanword phonology, he hypothesized that a host speaker, upon encountering a foreign segment, matches this phonetic signal with the native segment with which it is most closely related. Paul implicitly assumed that this match involves a perceptual similarity judgment based on *Sprachgefühl*, the feeling of language: speakers adapt a non-native segment to one which they 'feel' most closely resembles the former acoustically.

The models of loanword phonology that employ acoustic/perceptual similarity as the basis for the treatment of the loanwords (Silverman 1992; Yip 1993; Kenstowicz 2003a, b; Peperkamp & Dupoux 2003) develop this traditional view. According to them, the replacement operation between the non-native and the native segment is strictly based on phonetic similarity between the outputs of the donor and recipient languages. For example, according to Peperkamp & Dupoux (2003), the equivalences in loanword adaptation are based on a similarity that is defined as "acoustic proximity or proximity in the sense of fine-grained articulatory gestures."

"Mandarin Adaptations of Coda Nasals in English Loanwords" by Feng-Fan Hsieh, Michael Kenstowicz and Xiaomin Mou in this volume argues for such a perceptual model. This article is an investigation of the adaptation of English VN rhymes into Mandarin Chinese. The adaptation of the coda nasal is determined by the position of the vowel in the source word on the front-back, second formant (F2) dimension. Thus, the front vs. back quality of the vowel in English determines the substitution as [n] or [ŋ], respectively. When the vowel occupies a medial position on this dimension, as in the case of [ʌ] or schwa, the place of articulation of the English nasal coda is largely preserved. The consequence is that in the vowel + nasal consonant sequences, the vowel, which is phonetically more salient, determines the direction of adaptation, not the phonemically contrastive nasal itself, despite the fact that in MC the vowel differences heard in the source language are allophonic, not phonemic.

Together with the other articles of this collection, this work provides robust evidence demonstrating that the input to the adaptation in loanwords is phonetic. Most other articles in this volume reach the same conclusion and thus hypothesize that loanword nativization occurs during perception, although they also argue that the adaptations evident in loanwords are phonological in nature. This is the case, for example, of "Loanword Adaptation as First-Language Phonological Perception" by Paul Boersma and Silke Hamann, who argue that loanword adaptations can only be truly understood in terms of the perception seen as an active process involving the mapping from raw sensory data to a more abstract mental representation. According to these authors, this process is fully phonological and involves an Optimality Theory (OT) interaction between structural and cue constraints. The structural constraints that play a role in a given language perception are the same ones active in production. In both perception and production, these constraints are ranked high. In perception, however, they interact not with faithfulness constraints, as they do in production, but with cue constraints. Cue constraints evaluate the relation between the input of the perception process (the auditory-phonetic form) and the output of the perception process (the phonological surface form). The result is that the satisfaction of these structural constraints in perception typically leads to processes different from those that occur in production.

Articles by Hsieh, Kenstowicz & Mou, and Boersma & Hamann are couched within the OT model of phonology, as are many other works adopting the perceptual stance. Adoption of OT is, however, not required to pursue the idea that loanword phonological adaptations occur in perception. The article "Korean Adaptation of English Affricates and Fricatives in a Feature-Driven Model of Loanword Adaptation" by Hyunsoon Kim, who does not reference OT, in fact also proposes that the perceived acoustic properties of L2 are structured according to the phonological categories of L1, specifically, according to L1 distinctive features and syllable structure, rather than in terms of the unstructured L2 acoustical input per se or of L2 phonological categories. In this model, it is assumed that acoustic parameters and cues are extracted in the first stage of L1 perception and that they are mapped into L1 linguistic entities such as distinctive features and syllable structure in conformity with the L1 grammar. In this way, loanwords are extracted and stored in a mental lexicon where each word is represented as a sequence of syllabified distinctive feature bundles stored in long-term memory.

Another article that also investigates loanwords in the context of speech perception but does not adopt OT is Andrea Calabrese's "Perception, Production and Acoustic Inputs in Loanword Phonology". He also investigates how a learner constructs mental representations of L2 sounds and structures by means of complex inferential computations. In this process, the learner adjusts these non-native sounds and structure so as to make them familiar, and therefore 'understand'

them accordingly in perceptual mental representations. An important concern for Calabrese is that, if perception of new words involves interpretation and inferential computation, it loses its primary function of tracking external reality, the environment; it becomes detached from reality and prone to illusions. He proposes that listeners always have direct access to the acoustic signal through a representation that is stored in a short-term acoustic working memory buffer, 'echoic memory' (see Neisser 1967). Although illusion-like, interpretative failures may occur, the acoustic representations preserved in echoic memory tie perception to external reality.

The issue of the construction of the underlying representation (UR) of loanwords is also the main focus of the articles by Nevins & Braun and Wetzels. These URs can be very abstract and quite different from the L2 URs. In his article "Nasal Harmony and the Representation of Nasality in Maxacalí: Evidence from Portuguese Loans", Leo Wetzels argues that nasality in the Brazilian indigenous language Maxacalí is contrastive only in the case of vowels. Nasal consonants are always derived by spreading the nasal feature of the vowel onto its syllable onset and coda if there is one. Wetzels shows that in Brazilian Portuguese (henceforth: BP) loanwords to Maxacalí, the original nasal onsets of the BP words are analyzed as being the outcome of this spreading rule. As he puts it, "In other words, confronted with a BP syllable containing a nasal onset and an oral nucleus, the speaker of Maxacalí interprets the nasal onset as an indication of the nasality of its nucleus." Therefore, faced with BP words such as *carneiro* 'sheep' [kahˈneɾu], a Maxacalí speaker postulates a UR where the nasality is a property of the vowel /kahDẽT/. The rule then spreads the nasality onto the preceding onset voiced stop and the following coda [kahnẽn]. If the vowel is interpreted as oral in the borrowing, its onset is also nonnasal, as expected if nasality is a property of the vowel and the partial nasality in word-initial oral syllable onsets is derived by rule, cf. Maxacalí [ᵐbahtet] from BP [mahˈtelu] *martelo* 'hammer'

Awareness of the rules and constraints of the L1 grammar, therefore, leads to the postulation of more abstract representations for L2, in particular the postulation of a representation for some L2 word consistent with the rules and constraints of L1. The paper "The Role of Underlying Representations in L2 Brazilian English" by Andrew Nevins and David Braun discusses the pronunciation of English as pronounced by Brazilians (Brazilian Portuguese English, BPE). Brazilian Portuguese has a rule changing the rhotic /r/ to a laryngeal fricative in word initial position: [dʒiˈɾɛtu] *direto* 'straight' vs. [ˈhɛtu] *reto* 'straight on'. Interestingly, in their pronunciation of English, Brazilian speakers replace word-initial /h/ with [r] (e.g., [rom] (or [hom]) for *home*). Nevins & Braun explain this replacement by hypothesizing that when exposed to English words, a Brazilian learner observes that the rule debuccalizing [r] into [h] does not apply to English. When faced to word-initial

/h/ in English, he hypothesizes that it derives from underlying /r/ as in his own language. Given that he has postulated that r-debuccalization does not apply in English, this hypothesized /r/ surfaces in the English word as can be seen in [rom] for *home*. Therefore the speaker postulates a UR consistent with the phonological system of L1.

The conclusion in most of the papers in this collection is that the nativization of loanwords occurs under the nativization-through-perception scenario, i.e., when the L2 words are perceived and learned. This is again shown with another aspect of BPE pronunciation discussed by Nevins & Braun: the affrication of coronal stops before the vowel [u]. The authors relate this unexpected process to the fact that /u/ is fronted after coronals English. In their analysis, this fronted /ü/ becomes the diphthong [iu]; the high front vocalic component manages to trigger the affrication characteristic of their native BP phonology.

Nevins & Braun show that in order to account for the borrowing of allophonic [ü], the input must be phonetic and not phonemic as assumed by the phonological stance model. Simultaneously, the assumption that phonetic similarity is essential to the adaptation found in loanword phonology as hypothesized by some perceptual stance theorists cannot account for the affrication we find in this case in BPE. Crucially, the adaptation of the loanword must be phonological in nature.

The converging evidence is that, if one assumes that the adaptations are indeed phonological, one could reinterpret the cases for the phonological stance model in terms of the perceptual stance model as involving an alternative phonological treatment of the acoustic input, without requiring bilingualism and access to abstract underlying forms of L2. Clearly, if the Mandarin Chinese adaptors possess full mastery of both the phonological grammars of English and MC, they 'know' that in English aspirated and non-aspirated stops are in complementary distribution, i.e., belong to the same phonological class. Their choice of the feature [aspirated] as the relevant corresponding lexical feature in MC may be directly imposed by the English grammar, if Iverson & Salmons' (1995) hypothesis that [aspirated] is the underlying feature for voiceless stops is correct. Otherwise, perhaps their choice for [aspirated] as the generalized feature owes to the observation that aspiration is realized in the perceptually more salient stressed syllables in the English loans. If, on the other hand, no knowledge of the English phonology could be assumed, one would need to explain why the English surface system [p, pʰ, b] is categorized in terms of the MC distinctive categories the way it is. In other words, although Paradis & Tremblay (this volume) convincingly show that the perceptual stance model alone is inadequate for predicting the MC nativization of the English laryngeal features, it is also clear that, in the case of a monolingual MC speaker, perception would have a role in explaining why [p, pʰ] (> MC /pʰ/) are classified together as a single phonological class and

as separate from [b] (> MC /p/). One possibility is that the feature [voice] is to be rejected, as proposed by Halle & Stevens (1971) and that the distinction between aspirated and non-aspirated (lenis) consonants in MC is to be made in terms of the features [stiff vocal cords] and [slack vocal cords], as the latter authors propose for Korean. This would yield a classification of MC aspirated "voiceless" obstruents as [+ stiff vocal cords, – slack vocal cords, + spread glottis], unaspirated "voiceless" obstruents [– stiff vocal cords, – slack vocal cords, – spread glottis]. In the case of the nativization of English stops in Mandarin Chinese one could then propose the following: given that [+stiff vocal cords] stops are always aspirated in MC, we need a rule such as [+stiff vocal cords] → [+spread glottis]/[___, –sonorant]. One can then propose that during perception all voiceless stops are interpreted by the MC learner according to that rule, so that the allophonic distribution of [spread glottis] in English is overridden. It is unclear if there is phonetic evidence for this hypothesis, but it is obvious that for the monolingual MC adaptor, there would have to be some acoustic property shared by English [pʰ, p], which is lacking in English [b], in order to explain the classification he is making. The difference between bilingual and monolingual adaptors therefore becomes very relevant.

At this point it may be tempting to simply assume that all nativization occur during perception, though this would be an implausible conclusion. Anyone familiar with bilingual environments knows that nativized loanwords can be innovatively produced by bilinguals simply by taking one word from one of the languages they know and adapting it into the other language they know, e.g., an English-Italian bilingual may take the English word for *street* and adapt it into Italian [stritta]. Still, there remains the issue of the overwhelming evidence supporting the observation that for the majority of loanwords, the input seems to be the L2 word in its surface phonetic representation.

A possible solution to this problem is suggested in "The Adaptation of Romanian Loanwords from Turkish and French" by Michael L. Friesner, who examines several factors affecting loanword adaptation, using a data set of Romanian loanwords from Turkish and French. It proposes that in order to get a full picture of how loanwords are nativized, one must consider not only different modules, such as the phonology and the morphology, but also different levels, including linguistic differences and external explanations such as orthography and, most importantly, social factors. For example, there is a striking difference in the nativization of loanwords from Turkish and French into Romanian with regard to gender. Whereas the gender was assigned to Turkish words arbitrarily, this was not so with French, where the gender of the word proved pertinent. This is because French borrowings were usually facilitated by scholars who had learned French grammar formally and thus had a greater awareness of the gender of French words. There was also a

need to have these words fit into a native pattern, since French words were often borrowed out of a conscious effort to 're-Latinize' the language.

Thus, socio-political factors have an impact on the nativization patterns. Suppose that for normative social reasons, the input to nativization even during production is always a surface word as it is 'heard' and not its abstract mental representation. This is because words are accepted in the linguistic community in their surface shape, which thus acquires a normative status. The abstract UR is used only to pronounce the L2 word correctly although it can be pronounced with an accent, and not as input to nativization. In this nativization scheme, a bilingual borrower first produces the word in L2 and then uses that surface representation as input to the nativization process, which is phonological. If this is correct, the perceptual stance and phonological stance models no longer need be contrasted, and could be largely unified: the input to nativization is always phonetic, the word as it is "heard". The treatment, on the other hand, is always phonological and it can occur either during perception or during production.

The importance of the social dimension of language in determining the properties of loanwords is also discussed in the article "Early Bilingualism as a Source of Morphonological Rules for the Adaptation of Loanwords: Spanish loanwords in Basque" by Miren L. Oñederra. She considers the special situation circumscribing Spanish loanwords into Basque: Basque speakers are bilingual (some simultaneous, some sequential) with respect to Spanish, and have been for many years, with the result that once phonologically natural processes of substitution have become defunctionalized and institutionalized into synchronically arbitrary patterns. This study demonstrates the intertwining influences between linguistically unrelated yet socially coexistent languages over a long period of time, underscoring how contact this close can result in the loss of phonological motivation for some of the sound substitutions that occur as one language incorporates words from the other.

Finally, the complexities of the nativization process are the subject of Lori Repetti's article "Gemination in English Loans in American Varieties of Italian". It deals with the process whereby a singleton consonant in the loaning language is adapted as a geminate consonant in the borrowing language. This process is very common cross-linguistically and is attested in Japanese, Finnish, Kannada, Maltese Arabic, Hungarian, and Italian (including North American varieties), as well as many other languages. Repetti argues that a combination of factors is needed to account for gemination in loanwords, e.g., lexical considerations, morpho-phonological constraints, and, importantly, perceptual factors. This again demonstrates that perception and production cannot be separated in the study of nativization in loanwords, but must be always seen in their synergetic interaction. This is what we believe to be the most important conclusion of this collection.

References

Calabrese, Andrea. 1988. *Towards a Theory of Phonological Alphabets*. Ph.D. dissertation. Massachusetts Institute of Technology, Cambridge, Mass.

Calabrese, Andrea. 1995. "A Constraint-Based Theory of Phonological Markedness and Simplification Procedures". *Linguistic Inquiry* 26:2. 373–463.

Connelly, Mark. 1994. *Phonological Markedness and Second Language Error Interpretation,* Ph.D. dissertation. Harvard University, Cambridge, Mass.

Danesi, Marcel. 1985. *Loanwords and Phonological Methodology*. Ville LaSalle, Quebec: Didier.

Dupoux, Emmanuel, Kazuhiko Kaheki, Yuki Hirose, Christophe Pallier, Stanka Fitneva, & Jacques Mehler. 1999. "Epenthetic Vowels in Japanese: A perceptual illusion". *Journal of Experimental Psychology: Human perception and performance* 25. 1568–1578.

Hyman, Larry. 1970. "The Role of Borrowings in the Justification of Phonological Grammars". *Studies in African Linguistics* 1. 1–48.

Iverson, Gregory K. & Joseph C. Salmons. 1995. "Aspiraton and Laryngeal Representation in Germanic". *Phonology* 12. 369–396.

Jacobs, Haike & Carlos Gussenhoven. 2000. "Loan Phonology: Perception, salience, the lexicon and OT". *Optimality Theory: Phonology, syntax, and acquisition* ed. by Joost Dekkers, Frank van der Leeuw & Jeroen van de Weijer, 193–210. Oxford: Oxford University Press.

Kenstowicz, Michael. 2003a. "Salience and Similarity in Loanword Adaptation: A case study from Fijian". *Language Sciences* 29. 316–340.

Kenstowicz, Michael. 2003b. "The role of Perception in Loanword Phonology: A review of *Les emprunts linguistiques d'origine européenne en Fon by Flavien Gbéto*". *Studies in African Linguistics.* 32. 95–112.

LaCharité, Darlene & Carole Paradis. 2005. "Category Preservation Versus Phonetic Approximation in Loanword Adaptation". *Linguistic Inquiry* 36:2. 223–258.

Neisser, Ulric. 1967. *Cognitive Psychology*. New York: Appleton-Century-Crofts.

Paradis, Carole & Darlene LaCharité. 1997. "Preservation and Minimality in Loanword Adaptation". *Journal of Linguistics* 33. 379–430.

Paradis, Carole & Jean-François Prunet. 2000. "Nasal Vowels as Two Segments: Evidence from borrowings". *Language* 76. 324–357.

Paul, Hermann. 1880. *Prinzipien der Sprachgeschichte*. Halle/Saale: Max Niemeyer.

Peperkamp, Sharon & Emmanuel Dupoux. 2002. "A Typological Study of Stress 'Deafness'". *Laboratory Phonology* 7 ed. by Carlos Gussenhoven & Natasha Warner, 203–240. Berlin: Mouton de Gruyter.

Peperkamp, Sharon & Emmanuel Dupoux. 2003. "Reinterpreting Loanword Adaptations: The role of perception". *Proceedings of the 15th International Conference of Phonetic Sciences*. Barcelona: Causal Productions. 367–370.

Polivanov, Evgenij D. 1931. "La perception des sons d'une langue étrangère". *Travaux du Cercle Linguistique de Prague* 4. 79–96. [English translation, "The Subjective Nature of the Perceptions of Language Sounds", *Selected Works: Articles on general linguistics*, 223–237. The Hague: Mouton. 1974.]

Silverman, Daniel. 1992. "Multiple Scansions in Loanword Phonology: Evidence from Cantonese". *Phonology* 9. 289–328.

Yip, Moira. 1993. "Cantonese Loanword Phonology and Optimality Theory". *Journal of East Asian Linguistics* 2. 261–291.