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Unveiling the Unmarkedness of Sino-Japanese[1]

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1. Introduction

One of the most important current issues in Japanese phonology is the internal structure of the phonological lexicon. Japanese vocabulary seems to be divided into four major strata: Yamato (native), Sino-Japanese (borrowings from Chinese), Foreign (recent loans mainly from English), and Mimetics (sound symbolic words) (Itô & Mester 1995a, McCawley 1968). This stratification not only reflects the diachronic history of the formation of the current Japanese lexicon, it is also of interest for the synchronic investigation of Japanese phonology. In particular its importance lies in the fact that each of the strata exhibits a different degree of obedience to several markedness constraints (Itô & Mester 1995ab, 1999). Itô & Mester (1999) propose the *Core-Periphery* model to formalize this subdivided lexicon. The basic idea is that the ranking of markedness constraints is fixed for the entire phonology, but stratum-specific faithfulness constraints are interspersed between these markedness constraints. Specifically, the following

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ranking schema is proposed (henceforth, M stands for a markedness constraint (possibly a set of those), FAITH(SJ) and FAITH(Y) stand for FAITH(Sino-Japanese) and FAITH(Yamato), respectively):[2]

(1) M_1 » FAITH(Foreign) » M_2 » FAITH(SJ) » M_3 » FAITH(Y)

In this model, Yamato Japanese is considered to be the most unmarked stratum, as the lowest ranked faithfulness constraint for Yamato, i.e., FAITH(Y), suggests. Of particular relevance to our concern is the ranking FAITH(SJ) » M_3 » FAITH(Y). Itô & Mester (1999) reach this conclusion because postnasal voicing seems to occur only in Yamato, as seen in the contrast illustrated in (2). This contrast motivates FAITH(SJ) » *NT » FAITH(Y), *NT being the trigger constraint for postnasal voicing (see Pater 1999 for the phonetic motivation behind this constraint).

(2) Yamato: /sin + ta/ → [sinda] 'died'
Sino-Japanese: /sin + tai/ → [siNtai] 'body'

In this paper, we argue that, contra Itô & Mester's formulation, it is Sino-Japanese that is the most unmarked stratum in the Japanese language. The relative unmarkedness of Sino-Japanese with respect to other strata is supported by (i) size restriction, (ii) the non-preservation of lexical accents, and (iii) segmental restriction in the second syllable. To accommodate these unmarked aspects of Sino-Japanese, we propose the following ranking schema, in which FAITH(SJ) is ranked the lowest among the faithfulness constraints for the three strata:

(3) M_1 » FAITH(Foreign) » M_2 » FAITH(Y) » M_3 » FAITH(SJ)

We further show that evidence adduced by Itô & Mester to argue for the relative unmarkedness of Yamato with respect to Sino-Japanese can be reinterpreted as the effect of positional faithfulness constraints (Beckman 1998), constraints which are independently needed to account for an asymmetry in segmental inventory between first and second syllables.

The rest of the paper proceeds as follows. Section 2 discusses the size restriction of Sino-Japanese to argue for its relative unmarkedness compared to Yamato. The proposed ranking schema also accounts for the fact that only roots in Sino-Japanese, but not those in Yamato, may undergo deletion of a root-final vowel (Nasu 1996, Itô & Mester 1996, Kurisu 2000). In addition, we show in Section 3 that the asymmetrical accent patterns in Sino-Japanese and Yamato support our main claim that Sino-Japanese is the more unmarked of the two. Section 4 further motivates our basic idea, and introduces positional faithfulness constraints to account for the first/second syllable asymmetry in Sino-Japanese. In Section 5 we reinterpret the argu-

[2] A candidate for M1 is a set of constraints for syllable structure wellformedness such as CODACOND (Itô 1986) and *COMPLEX. A candidate for M2 is *SINGLE-P that prohibits a singleton [p] (see Section 4). See Itô & Mester (1999) for extensive discussion on these constraints.

ments by Itô & Mester that Yamato is the most unmarked stratum. The final section concludes the paper.

2. Size Restriction

The first indication of Sino-Japanese's unmarkedness relative to Yamato comes from its size restriction. It is undisputed that Sino-Japanese vocabulary is restricted in terms of size. Sino-Japanese stems can be maximally bimoraic, as illustrated in (4); larger stems, such as [CVCCV] or [CVVCV], are not attested in Sino-Japanese.

(4) SJ Size Restriction (from Itô & Mester 1996)

[(C)V]	[(C)VV]	[(C)VN]
ka 'dept'	bee 'rice'	koN 'this'
i 'stomach'	kyoo 'capital'	keN 'prefecture'
[(C)VCV]	*[CVCCV]	*[CVVCV]
atu 'pressure'	unattested	unattested
huku 'lie'		

By contrast, Yamato is replete with stems that are larger than bimoraic: *murasaki* 'purple', *kangae* 'thinking', and so on. As pointed out by McCarthy & Prince (1994) (see also works cited therein), structures that are larger than binary are marked (see also Itô, Kitagawa & Mester 1996). Thus, it is fair to say that Sino-Japanese can be conceived of as more unmarked than Yamato with respect to the size of stems.

Given the Richness of the Base Hypothesis (Prince & Smolensky 1993), we should not impose such a size restriction on the input; rather it must be derived from constraint interaction. Let us assume that the relevant faithfulness constraint is MAX that penalizes against deletion, and posit a markedness constraint, SIZE-RESTRICTOR, as a driving force for the size restriction. Violation of this markedness constraint is accrued for any stem which is larger than bimoraic.[3] We now have an account of the size restriction in Sino-Japanese by ranking SIZE-RESTRICTOR above MAX(SJ). On the other hand, MAX(Y) dominates SIZE-RESTRICTOR, so that stems in Yamato are immune to the size restriction. The tableaux below demonstrate how we get the correct results in both Yamato and Sino-Japanese.

(5)

/CVVCV/ YAMATO	MAX(Y)	SIZE-RESTRICTOR	MAX(SJ)
a. ☞ CVVCV		*	
b. CVCV	*!		

(6)

/CVVCV/ SJ	MAX(Y)	SIZE-RESTRICTOR	MAX(SJ)
a. CVVCV		*!	
b. ☞ CVCV			*

[3] The nature of this constraint is not entirely clear. This may be the effect of two alignment constraints, ALIGN-L(STEM, FOOT) and ALIGN-R(STEM, FOOT), each of which require an alignment of a stem edge with a bimoraic foot edge (Poser 1990: cf. Ono 2002 and Itô, Kitagawa & Mester 1996).

With a large input like /CVVCV/ in Yamato, no 'shrinking' occurs due to the high-ranked MAX(Y). However, in Sino-Japanese, the input /CVVCV/ is too large to be parsed as it is. Therefore, deletion is invoked so that the stem satisfies the maximally bimoiraic size restriction in Sino-Japanese.

The ranking we established above, MAX(Y) » MAX(SJ), is further supported by an interesting observation about the deletion of a root-final vowel, first made explicit by Nasu (1996). As in (7a), a root-final vowel is deleted in Sino-Japanese and causes so-called root-fusion, cross-morphological fusion of two adjacent consonants.[4] The relevant examples are given in (7a), where the deletion of the root-final vowel (accompanied by root-fusion) is obligatory. On the other hand, such deletion is not observed in Yamato compounds, as in (7b).

(7) a. Root-fusion in Sino-Japanese

hat-tatu	*hatu-tatu	'development'
hak-kaku	*hatu-kaku	'detection'
hap-pyoo	*hatu-pyoo	'presentation'
has-siN	*hatu-siN	'dispatch'

ak-kan	'the best'
mik-kai	'secret meeting'

b. No root-fusion in Yamato

atu-kan	*ak-kan	'hot sake'
mitu-kan	*mik-kan	'honey pot'

If we assume that the trigger for root-fusion is ALIGN(σ, STEM), which requires stems to be monosyllabic, then the ranking should be MAX(Y) » ALIGN(σ, STEM) » MAX(SJ).[5] Here again, the schema FAITH(Y) » FAITH(SJ) is required, lending further support to the main claim of this paper.

3. Accent: Little Mermaid Pattern

The thesis that Sino-Japanese is more unmarked than Yamato is further supported by a fact about accentuation. As pointed out by Kubozono (1997), faithfulness to lexical accent in Sino-Japanese is less stringent than in Yamato. The most salient evidence comes from the so-called Little Mermaid Pattern. This concerns the case of 'noun+noun' compounding in which the second element has a penultimate accent. As seen in (8a), in Yamato, this lexical accent is usually preserved. By contrast, Sino-Japanese

[4] See Itô & Mester 1996 and Kurisu 2000 for discussion in detail.

[5] This incidentally accounts for the lack of a Sino-Japanese [CVC(+nas)V] stem in which the second consonant is a nasal: given this ranking, underlying /CVC(+nas)V/ will always reduce to [CVN] (a capital N represents a moraic nasal). In contrast, [CVC(+nas)V] stems are found in Yamato, as in *kami* 'paper', *kuni* 'nation', and so on. This again indicates MAX(Y) is ranked above ALIGN(σ, STEM) and it is thus consistent with the ranking we have just motivated here.

compounds shift the accent onto the final syllable of the first stem (Kubozono 1997, Tanaka 2002):

(8) a. Yamato

néko:	perusya-(néko)	'Persian cat'
íta:	garasu-(íta)	'glass board'
áme:	niwaka-(áme)	'sudden rain'

b. Sino-Japanese

séki:	yoyakú-(seki)	*yoyaku-(séki)	'reserved seat'
ryóku:	júu-(ryoku)	*juu-(ryóku)	'gravity'

This contrast suggests that Yamato is more faithful to the underlying accent than Sino-Japanese. More formally, we posit two constraints: first, a faithfulness constraint NOFLOP (Alderete 1999), which militates against the displacement of an underlying accent, and second, a markedness constraint NON-FINALITY(FOOT), which prohibits an accent from being in a prosodic-final foot (Kubozono 1997 and Itô, Kitagawa & Mester 1996). These should be ranked as NOFLOP(Y) » NON-FINALITY(FOOT) » NOFLOP(SJ), as the two tableaux below illustrate:[6]

(9)

/perusha+ néko/ YAMATO	NOFLOP(Y)	NONFINALITY (FOOT)	NOFLOP (SJ)
a. ☞ perusha-(néko)		*	
b. perushá-(neko)	*!		

(10)

/yoyaku+ séki/ SJ	NOFLOP(Y)	NONFINALITY (FOOT)	NOFLOP (SJ)
a. yoyaku-(séki)		*!	
b. ☞ yoyakú-(seki)			*

4. Positional Asymmetry

We have shown that, from the asymmetries in size-restriction and accent preservation between Sino-Japanese and Yamato, the former is less faithful to underlying information than the latter. This section further advances our hypothesis that FAITH(SJ) is systematically lower than FAITH(Y), dealing with the segmental restriction found in the second syllables of Sino-Japanese stems. Further, we argue that the asymmetry between the first and second syllables in Sino-Japanese motivates the postulation of positional faithfulness constraints that are specific to first-syllables.

In Sino-Japanese, descriptively speaking, while the first syllable has a relatively rich inventory, the second syllable in disyllabic stems (i.e.,

[6] There is a bit of twist here. Young speakers optionally allow the flopping even for compounds in Yamato, as in [perusyá-neko]. This indicates that NOFLOP(Y) and NON-FINALITY can be unranked. Yet, it is absolutely impossible to maintain a lexically penultimate accent in Sino-Japanese. This shows that NOFLOP(SJ) is unambiguously below NON-FINALITY (FOOT), and hence this fits our general schema, FAITH(Y) » FAITH(SJ).

CVCV) is heavily restricted: In the second syllable, consonants must be [t] or [k], and vowels must be [u] or [i], as illustrated in (11) (Tateishi 1990).[7]

(11) a. Attested forms

hatu	'leave'	geki	'hard'	ritu	'law'
teki	'a drop'	daku	'impure'	riki	'power'

b. Unattested forms (among many others)
*kasa, *goza, *hada, *uba, *iga, *kari,*haru, *toro, *kiri

On the other hand, such restrictions do not apply to Yamato stems: segments other than [t], [k], [u], and [i] are allowed even in non-initial syllables, as seen, for example, in *doro* 'mud', *kaze* 'wind', and *hada* 'skin'.

The examples in (11) clearly show that the possible segments in the second syllable of a Sino-Japanese stem are those that are considered unmarked. Given the Richness of the Base Hypothesis, such a restriction should not be imposed on the input, but should be derived from constraint interaction. Concretely speaking, faithfulness constraints for Sino-Japanese must be dominated by markedness constraints which prohibit non-attested segments (e.g., voiced obstruents, fricatives, etc.). This ranking alone, however, mistakenly predicts that the segmental restriction also applies to the first syllable, contrary to fact. Our proposal to avoid this problem is to postulate that stem-initial syllables are protected by *positional faithfulness constraints* (Beckman1998; see also Makihara 1998 and Kurisu 2000). It is worth emphasizing here that splitting the faithfulness constraints into a position-specific one and a general one is unavoidable if we are to derive sound inventories from constraint interaction. It is an empirical fact about Sino-Japanese that first syllables and second syllables differ in their inventory, and thus they need to be governed by different sets of faithfulness constraints.[8]

Moving on to a specific analysis, as the driving force of the segmental restriction, we posit the following markedness constraints:

(12) a. *FRIC: no fricative
*LIQIUD: no liquid
*VOIOBS: no voiced obstruent
b. *SINGLE-P: no non-geminated [p]

The constraints in (12a) are motivated by the fact that a voiceless stop is universally the most unmarked consonant (see e.g., Maddieson 1984 and Prince & Smolensky's (1993) Margin Hierarchy). Since no consonant but a voiceless stop is allowed in the second syllable, general faithfulness constraints must be ranked below these markedness constraints. On the other hand, stem-initial positional faithfulness constraints must dominate these

[7] Sino-Japanese phonotactics realizes [t] as a coronal affricate after high vowels. We abstract away from this point in this paper.

[8] Another conceivable approach is to postulate positional markedness constraints (e.g., Zoll 1998). We do not pursue that possibility in this paper due to space limitation.

markedness constraints to account for the rich inventory in the first syllable. The following tableau demonstrates how the motivated ranking neutralizes only a consonant in the second syllable, taking the hypothetical example /sasu/:

(13)

/sasu/ SJ	FAITH(SJ: STEM-INITIAL-σ)	*FRIC	FAITH(SJ)
a. sasu		**!	
b. ☞ satu		*	*
c. tatu	*!		**

There is one more important point to be discussed. A singleton [p] is not allowed in any syllable in Sino-Japanese or in Yamato. Thus the markedness constraint in (12b) must be undominated in Sino-Japanese and Yamato (see Itô & Mester 1995ab). The established constraint ranking for the restriction on consonants is summarized below.

(14) *SINGLE-P » FAITH(SJ: STEM-INITIAL-σ) » *FRIC, *LIQUID, *VOIOBS » FAITH(SJ)

Let us move on to the restriction on vowels. In the pre-OT literature (e.g., Tateishi 1990, Itô 1986), the fact that only high vowels are allowed in the second syllable is explained by postulating that vowels in this position are epenthetic. Under the Richness of the Base Hypothesis, however, there is nothing to guarantee that second vowels are absent underlyingly, and thus the restriction must be derived from constraint interaction (see Kurisu 2000 for a relevant discussion).[9]

Crucially allowing the possibility that the second vowel is not always epenthetic, our analysis goes as follows. High vowels are cross-linguistically often more unmarked than mid and low vowels (see Striade 1995, Kirchner 1996, Beckman 1998, Alderete et al 1999, and Kurisu 2000 among others). This fact motivates the following constraint ranking.

(15) *MIDVOWEL, *LOWVOWEL » *HIGHVOWEL

A vowel can only be high in the second syllable of Sino-Japanese stems; therefore, general faithfulness constraints for Sino-Japanese must be dominated by *MIDVOWEL (*MV) and *LOWVOWEL (*LV). On the other hand, stem-initial syllables in Sino-Japanese additionally license mid and low vowels. Thus, a stem-initial positional faithfulness constraint must outrank all the markedness constraints in (15). In short, the following ranking must hold to account for the distribution of vowels in Sino-Japanese.

(16) FAITH(SJ: STEM-INITIAL-σ) » *MV, *LV » FAITH(SJ), *HV

[9] We do not discuss how to choose the unmarked vowel in the second syllable of Sino-Japanese stems, i.e., between [u] or [i]; See Tateishi 1990 for their distribution, and Kurisu 2000 for an OT analysis.

The following tableau demonstrates how the first/second syllable asymmetry is derived from our constraint ranking.

(17)

/geta/ SJ	FAITH(SJ: STEM-INITIAL-σ)	*MV, *LV	FAITH(SJ)	*HV
a. geta		**!		
b. ☞ getu		*	*	*
c. gutu	*!		*	**

Recall that the restrictions imposed on Sino-Japanese are not observed in Yamato stems, except for *SINGLE-P. That is, unlike Sino-Japanese, with respect to segment quality, the first/second syllable asymmetries are not observed in any Yamato words. Therefore, general faithfulness constraints for Yamato must dominate all the markedness constraints in (12a) and (15). By way of illustration, let us consider cases where a stem in Yamato contains non-high vowels and marked consonants. As seen, these sounds are not neutralized:

(18)

/kaze/ Yamato	FAITH(Y)	*MV, *LV	*HV
a. ☞ kaze		**	
b. kazu	*!	*	*

(19)

/kaze/ Yamato	FAITH(Y)	*FRIC	*VOIOBS
a. ☞ kaze		*	*
b. kate	*!		

In sum, we have established the following ranking:

(20) FAITH(SJ: STEM-INITIAL-σ), FAITH(Y) » *FRIC, *LIQUID, *VOIOBS, *MV, *LV » FAITH(SJ), *HV

In conclusion, we have argued for two points in this section. First, as observed in (20), general faithfulness constraints for Sino-Japanese are ranked lower than faithfulness constraints for Yamato. Second, the first/second syllable asymmetry in Sino-Japanese motivates the postulation of positional faithfulness constraints.

5. Reinterpreting the Apparent Markedness of Sino-Japanese

We have argued that FAITH(SJ) is ranked lower than FAITH(Y), based upon the size restriction, non-preservation of an underlying accent in compound formations, and segmental restriction observed only in Sino-Japanese. Further, we have seen that the first syllable of the Sino-Japanese stems is protected by positional faithfulness constraints. In this section, we reinterpret the apparent relative markedness of Sino-Japanese with respect to Yamato as an effect of the positional faithfulness constraints that we have motivated in Section 4 above.

The evidence that Itô & Mester adduce to argue for the schema FAITH(SJ) » FAITH(Y) is postnasal voicing which is observed only in Yamato. Another indication is the presence of palatalized consonants such as

tya, *mya*, or *kya*, which are found only in Sino-Japanese (McCawley 1968)[10].

(21) Postnasal voicing only in Yamato
Yamato: /sin + ta/ → [sinda] 'died'
Sino-Japanese: /sin + tai/ → [sintai] 'body'

We propose that this failure of postnasal voicing and the licensing of palatalized consonants in Sino-Japanese are the effect of positional faithfulness constraints. First, with respect to postnasal voicing, given the size-restriction discussed in Section 2, a voiceless obstruent after a nasal in Sino-Japanese is inevitably in the stem-initial syllable. As we have observed in Section 4, this position is protected by positional faithfulness constraints, so it seems natural to speculate that the failure of voicing is due to the faithfulness constraint which is specific to stem-initial syllables. This approach is illustrated by the following two tableaux (ID[voi] is a faithfulness constraint which preserves the underlying value of voicing):

(22) Failure of voicing in Sino-Japanese

/sin+tai/ SJ	ID[voi](SJ: STEM-INITIAL-σ)	*NT	ID[voi](Y)	ID[voi](SJ)
a. ☞ sin+tai		*		
b. sin+dai	*!			*

(23) Postnasal voicing in Yamato

/sin+ta/ Yamato	ID[voi](SJ: STEM-INITIAL-σ)	*NT	ID[voi](Y)	ID[voi](SJ)
a. sin+ta		*!		
b. ☞ sin+da			*	

Splitting faithfulness constraints into a position-specific one and a general one is indirectly supported by the behavior of mimetics. It is usually assumed that roots in mimetics obey *NT because of the lack of forms such as **shompori* (cf., *shombori* 'depressed': Itô & Mester 1995; Fukazawa, Kitahara, & Ota 1998). However, postnasal voicing fails to take effect at stem-

[10] One might further add to this list the asymmetry in resyllabification between Sino-Japanese and Yamato. In Sino-Japanese, resyllabification across a morpheme boundary is prohibited, as in /ren+ai/ → [reN.ai] *[re.nai] 'love'. On the other hand, there is an example from Yamato verbal paradigm which apparently allows such resyllabification across a morpheme boundary: /sin+anai/ → [si.na.nai.] *[sin.a.nai] 'not die'. This lack of resyllabification of Sino-Japanese might be used to argue that it tolerates more marked structures because the lack of resyllabification leads to a violation of markedness constraints like ONSET and NOCODA. However, the asymmetry in resyllabification noted above is derived from the difference in morphological levels, i.e., Sino-Japanese compounds are root-root compounds while the Yamato verbal paradigm involves root-suffix concatenation. This is demonstrated by the fact that even Yamato does not tolerate resyllabification if concatenation involves only roots, as in /saigoo-san+o/ → [saigoo.saN.o] *[saigoo.sa.no] 'Mr. Saigo (accusative Case)'.

initial syllables, as in *ton-ton* versus **ton-don* 'knock-knock'. Thus, splitting ID[voi] is required to account for the behavior of mimetics as well.

The postulation of faithfulness constraints specific to stem-initial syllables also allows us to account for the presence of palatalized consonants in Sino-Japanese. It is of crucial importance that these marked consonants are found only in the first syllable, thereby motivating the ranking FAITH(SJ-STEM-INITIAL-σ) » *PALATALIZEDCONSONANTS » FAITH(Y) » FAITH(SJ).

6. Conclusion

In this paper, we have proposed that general faithfulness constraints for Sino-Japanese are systematically ranked lower than general faithfulness constraints for Yamato, contra Itô & Mester (1999). This analysis allows us to account for the relative unmarkedness in Sino-Japanese compared to Yamato. Specifically, we have accounted for (i) the size restriction specific to Sino-Japanese (and lack thereof in Yamato), (ii) the contrast in preservation of a lexical accent in compounding, and (iii) the limited segmental restrictions in Sino-Japanese (and lack thereof in Yamato). Furthermore, we have provided an alternative way to interpret alleged evidence used by Itô & Mester (1999) to argue for the schema FAITH(SJ) » FAITH(Y). We have argued that the positional faithfulness constraints for Sino-Japanese dominate general faithfulness constraints for Yamato. We have also shown that postulating position-specific faithfulness constraints (in addition to general faithfulness constraints) is independently needed to account for the first/second syllable asymmetry in Sino-Japanese, and additionally, the behavior of mimetics.

Let us now briefly consider a conceivable alternative for the problems discussed in this paper. One might stick to the original hypothesis by Itô & Mester (1999), i.e., the general schema FAITH(SJ) » FAITH(Y), and demote some relevant faithfulness constraints for Sino-Japanese. That is, for example, since size restriction is only observed in Sino-Japanese, we could have demoted MAX(SJ) below the trigger constraint, as in (24).

(24) MAX(SJ) » MAX(Y) » SIZERESTRICTOR
→ MAX(Y) » SIZERESTRICTOR » MAX(SJ)

However, this demotion of MAX(SJ) lacks an independent motivation. It is an empirical fact that Sino-Japanese is more unmarked than Yamato in some respects (as we have argued throughout this paper), but it is also true that Sino-Japanese allows more marked segments (i.e., palatalized segments) than Yamato. Thus, FAITH(SJ) » FAITH(Y) is required in some dimensions and FAITH(Y) » FAITH(SJ) is required in other dimensions (see Fukazawa, Kitahara, & Ota 1998 for relevant discussion). We solved this discrepancy by using position-specific faithfulness constraints, which are independently required for an analysis of Sino-Japanese as well as cross-linguistically. Using constraint demotions as in (24) to account for these problems, on the other hand, is totally ad hoc and lacks any independent support. Moreover, in order to account for the strict segmental restriction discussed in Section 4, virtually all faithfulness constraints must be demoted. For these reasons, this alternative is untenable.

If our analysis is on the right track, Japanese provides a rare case in which a borrowed vocabulary constitutes the most unmarked stratum of a particular language (contra Itô & Mester 1995a:818). It also shows that synchronic stratification and historical processes do not necessarily coincide; it is not always the case that the more native (or nativized) a particular stratum is, the more unmarked it is. Thus, the lexical stratification must be solely based on the phonological evidence available to the language learners.

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