Position-Sensitive Licensing Asymmetries and Developmental Paths in L2 Acquisition

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1. Introduction

Cross-linguistically, prosodically strong positions, including onsets and stressed syllables, may license a wider range of segmental contrasts (e.g. voicing, place) than relatively weaker positions, such as codas and unstressed syllables. Onset-coda licensing asymmetries are among the most frequently observed. For example, many languages allow contrastive obstruent voicing in onsets, yet restrict codas to voiceless obstruents alone. To illustrate, consider the German examples in (1), typical of such an asymmetry.

(1) *German onset-coda obstruent voicing asymmetry*

a. /pakən/	[pakn̩]	'to grab'		
b. /bakən/	[bakn̩]	'to bake'		
c. /lob/	[lop]	'praise'	cf. [lo.bn̩]	'to praise'

Whereas the German voiceless-voiced contrast is permitted in onset position (1a,b), only voiceless obstruents may appear in coda position (1c). Within phonological theory, such asymmetries are often attributed to differences in feature licensing potential between syllable positions (e.g. Itô 1986). As concerns the voicing asymmetry in (1), the ban on syllable-final voiced obstruents results from the German coda's inability to license the input voicing structure in outputs.

Second language (L2) grammars also display position-sensitive licensing asymmetries. For example, L2 learners whose first language (L1) prohibits coda voicing contrasts often devoice target voiced codas while maintaining a voicing contrast in onsets. Some researchers have thus claimed that phonological transfer involves, in part, the transfer of the L1 position-sensitive feature licensing possibilities into the interlanguage (IL) grammar (e.g. Broselow, Chen & Wang 1998).

In this paper, I analyse data from the L2 acquisition of coda voicing (Japanese-English, Sekiya & Jo 1997) and place (Mandarin-English, Wang 1955; Mandarin-French, Steele 2002) that provide further support for this claim. The incorporation of the principle of phonological licensing into a theory of the L2 acquisition of position-sensitive contrasts not only allows for a formalization of phonological transfer, it also makes predictions for possible differences in IL development. Specifically, I will demonstrate that, in those cases where the L1 and target grammars differ in the types of position-sensitive contrasts permitted, there exist two possible developmental paths. The first path involves the licensing of the target featural content in a relatively stronger licensing position. In the case of coda contrasts, this results either in epenthesis, which allows the new featural content to be licensed in an onset, or, when the content is shared with the following onset, it may be parasitically licensed. In contexts where both epenthesis and parasitic licensing are illicit, feature change (e.g. devoicing) ensues. Stated otherwise, the learner will only license those features of the segments' representation permitted in the L1 grammar following transfer.

The remainder of this paper is structured as follows: in §2, I begin by outlining the basics of the theory of representation adopted. I then continue with the analysis of the L2 acquisition data, focusing on coda stop voicing in §3 and coda place in §4. A discussion of factors that may possibly influence which of the two paths learners follow is found in §5. I conclude briefly in §6.

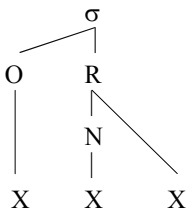
 Proceedings of the 7th Generative Approaches to Second Language Acquisition Conference (GASLA 2004), ed. Laurent Dekydtspotter et al., 226-237. Somerville, MA: Cascadilla Proceedings Project.

2. Representation and licensing

2.1 Syllable structure

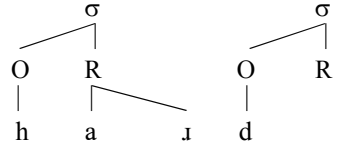
As per (2), I adopt standard onset-rhyme theory with one exception. I follow Government Phonology (GP; Kaye, Lowenstamm & Vergnaud 1990) in assigning no formal status to the coda. I will use the term 'coda' informally to designate post-nuclear rhymal consonants.

(2)



I assume that syllable constituents are maximally binary (e.g. Selkirk 1982; Kaye, Lowenstamm & Vergnaud 1990; Hulst & Ritter 1999). There is one important consequence of this constraint for final consonants relevant to the analyses here: if the rhyme is constrained by binarity, the maximal sequence that may be syllabified rhyme-internally is /Vː/ or /VC/. In the case of final CC clusters, I assume that the second consonant is syllabified as the onset of an empty-headed syllable (OEHS), as per (3).[1]

(3) *Onset of empty-headed syllable* (e.g. English *hard* [haɹd])



The possibility of empty positions has been posited in a number of frameworks (GP: Kaye, Lowenstamm & Vergnaud 1990; Kaye 1990; P&P: Goldsmith 1990; McCarthy & Prince 1990; OT: Féry 2003).

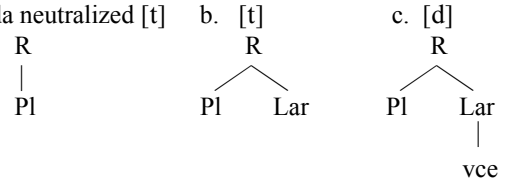
2.2 Segmental representation

2.2.1 Voicing

In languages exhibiting a voicing contrast in obstruents, the representation of the voiced member of the pair involves the feature [vce] organized under the Laryngeal (Lar) node. The representation of the three-way contrast between coda neutralized voiceless, voiceless plain, and voiced stops is given in (4).

(4) *Representation of laryngeal contrasts*

a. Coda neutralized [t] b. [t] c. [d]



In §3, the representational difference between (4a) and (4b) will be central to the analysis of the acquisition of English coda voicing by Japanese-speaking learners proposed. Both representations are interpreted as phonetically voiceless (cf. §2.2.3). In languages without a coda voicing contrast, voiceless coda obstruents will be represented without a Largyngeal node, as per (4a). In languages having such a contrast, the representation will be that in (4b).

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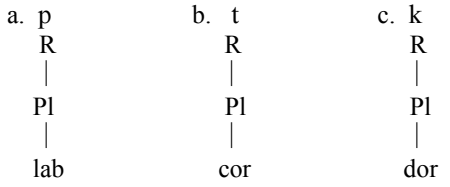
[1] For the sake of space, I will eliminate the Nucleus (N) and timing slots (X) from subsequent representations.

2.2.2 Place

Place features are organized under the Place (Pl) node. These features include [cor, lab, dor]. The representations for oral voiceless obstruents showing a three-way contrast in place are given in (5) below.

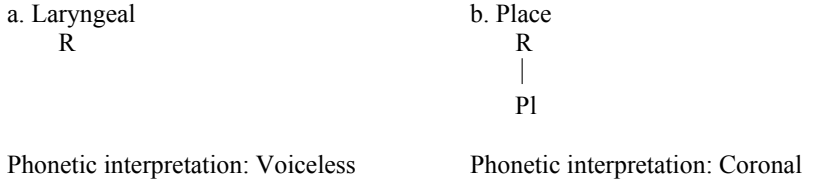
(5) *Representation of place in consonants*



2.2.3 Phonetic interpretation of phonological outputs

I assume that output representations are interpreted by a separate phonetic component, with the absence of a given phonological feature having a specific phonetic interpretation. Default phonetic interpretation applies to all organizing nodes, including Place and Laryngeal. As shown in (6), the absence of a Laryngeal node is interpreted as voiceless (e.g. Lombardi 1991, 1995), while a bare Place node is interpreted as coronal (e.g. Avery and Rice 1989; Rice 1992).

(6) *Default phonetic laryngeal and place interpretation*

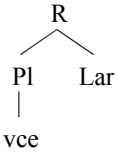


The presence of a phonetic property such as coronal place of articulation consequently does not require the presence of the corresponding phonological feature in a segment's output representation. As will be demonstrated in §§3,4, the representations in (6) allow for a straightforward account of asymmetries in the L2 acquisition of position-sensitive contrasts.

2.3 Phonological licensing

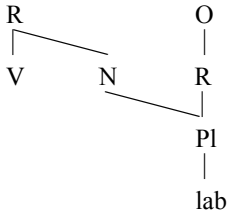
Phonological Licensing requires that all phonological structure be organized into progressively larger units from the level of the feature upwards. Phonological features, including [vce] and articulators, are licensed when dominated by some superordinate feature or prosodic constituent. In (7), the feature [vce] is licensed by the Place node.

(7)



A feature need not be licensed by the same constituent that parses the segment to whose representation it belongs. For example, when a coda and the following onset share features, including place structure, the onset will license these features; this phenomenon is known as parasitic licensing. The representation of a homorganic nasal-stop coda-onset sequence is given in (8).

(8) *Parasitic licensing of nasal coda place features*



We will return to parasitic licensing of coda place structure in the analyses in §4.

3. L2 acquisition of coda voicing: Japanese learners of English

In order to demonstrate the contribution of a theory of licensing to the understanding of asymmetries in the L2 acquisition of new coda contrasts, we begin by examining data from the acquisition of coda stops contrasting for voice.

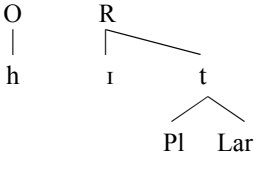
3.1 Epenthesis asymmetry in final voiceless versus voiced stops

The data in question come from Sekiya & Jo (1997). These researchers tested forty intermediate Japanese-speaking learners of English on their syllabification of word-final stops using a word list task. The stimuli included both voiceless (n=52; $n_{/VC/}$=21, $n_{/V:C/}$=31) and voiced (n=49; $n_{/VC/}$=26, $n_{/V:C/}$=23) targets. Japanese codas are restricted to the first part of a geminate, including a place-sharing nasal, and /ŋ/ word-finally. In terms of licensing, the Japanese-speaking learners' L1 coda licenses neither laryngeal nor place structure;[2] the ability to license both structures in coda position must thus be acquired.

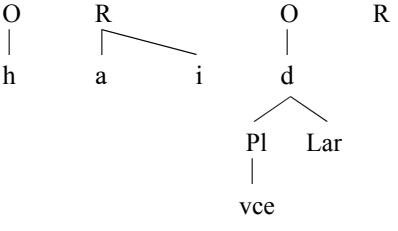
In English, final stops are syllabified as codas when the preceding vowel is short (e.g. *hid* [hɪd]), but as OEHS when the preceding vowel is long (e.g. *hide* [hai.d]), as shown in (9).

(9) *English output representation for [CVC] forms*

a. [$CVC_{Voiceless}$], e.g. *hit* [hɪt]



b. [CVC_{Voiced}], e.g. *hid* [hɪd]



The OEHS syllabification in (9b) is driven by the need to satisfy rhyme binarity. Recall from §2.1 that binarity precludes coda syllabification of a final stop when it follows a bipositional [V:] or [VG] rhyme, as the nucleus already contains two positions. Consequently, the [d] of a word like [hai.d] must be syllabified as an OEHS. In contrast, when the vowel preceding the final stop is short, UG provides two possible syllabifications, either as a coda or OEHS; English chooses the former option.[3]

Sekiya & Jo found a significant difference (p<.001) between the rate of epenthesis following final voiceless and voiced stops. While only 1.7% of targets containing final voiceless stops involved epenthesis,

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[2] In accord with the hypothesis in §2.2.3, I assume that Japanese coda [ŋ] is the consequence of two default interpretations. The first is that of a bare Sonorant Voice (SV) node as nasal (Rice 1992), the second is the interpretation of the absence of place structure (i.e. Place node and articulator) in nasals as velar (cf. §4.1.2).

[3] Word minimality requires that the final stop of a form like *hid* be syllabified as a coda. In English, prosodic words must minimally be bimoraic (e.g. *sea* [si:], *sun* [sʌn], *[sɪ]). Under the assumption that onsets are never moraic, the word would be subminimal, were the final stop of a *hid* syllabified as an OEHS (i.e. [hɪ.d∅]).

22% of word-final voiced stops contained epenthetic vowels.[4] A licensing-based explanation for this asymmetry will be elaborated in the next section.

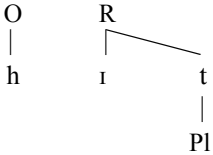
3.2 Analysis

When acquiring word-final stops, Sekiya & Jo's Japanese-speaking learners were more proficient with voiceless stops than voiced ones. Such findings have been reported for other learners of English (e.g. L1 Hungarian, Altenberg & Vago 1983; L1 Thai, Hancin-Bhatt 2000). This asymmetry follows directly from the fact that, for any voiceless-voiced stop pair, the representation of the voiced member involves greater representational complexity, namely the feature [vce]. This structure must be licensed in a relatively weak position, a possibility not available in the learners' L1.

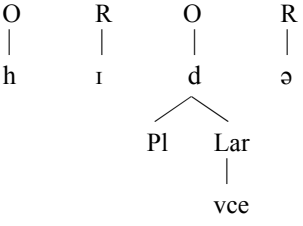
Learners can, however, have phonetically voiceless stops in coda position via default phonetic interpretation. As shown in (10), even in the absence of Laryngeal structure, a coda obstruent will be interpreted as voiceless in outputs (cf. (6a)). In contrast, the output representation of voiced final stops must contain the structure [Lar-vce] if they are to be interpreted phonetically as voiced. When this structure cannot be licensed in coda, epenthesis allows for it to be licensed in an onset, a strong licensing position.

(10) *Japanese learners' output representation for [CVC] forms*

a. [$CVC_{Voiceless}$], e.g. *hit* [hɪt]



b. [CVC_{Voiced}], e.g. *hid* [hɪd]



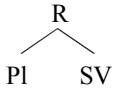
In summary, the Japanese-speaking learners' higher rate of epenthesis following target word-final voiced codas is driven by the need to license the structure [Lar-vce] in voiced outputs.

4. L2 acquisition of coda place: Mandarin learners of English and French

Difference in licensing potential between codas and onsets can also be used to explain asymmetries in the acquisition of place contrasts. We will examine two separate studies which investigated the acquisition of word-final English and French consonants by Mandarin-speaking learners. For present purposes, the focus will be specifically on targets containing final nasal codas. We will see that Mandarin speakers acquire place in such codas more readily when place structure can be parasitically licensed by the following onset.

Mandarin codas are fewer in number than those of either English or French. Specifically, coda consonants are restricted to /n,ŋ/ and /ɹ/ in suffixed forms (e.g. [p^han] 'judge', [p^haŋ] 'fat', [$p^h a^ɹ$ɹ] 'plate (dim.)'). In terms of licensing, Mandarin permits only the coda structure in (11).

(11) *Maximal featural complexity licensed by Mandarin coda*



In order for Mandarin-speaking learners to acquire languages such as English or French in which codas contrast for place, they must acquire the ability to license the articulators [lab, cor, dor] in coda position.

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[4] In their presentation of the data, Sekiya & Jo do not separate stimuli involving short and long vowels. As such, it is impossible to determine whether the asymmetry reported holds for coda position (i.e. /VC/ stimuli), for OEHS (/V:C/ stimuli), or both. Ultimately, neither position is a licit licensor for obstruents in the learners' L1 Japanese grammar.

4.1 Mandarin-speaking learners of English (Wang 1995)
4.1.1 Place-based asymmetry in CVN targets

Wang (1995) tested ten intermediate native Mandarin speakers on their syllabification of English word-final stops and nasals in monosyllabic nonce words; we focus on the nasal data here. As shown in Table 1, while the learners were highly accurate on /n/ and /ŋ/-final forms, forms licit in their L1 and thus licensed in their IL grammar following transfer, coda /m/ was produced accurately in less than half of all cases.

Table 1. *Mandarin-speaking learners' accuracy on syllabification of English /CVN/*

	/CVm/	/CVn/	/CVŋ/
% Correct	46.7	90.0	100

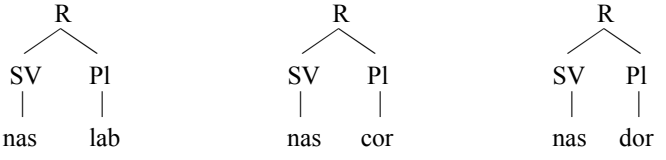
Interestingly, the learners' errors with target English word-final /m/ did not involve deletion or epenthesis, but rather feature change; in all non-native-like outputs, target /m/ surfaced as /n/.

4.1.2 Analysis

In order to understand this asymmetry, consider the types of representations from which surface nasals may result. We begin with the input representations in (12) for nasals showing a three-way place contrast.

(12) *Input representation of nasals contrasting for place*

a. /m/ b. /n/ c. /ŋ/



In Mandarin, a three-way contrast in place is licensed in onset position (e.g. [paŋ] 'stick', [taŋ] 'swing', [kaŋ] 'harbour'). Were the Mandarin coda also able to license place, one would expect a three-way contrast here too, as is the case in related Chinese varieties including Cantonese and Taiwanese (e.g. Cantonese [lam] 'blue', [lan] 'lazy', [laŋ] 'cold'). That Mandarin nasal codas only show a two-way contrast – [n] versus [ŋ] – suggests that contrastive place features are not licensed in coda position.

If place cannot be licensed in codas, one must ask how the language's two-way contrast between coronal and velar nasals is represented. I argue that the answer lies in the hypothesis that there are two potential representations from which surface coronal and velar nasal codas can result. The first is the type of place-specified representations given in (12a-c). In languages like English that license place in coda, the output representations of coronal and velar nasals will contain both a Place node and the relevant articulator. The second type of representation from which such a two-way contrast results involves reduced or no place structure that is interpreted as coronal and velar by the phonetics. In §2.2.3, it was proposed that the default phonetic intepretation of a bare Place node is [coronal]. Thus, the representation in (13a), where the Place node is licensed yet lacks any articulator dependents, is phonetially interpreted as [n]. Following Rice (1996), among others, I assume that the cross-linguistic default interpretation of a nasal lacking any place structure is [ŋ]. Thus, if the output representation of a nasal segment lacks both an articulator and a Place node as in (13b), it will be interpreted as velar.[5]

[5] The analysis proposed here for the Mandarin-speaking L2 learners is also supported by data from L1 acquisition. Hua & Dodd (2000), in their study of the acquisition of 129 Mandarin child learners, found that 55% of the children replaced target [n] with [ŋ] to some degree; the authors do not provide individual or group mean rates of substitution. In stark contrast, only 3% of children replaced [ŋ] with [n]. Hua & Dodd cite Li (1977), who reports similar findings. The striking asymmetry between [n]→[ŋ] and *[ŋ]→[n] is consistent with the licensing approach proposed here. If [ŋ] is the default interpretation of a nasal lacking place structure, it will surface in those cases where the children's grammar can license an SV-node but no Place node.

(13) *L1 Mandarin output representation of coda coronal-velar contrast*

a. Coronal [n] b. Velar [ŋ]

To summarize, cross-linguistically, surface coronal and velar nasal codas may result from two different output representations. In languages with a three-way coda place contrast, their representation includes both a Place node and the relevant articulators. In languages that do not license place in coda but nonetheless have a two-way contrast between coronal and velar nasals, the output representations of coronal and velar nasal codas involve no articulators. The representation of the coronal nasal includes a bare Place node that is interpreted as coronal; a nasal lacking a Place node is interpreted as velar [ŋ].

In the OT framework adopted here, the ability of the coda to license a Place node and/or its dependent articulators is related to the relative ranking of Faithfulness constraints and the two markedness constraints in (14), NoCoda(Pl) and NoCoda(Articulator).

(14) **NoCoda(Place)**
The coda may not license a Place node

NoCoda(Articulator)
The coda may not license articulators (i.e. [lab, cor, dor]).

Both of the constraints in (14) are licensing constraints. Whereas NoCoda(Place) bans the licensing of a Place node by the coda, NoCoda(Articulator) prohibits the licensing of articulators. Languages such as Mandarin that allow a two but not three-way contrast only allow the licensing of a Place node (cf. (13a,b)). In such languages, Max(Pl), the faithfulness constraint requiring Place nodes present in inputs to appear in their corresponding output, must dominate NoCoda(Pl). In a language like Mandarin, however, where the three-way contrast possible in onsets is illicit in codas, it must also be the case that the coda cannot license articulators (i.e. NoCoda(Articulator) » Max(Articulator)).

The relative ranking of these four constraints is transferred into the L2 grammar. While this allows for a Place node present in the input to be licensed in the output, any input representation containing a coda consonant specified for an articulator will be suboptimal in the IL grammar until NoCoda(Articulator) and Max(Articulator) have been reranked so that Max(Articulator) dominates. The transferred ranking makes a strong prediction for the realization of coda nasals whose input includes a [lab] feature. Were the Mandarin coda incapable of licensing a Place node, not simply an articulator, the theory presented here would predict that input coda labials would surface as velars, given that a nasal lacking any place structure would be interpreted as [ŋ], as illustrated in (15a).

(15) *Consequences of loss of place structure for input nasals*

a. /m/ → [ŋ] b. /m/ → [n]

However, given that the Mandarin coda licenses a bare Place node, an input containing a Place-[lab] structure should only lose the articulator in the output, as the ranking Max(Pl) » NoCoda(Pl) will ensure faithfulness to the Place node. Indeed, loss of the Place node would incur an unnecessary violation of Max(Articulator). This bare Place node will be interpreted as coronal (15b), and not velar, by the

phonetics. That the substitution for target [m] was without exception [n], and not [ŋ], is consistent with this prediction.

To illustrate, consider the Mandarin-speaking learners' evaluation of nonce target *bim* in (16). The first two candidates, whose representations are specified for articulators, both incur a fatal violation of NoCoda(Articulator). High-ranking Max(Pl) eliminates the fourth candidate (16d), [bɪŋ], as its representation is unnecessarily unfaithful to the Place node in the input. This leaves the third candidate, (16c) [bɪn], as optimal. While this candidate violates both NoCoda(Pl) and Max(Articulator), the ranking of these constraints below Max(Pl) and NoCoda(Articulator) leaves them powerless to determine the optimal candidate.

(16) *Intermediate Mandarin learners' acquisition of place in English nasal codas*

	Input: O R / b ɪ m / Pl SV / lab nas	NoCoda (Articulator)	Max(Pl)	NoCoda(Pl)	Max (Articulator)
	a. [bɪm] O R / b ɪ m / Pl SV / lab nas	*!		*	
	b. [bɪn] O R / b ɪ n / Pl SV / cor nas	*!		*	
☞	c. [bɪn] O R / b ɪ n / Pl SV / nas			*	*
	d. [bɪŋ] O R / b ɪ ŋ / SV / nas		*!		*

In summary, unlike Sekiya & Jo's Japanese-speaking learners of English, Wang's learners, whose L1 Mandarin coda also fails to license (nasal) obstruent codas, failed to use epenthesis. Instead, target word-final nasals were syllabified as codas, as per the target. The learners' IL grammars' inability to license the target place structure, in particular articulators, resulted in featural reduction, with accuracy on coronal and velar nasals directly related to default phonetic interpretation.

4.2 Mandarin-speaking learners of French (Steele 2002)

The inability of the Mandarin-speaking learners' IL grammars to license place structure in final consonants syllabified as codas results in the unfaithful realization of such segments in their IL English. In §2.3, we saw that not all the featural content need be licensed by the position into which it is syllabified. Moreover, features in weak positions, such as codas, may be licensed by relatively stronger positions including onsets. This raises the question as to whether Mandarin-speaking learners would be more accurate with targets in which coda nasals were followed by homorganic onsets.

Data from Steele (2002) allows for the investigation of this hypothesis. In this study, five beginner Mandarin-speaking learners of French were tested on their syllabification of word-final clusters including nasal-stop clusters (i.e. target *lampe* [lɑ̃p] 'lamp', *conte* [kɔ̃t] 'tale', *banque* [bɑ̃k] 'bank')[6] on which we focus next.

4.2.1 Results

The beginner Mandarin-speaking learners syllabified the input French /NC/ sequence as a coda-onset sequence, i.e. in a non-native fashion. However, in contrast to Wang's learners of English, Steele's Mandarin-speaking learners of French did not show an asymmetry between coda /m/ versus /n/ and /ŋ/. Whereas Wang's learners' /CVm/ inputs surfaced as [CVn], Steele's learners' /CVmC$_{lab}$/ inputs overwhelmingly surfaced as [CVmC$_{lab}$] as shown in Table 2.

Table 2. *Mandarin-speaking learners' syllabification of French /CVNC/*

	/CVmC/	/CVnC/	/CVŋC/
% I-O nasal place identity	91.7	85.7	96.3

4.2.2 Analysis

As stated above, I argue that the lack of asymmetry in the French data is related to the fact that the French target forms contain a final obstruent capable of parasitically licensing the [labial] feature of the nasal.[7] As discussed in §2.3, grammars, including those of L2 learners, may allow coda features to be licensed by the following onset. This is possible when the features in question are also present in the input representation of the segment syllabified in the onset. Homorganic coda-onset sequences constitute one such case (cf. (8)). In the case of the Mandarin-speaking learners, parasitic licensing allows the learners to be faithful to the input place specification of the nasal, even when their IL grammars do not license coda articulators in outputs (i.e. when NoCoda(Articulator) » Max(Articulator)).

The Mandarin-speaking learners' evaluation of the three most likely outputs for input /lɑmp/ is shown in (17) below. The first candidate (17a) fatally violates NoCoda(Articulator). The representation of the coda nasal in candidate (b) is identical to that of the optimal candidate in (17c). While violation of NoCoda(Pl) and Max(Articulator) was not fatal for the native Mandarin learners' syllabification of English labial nasal codas in (16), such violations are indeed fatal when parasitic licensing is possible. As shown with candidate (17c), the Place-[lab] structure of the input can be licensed by the following onset. Under the assumption that the representation of candidate (c) involves fusion of the Place-[lab] structure of the input coda-onset sequence, the parasitic licensing of coda place features allows for a "target-like"

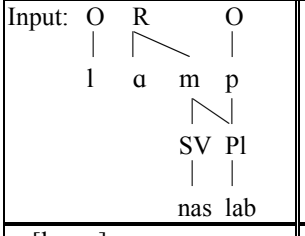
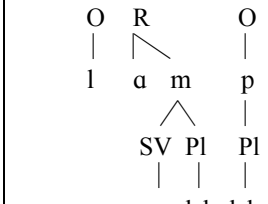
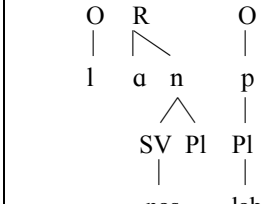
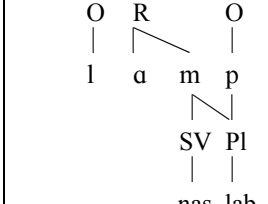
---

[6] In target French, syllable-final input /VN/ sequences are syllabified as a nasalized vowel (i.e., /bɑNk/→[bɑ̃k]; e.g. Schane 1968, Dell 1995). L2 learners of French commonly realize these sequences incorrectly as [VN] sequences.

[7] Under the assumption that the licensing possibilities of early IL grammars are those options transferred from the learners' L1, the analysis proposed here would be strengthened by evidence of parasitic licensing in Mandarin, which is not observed in /NC/ coda-onset contexts, e.g. [[pʲan̲pʲaɹdə] 'flat'. However, all /NC/ strings are interrupted by a compound boundary. Mandarin does, however, have place sharing in other contexts which could be extended to the coda-onset domain in the IL grammar. In particular, place sharing is observed with nuclear harmonies. In Mandarin, the glide of a /VG/ sequence must agree in frontness and rounding with the preceding vowel (e.g. Duanmu 2000:55). Such a harmony is consistent with a requirement that the head of the nucleus parasitically license (some of) the featural content of the glide.

representation while satisfying NoCoda(Articulator) and Max(Pl). While the coda nasal in (17c) is specified for [lab], the articulator is licensed by the following onset. As such, the candidate fails to violate NoCoda(Articulator), which makes reference only to the position which licenses the feature, not the position into which the feature is parsed. The representation in (17c) also fails to violate Max(Pl), which requires simply that an input Place node have an output correspondent. The fused Place node doubly linked to [m] and [p] thus satisfies Max(Pl) for both input articulators.

(17) Beginner Mandarin-speaking learners' evaluation of French /NC/ inputs

	NoCoda (Articulator)	Max(Pl)	NoCoda(Pl)	Max (Articulator)
Input: 				
a. [lɑmp] 	*!		*	
b. [lɑnp] 			*!	
☞ c. [lɑmp] 				

To summarize, the Mandarin-speaking learners of French differed from their English-learning counterparts in that no asymmetry was observed between coda labial and non-labial targets. As shown here, such an asymmetry follows from the theory of licensing: the learners' accuracy is related to the possibility of parasitic licensing of featural content in a strong position.

5. Which learning path to choose?

In §1, it was proposed that two developmental paths are available to L2 learners when new position-sensitive contrasts cannot be licensed as per the target. The data from Sekiya & Jo's (1997) learners of English and Steele's (2002) learners of French illustrate the first option in which the contrast is licensed in a new position. In both cases, the relevant features were licensed in an onset, either via epenthesis or

parasitic licensing. Wang's (1995) Mandarin-speaking learners of English chose the other path: in over half of their outputs, only the featural complexity allowed in their L1 grammar was licensed.[8]

That L2 learners may follow either path raises the question as to which option – licensing the target features in another position or licensing only a subset of said features in the same position – is chosen. I propose that there are at least two factors that come into play. First, constraints on prosodic structure, including word minimality, may (dis)favour epenthesis (e.g. Broselow, Chen & Wang 1998). Second, grammars must weigh the relative importance of segmental and prosodic faithfulness. For example, while epenthesis allows for the segmentally-faithful licensing of a coda contrast in an onset, it is prosodically unfaithful, as it creates a syllable not present in the input. Future studies with carefully controlled experimental stimuli will be necessary to determine which of these and other factors are most relevant.

6. Summary

The data examined in the present paper reveal that IL grammars display the same types of feature licensing asymmetries as natural languages. A licensing-based approach to the acquisition of position-sensitive contrasts explains non-target-like properties of learners' outputs in terms of transfer, while making predictions for L2 phonological development. Learners initially begin with the position-sensitive contrasts permitted in the L1. As acquisition progresses, target language contrasts not permitted in the IL grammar will either be licensed in positions in which such contrasts are permitted until the relevant position-sensitive contrast has been acquired, or be reduced altogether.

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[8] The analyses proposed might lead one to expect non-variability in the learners' outputs, contrary to the data presented. As is usually the case, the L2 learners discussed have not acquired new representations in an all-or-none manner. Within OT, this can be understood as learners' indeterminacy vis-à-vis the target constraint ranking. I assume that the non-target-like output representations in (10) and (15) are the result of an L1-influenced constraint ranking, whereas target-like forms are generated by a grammar in which the constraint ranking reflects the language being acquired. At intermediate stages, learners alternate between the two.

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Proceedings of the 7th Generative Approaches to Second Language Acquisition Conference (GASLA 2004)

edited by Laurent Dekydtspotter,
Rex A. Sprouse, and Audrey Liljestrand

Cascadilla Proceedings Project Somerville, MA 2005

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ISBN 1-57473-406-7 library binding

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Steele, Jeffrey. 2005. Position-Sensitive Licensing Asymmetries and Developmental Paths in L2 Acquisition. In *Proceedings of the 7th Generative Approaches to Second Language Acquisition Conference (GASLA 2004)*, ed. Laurent Dekydtspotter et al., 226-237. Somerville, MA: Cascadilla Proceedings Project.

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Steele, Jeffrey. 2005. Position-Sensitive Licensing Asymmetries and Developmental Paths in L2 Acquisition. In *Proceedings of the 7th Generative Approaches to Second Language Acquisition Conference (GASLA 2004)*, ed. Laurent Dekydtspotter et al., 226-237. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #1169.