LANGUAGE GAMES, SEGMENT IMPOSITION, 
AND THE SYLLABLE

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ABSTRACT

Language games in which the phonological forms of words are systematically altered have been well-studied from a typological perspective. The two most common types of language games entail the transposition of phonological constituents (usually syllables) and the addition of phonemes at one or more locations within the word. Here we examine the latter type, proposing a novel distinction between insertion-type games and imposition-type games (exemplified, for example, by Spanish grande, which has the language game form grafandefe). In previous studies, imposition-type games have been analyzed formally as inserting a CV-template after each vowel of the word. We propose instead that such games involve the imposition of a consonant articulation upon the vowel. Not only is this approach conceptually simpler than the templatic approach, but it also provides an unproblematic account of diphthongal behavior, a natural explanation for the high frequency of inserted labial consonants, and independent support for the concept of the demisyllable.

1. Introduction

As noted by many phonologists, language games have been used as evidence for such phonological concepts as the syllable, the tonal tier, and underlying representations. Transposition games, in which syllables are transposed in various ways, provide evidence both for the reality of the syllable and the nature of syllabification in a particular language. As a case in point, Conklin (1956) reports on a Tagalog language game in which the first and last syllables are transposed, so that the word kapatid ‘sibling’ has the language game form tidpaka. Transposition games in tone languages such as Sanga (Bantu) provide evidence not only for the reality of the syllable,
but also for an independent tonal tier. In such cases, transposition of syllables frequently leaves the tone structure unaffected. As an example, Kenstowicz and Kisseberth (1979: 168) report that the Sanga word bākōlwe has the language game form bālwekō in which the tones are not transposed with the syllables. Finally, Sherzer (1970) has argued, based on language games in Cuna, that such games provide evidence for underlying phonological representations and that speakers of the same language may have different underlying representations for the same form.

The phonological typology of language games has been well studied by such researchers as Pound (1963), Laycock (1972), Bagemihl (1988), McCarthy (1991), and Davis (1993). From these studies, the two most common types of games that emerge are syllable transposition games, as exemplified by the Tagalog and Sanga examples above, and games in which phonemes are inserted at one or more locations in a word (Spanish grande ‘big’, for example, has the language game form grañande). In this paper we examine the latter, focusing on how the integrity of the syllable may be disrupted by the inserted phonemes. For syllable disrupting games, we make a novel distinction between insertion-type games and imposition-type games. With the insertion-type games, a fixed sequence of phonemes can be inserted either following the syllable onset or between moras. In the imposition-type games, a consonant articulation (though sometimes a fixed -CVC- sequence) is imposed on the prosodic peak of the vocalic gesture. That is, insertion-type games violate the structural integrity of the syllable, imposition-type games the continuity of the vocal gesture. Insertion-type games are exemplified in Sections 2 and 3. Imposition-type games, which have not been recognized as such in previous work on language games and constitute the primary focus of this paper, are discussed in detail in Section 4. These imposition-type games have been analyzed in previous studies in nonlinear phonology as involving the insertion of a CV-template or infix in which the C is prespecified for some consonant and the V acquires its phonemic content by autosegmental spreading from the preceding vowel (cf. McCarthy 1982; Bagemihl 1987). In Sections 5 and 6, we propose that these games are more insightfully analyzed in terms of the imposition of a consonant articulation on the vocal gesture. We contend that the imposition is made at the prosodic peak of the vocal gesture: the demisyllable break in syllable-prominent languages, the demi-mora break in languages like Japanese that are overtly mora-sensitive. Section 5 specifically presents the advantages of
the demisyllable approach over the templatic approach. These include an explanation for the high frequency of labial consonants and the behavior of diphthongs in imposition-type games. Section 6 extends the demisyllable analysis to cases involving non-vocalic peaks. Section 7 considers games with multiple imposition on the vocalic peak. Section 8 provides a brief typology of insertion/imposition type games. Section 9 concludes the paper.

2. Insertion-type language games: syllable boundaries

In opposition to transposition games in which various constituents (usually syllables) are moved about in the word, insertion games disguise words by adding specified segments to the word at a fixed point. Such games fall into one of three types: syllable prefixing, syllable suffixing, or syllable infixing.

Syllable prefixing language games involve affixation of a CV-sequence either to the initial syllable of the word, as in Lebanese Arabic (1), or to all syllables in the word, as in Hausa (2) and Malayalam (3). Other languages that have a syllable prefixing game include Iraqi Arabic [prefix sV- to word], Ecuadorean Spanish [prefix kut- to all syllables], Costa Rican Spanish [prefix ku-], Albanian [prefix xh-], and Bengali [prefix c̣i-] (Pound 1963).¹

(1) Lebanese Arabic [Pound 1963]
za- kitāb ‘book’ → zā-kitāb

(2) Hausa [Alidou 1997]
da- tsintsíyáa ‘broom’ → dà-tsín-dà-tsíi-dà-yáa²

(3) Malayalam [Mohanan 1982]
pa- kañcan ‘a name’ → pa-ka-pañcan³

Syllable suffixing games involve affixation of a -CV(CV) sequence (where C indicates one or more consonants) either to the final syllable of the word, as in Finnish (4), or to all syllables, as in German (5) and Spanish (6). Other languages that have a syllable suffixing game include Bengali [−ra], Hanunoo [−tagsa], Hausa [−grv, -sv], Latvian [−pa], and Maori [−te].

(4) Finnish [Pound 1963]
-kontti mìka sinun nimesi on ‘What is your name?’ → mìka-kontti sinun-kontti nimesi-kontti on-kontti
(5) German [Pound 1963]
-\textit{bi} \textit{knabe} ‘boy’ $\rightarrow$ kná-\textit{bi}-bê-\textit{bi}

(6) Ecuadorian Spanish [Pound 1963]
-\textit{pV} \textit{la casa es bonita} ‘the house is pretty’ $\rightarrow$
lá-\textit{pa} cá-\textit{pa}-sá-\textit{pa} és-\textit{pe} bó-\textit{po}-ní-\textit{pi}-tá-\textit{pa}

Finnish (Campbell 1980) has another game in which -\textit{ta-} is inserted between the first and second syllables of the word. We consider this to be a case of a syllable suffixing game because we view the first syllable as the salient entity.

There appear to be many languages that have games in which the insertion site coincides with a syllable boundary (see, for example, the survey of language games in Laycock 1972 and Pound 1963). The typical affixing game attaches a CV sequence to initial, final, or all syllables. In most games this sequence is fixed. However, we note that in the Iraqi Arabic prefixing game, and in the Spanish and Hausa suffixing games, the C of the affixal insert is fixed while the V is a copy of the vowel of the relevant adjacent syllable. We turn now to a brief overview of syllable infixing games, games in which the integrity of the syllable is violated.

3. Insertion-type games: disrupting syllable integrity

Language infixing games provide deeper disguisability to words not only by adding segments to the word, but by violating the integrity of its syllabic structure in some way. The type of syllable structure that the data and our analysis supports is that argued for by Hayes (1989) and shown in (7).

Given this, the natural site for syllable infixing is after the onset or between moras.

(7)

\begin{equation}
\sigma
\begin{array}{c}
\text{On} \\
\mu
\end{array}
\begin{array}{c}
\mu
\end{array}
\begin{array}{c}
\text{C} \\
\text{V} \\
\text{C}
\end{array}

(\text{On} = \text{onset}, \mu = \text{mora})
\end{equation}

The most common site of insertion within the syllable appears to be after the onset. In (8)–(9), for example, we have listed five languages that insert a
fixed -VC- sequence following the onset. Tagalog (8a) only violates the integrity of the first syllable of the word, Indonesian (8b) only the last; Chinese, English, and Tamajaq (9) violate all syllables in the word.

(8)  
  a. Tagalog [Conklin 1956]  
     -um- tinápay ‘bread’ → t-um-í:napáy  
  b. Indonesian [Pound 1963]  
     -ark- kasakóla ‘school’ → kasakol-árk-a

(9)  
  a. Chinese [Yip 1982]\(^5\)  
     -ayk- pey ‘north’ → p-ayk-ey  
  b. English [Pound 1963]  
     -ælf- notebook → n-ælf-o"tb-ælf-œk  
  c. Tamajaq [Alidou 1997]  
     -6lw- ñfùs ‘hand’ → ñlw-œf-ñlw-us

By contrast, insertion games between moras appear to be less common. Japanese, a mora-prominent language, has a language game cited by Pound (1963) where the sequence -nosa- appears inserted after the first mora of the word. Estonian has a language game discussed by Lehiste (1985) in which a fixed CV sequence is inserted after the first mora of the word, as in (10a–d). The schemas in (10e) illustrate that, for the word saag, in which the vowel is associated with two moras, insertion is, indeed, after the first mora since the insertion does not affect the segment itself. Another, more complicated mora-based game, is found in Tigrinya, which will be discussed in Section 6.

(10)  
  a. laulus → la-pi-ulus ‘in the song (inessive sg.)’  
  b. saag → sa-pi-g ‘saw (nom. sg.)’  
  c. sakk → sa-pi-kk ‘zigzag’  
  d. sada → sa-pi-da ‘hundred’  
  e. Insertion after first mora in Estonian saag

\[\sigma\]
\[
\begin{array}{c}
\text{O} & \mu & \mu & \mu & \rightarrow & \text{O} & \mu & \mu \\
\text{s} & \text{a} & \text{g} & \text{s} & \text{a} & \text{[pi]} & \text{g}
\end{array}\]
4. Imposition-type games

In addition to the preceding types of syllable disrupting insertion games, there is a very common type of game that the previous typological studies consider as an insertion-type game but which cannot be analyzed in terms of insertion after the onset or between moras. We call this type of game an imposition game and formally distinguish it from insertion games. The examples in (11) are representative of this type of game.

(11) a. Cuna [Sherzer 1982]
   -r-  tanikki ‘he’s coming’ → ta-r-ani-r-ikki-r-i
   -pp-  merki ‘North American’ → me-pp-erki-pp-i
b. Fula [Alidou 1997]
   -b-  taylalt ‘guinea fowl’ → ta-b-ayla-b-alt
c. Greek [Pound 1963]
   -k-  diakopés ‘vacation’ → ði-k-iá-k-akó-k-opé-k-es
d. Hausa [Alidou 1997]
   -b-  ?alzúma ‘personal name’ → ã-b-alzú-b-umá

e. Hungarian [Pound 1963]
   -v-  soha ‘never, ever’ → so-v-oha-v-a
f. Kekchi [Campbell 1974]
   -p-  k’oxob’an ñ ‘to start it’ → k’o-p-oxo-p-ob’a-p-ank
g. Spanish [Davis 1993]
   -f-  grande ‘big’ → gra-f-ande-f-e
h. Zarma (Songhai) [Alidou 1997]
   -l-  kambe ‘hand’ → ka-l-ambe-l-e

As reflected by the underlining in the language game forms in (11), we treat this language game as involving the imposition of a consonant articulation upon the prosodic peak of the syllable, that is, upon the vowel. However, this type of game has typically been treated in the literature as involving the insertion of a consonant followed by a copy of the preceding vowel. That is, in a hypothetical word of the shape CV_{i}CV_{j}, the corresponding game form would be CV_{i}BV_{i}CV_{j}BV_{j}, in which the inserted sequence is underlined and B represents the inserted consonant, frequently a labial based on our informal survey. This type of language game is found in many languages, among
them German, Hebrew, Hungarian, Tagalog, Italian, and Korean, in addition to those illustrated in (11).

A typical analysis of this type of language game, such as that proposed by McCarthy (1982) for Cuna, treats word-game forms as involving the insertion of a CV template after each vowel of the word. Such a template contains a prespecified consonant and an empty V slot. The V slot is filled by means of the autosegmental spreading of the vowel melody from the preceding vowel. This type of analysis is illustrated in (12) using McCarthy’s (1982) analysis of Cuna *mepperkippi*, the game form of the word *merki* ‘North American’. The inserted -CCV- sequences are underlined.\(^7\)

\[\text{CVCCV} \rightarrow \text{CVCCVCCVCCV} \rightarrow \text{CVCCVCCVCCV} \rightarrow \text{[mepperkippi]}\]

In this analysis, a template is inserted after each vowel. The content of the template vowel is realized by means of autosegmental spreading from the preceding vowel, as illustrated in (12). Bagemihl (1987) has a somewhat similar analysis for games like those in (11) except that, rather than there being a template inserted after each vowel, a rule inserts a CV sequence where the consonantal element is prespecified for phonemic content while the vowel is unspecified. The vowel acquires phonemic content by a rule of autosegmental spreading from the preceding vowel in a manner similar to that seen in (12). The criticisms that we offer of the templatic account apply equally to Bagemihl’s account.

While this templatic analysis is insightful in certain respects, it does have several shortcomings. First, it seems arbitrary to view the inserted template as consisting of a CCV-sequence rather than a VCC-sequence. To put it another way, instead of viewing the location of the inserted template as being situated after the vowel, which is reflected in (12) above, the site of insertion could be readily analyzed as occurring before the vowel, exemplified by the underlining in *mepperkippi*, so that the inserted template would be -VCC-.\(^8\) Thus, one is confronted with the issue of whether the inserted sequence involves a -CV- template placed after the vowel or a -VCC-template placed before the vowel. Second, the analysis shown in (12) does
not answer why it is that it is only the vowel articulation that is repeated and not the consonant articulation. To our knowledge, there are virtually no languages in which the vowel is prespecified and the consonant repeated; that is, it is extremely unusual to find language games in which a hypothetical word like *parsek* would have a game form such as *parirsekik*. We know of one game in Mandarin Chinese, as cited by Pound (1963), in which this occurs. In this case, -C- is inserted after the first consonant of the word, for example, /lúo tā rèn/ ‘personal name’ becomes [l-al-úo t-at-à r-ar-èn]. Bagemihl (1988) also notes the rarity of such language games. He does, however, cite one example from a Swedish language game in which -oC- is inserted after each consonant of the Swedish word. For example, /bra/ has the game form [bobora], where the inserted sequence is underlined. This game is also unusual in that it splits an onset sequence. Davis (1993) notes that insertion games like those in (8) and (9) typically respect syllable-initial clusters and do not split them up. We want to emphasize the rarity of games like the Chinese and Swedish ones in comparison to games like those in (11) which are extremely common in the typological surveys of language games such as seen in Pound (1963) and Davis (1993). Given a McCarthy-like analysis such as that of the Cuna game word *mepperkippi* in (12), there is no reason for the rarity of such language games as suggested by a comparable analysis of hypothetical *parirsekik* in (13). The occurrence of insertion games like that illustrated in (12) and the extreme paucity of ones like that illustrated in (13) calls for an explanation beyond simple stipulation of a template pattern.

We propose, then, that language games like those in (11) do not involve the insertion of a specified CV-type template following each vowel in the word, but rather reflect the imposition of a consonant articulation on the vowel, between what Fujimura (1979), Fujimura and Lovins (1982), and Clements (1988, 1990) have called demisyllables. That is, in the game form of Fula *taylalt* (11b), for example, the imposition of the labial -b- splits each vowel
and, hence, each syllable, into two parts — two demisyllables. Specifically, the two demisyllables of the first syllable of *taylalt* are [ta] and [ay]; the imposition of the -b- occurs at the demisyllable break. In the second syllable of *taylalt* the two demisyllables are [la] and [alt]. Again, the labial articulation is imposed at the demisyllable break in forming the language game word.

5. The demisyllable and imposition games

The demisyllable as proposed in the work of Fujimura (cf. Fujimura (1979) and Fujimura and Lovins (1982)) is a gestural/acoustic notion. The first demisyllable comprises the initial consonant(s) plus the vocalic peak, while the second demisyllable comprises the vocalic peak plus any syllable-final consonant(s). The first demisyllable reflects the transition from the beginning of the syllable into the vowel steady state; the second demisyllable reflects the transition out of the steady state vowel. Thus, in a $C_0VC_0$ syllable, the first demisyllable consists of $C_0V$, the second of $VC_0$. Hence, demisyllables constitute abutting parts of a syllable in which, crucially, the vocalic peak belongs to both parts. We maintain that data from language games like those in (11) entail the imposition of a consonantal articulation at the demisyllable boundary.\(^{10}\)

We want to make clear, though, that we do not view the demisyllable as a phonological construct, despite suggestions to this effect by Clements (1988, 1990). According to Clements, the demisyllable can be viewed as the domain over which sonority constraints hold. The sonority constraints on the two demisyllables are independent of one another, the first demi-syllable maximizing the contrast among its constituents, the second minimizing it. Thus, the preferred initial demisyllable would have a sharp rise in sonority — an obstruent followed by a vowel — while the preferred final demisyllable would have a gradual fall in sonority — a vowel followed by a sonorant consonant. However, we maintain that the sonority profile of syllables reflects independent constraints on preferred syllable onsets and codas and does not offer support for the demisyllable as a phonological construct. Moreover, the fact that we do not find any transposition games that move demisyllables suggests that the demisyllable is not a phonological construct on par with the syllable.

Several important consequences follow automatically from viewing
language games like those in (11) as involving the imposition of a consonant articulation between two demisyllables rather than as the insertion of a template with a specified consonant. First, vowel quality before and after the inserted consonant will always be the same. Since a consonant articulation is being imposed in the middle of the vowel, the situation cannot be otherwise. In every language game that we are aware of in which an apparent sequence of the CV-type is supposedly inserted following each vowel of the normal word, the V is always a copy of the preceding vowel. This restriction on vowel type is understandable if, in fact, the vowel is not a copy, but rather a separation of the vowel into two demisyllables via the imposition of the consonant in mid-syllable. There is no need for autosegmental spreading from the preceding vowel as in the templatic analysis of (12). In a related vein, the issue raised above about the ambiguity of the template being CCV or VCC is no longer an issue since there is no template under our split-demisyllable analysis.

Second, a motivated reason for the asymmetry noted previously between the abundance of vowel splitting and the dearth of consonant splitting becomes apparent. Assuming templates and prespecification, one would expect to find approximately as many languages in which V is specified and C a copy as there are languages in which V is copied and C specified. In a split-demisyllable analysis, such as that we are proposing, the paucity of -VC- games in which V is specified, is motivated.

Third, the greater frequency of labial consonants in imposition games — about half of all games in our informal survey — finds a natural explanation in the split-demisyllable approach. If a consonant articulation is imposed in the middle of a vowel, the most common articulatory gesture expected would be one that does not interfere with the vowel articulation itself. Use of a labial gesture — b, p, v, f, but not w — for the imposed consonant permits the tongue position for the vowel to remain nearly constant throughout the vowel gesture. In other words, a labial gesture does not interrupt the vowel articulation and can be viewed as an imposition upon the vowel articulation. (If the labial gesture is imposed on a rounded vowel then the labial gesture itself is most likely also rounded; it still nonetheless does not interrupt the lingual part of the vowel articulation.) It should be noted, however, that there are language games where the consonant imposed on the vocalic gesture is not a labial, as in Cuna (-r-) or Zarma (-l-), illustrated earlier in (11), or in Tagalog (-g-), illustrated in (14).
(14) Tagalog [Conklin 1956]

\[ \text{si} \tilde{l}oq \text{ 'snare, trap'} \rightarrow \text{si-g-ílo-g-óq} \]

We have observed from the literature on language games of the imposition type that in games where the imposed consonant is not a labial it tends to be a coronal continuant, as in Songhai-Zarma -z-, Greek -s-, and Albanian -ž-, or less frequently, a velar or coronal stop. This suggests a hierarchy of imposition, as in (15), going from most likely to be imposed to least likely.

(15) Labial obstruents < Coronal continuants < Velar/Coronal stops

The hierarchy does not reflect general markedness considerations since coronals are normally considered to be the least marked consonants. Rather, as suggested above, they can be seen as reflecting a hierarchy of greater or lesser interference with the vowel articulation. A labial is least likely to interfere with the articulation of a vowel and thus is most common cross-linguistically as the imposed consonant in the imposition-type language game. The imposition of coronal continuants creates greater interference given the lingual movement away from the vowel, but not as much as velar and coronal stops, which are typologically rarer in imposition games.

Fourth, the imposition approach provides an explanation and motivated treatment of diphthongs in this type of language game. Although different languages treat diphthongs differently, even in languages where they are treated as single units the imposition of a consonant has the apparent effect of splitting the diphthong. Consider, for example, the data in (16) which illustrate a common dialect of a Spanish language game. As far as we are aware, these data reflect the typical behavior of diphthongs in such language games, not only in Spanish, but in other syllable-prominent languages with similar games.

(16) Spanish f-imposition

\begin{itemize}
  \item[a.] \[ \text{grande} \rightarrow \text{grafandefé} \text{ 'big'} \]
  \item[b.] \[ \text{hot} \rightarrow \text{hófor} \text{ 'today'} \]
  \item[c.] \[ \text{batle} \rightarrow \text{bañarfe} \text{ 'dance'} \]
  \item[d.] \[ \text{fœ} \rightarrow \text{fœfe} \text{ 'went (3rd pers.)'} \]
\end{itemize}

The example of \textit{grande} in (16a) can be analyzed either as inserting a CV-template after each vowel with the C-slot prespecified for /f/ (à la the McCarthy model) or as imposing a labial articulation on the vowel, as our model proposes. However, the data in (16b–c) and (16d) with an off-glide
and an on-glide, respectively, can be most satisfactorily understood within the imposition model that we are proposing. In a template-type model, a problem arises in (16b–d) in determining the location for the insertion of the CV-template. In (16b–c) the template would have to appear after the first element of the syllable rhyme, while in (16d) it would have to appear after the second element of the syllable rhyme. In our imposition model, the /l/ is imposed between two demisyllables. What is crucial is that, in the demisyllable model, the diphthong is simply split neatly into its two constituent parts between the two demisyllables. In the demisyllable analysis of diphthongs, the peak part of the diphthong is always split so that it is part of each demisyllable. Thus, in (16b) the peak vowel is /o/, which is split between the two demisyllables; a comparable situation pertains in (16c). As a result, the off-glide appears only in the second demisyllable. In (16d) the peak vowel is /e/, which is, like the /o/ in (16b), split between the two demisyllables. Consequently, the on-glide can only appear in the first demisyllable. Thus, game forms involving diphthongs provide supporting evidence for our proposal that the imposition games of the Spanish and Cuna type under consideration do not involve the insertion of a template but rather the imposition of a consonant articulation on a single vowel. Furthermore, such games can be taken as providing independent support for the demisyllable concept itself, since the consonant imposition occurs at the demisyllable break.

The demisyllable analysis accounts not only for diphthong behavior in syllable-prominent languages, but also for their behavior in mora-prominent languages such as Japanese. Consider the difference between the case of phonetic [ai] in Spanish in (16c) and phonetic [ai] in Japanese as in (17b).

(17) Japanese babibu game [Haraguchi 1982; Tsujimura 1996]
   a. asita → abasihtaba ‘tomorrow’
   b. hai → habaihi ‘yes’

The difference in Japanese reflects the mora-prominent nature of that language as evidenced by the role of the mora in speech errors and orthography in addition to its role in the internal phonology of the language (cf. Tsujimura 1996). Consonant imposition in Japanese appears at the demimora break while in Spanish it is at the demisyllable. We diagram this difference in imposition between the two languages in (18). (Note that the representations of syllable structure used here are modified simply to highlight the syllable-vs. mora-prominent dichotomy).
Whether a language is syllable-prominent like Spanish or mora-prominent like Japanese, imposition of a game consonant, we contend, splits each vowel of the respective prosodic unit at its vocalic peak into demi-units: demi-syllables or demi-moras, respectively. Thus, in Spanish the imposition of labial \(-f\)- produces \(ba\text{-}f\text{-ai}\text{-}le\text{-}f\text{-}e\) from \textit{baile} ‘dance’. In the Japanese \textit{babibu} game, however, the labial \(-b\)- is imposed on each of the underlying moraic vowels, as illustrated by the schema in (18b) and the examples in (17). Hence, both /a/ and /i/ of a phonetic diphthong [ai] are split in the game.

In comparison with the unified syllable/moraic approach outlined here, it is not possible in the template approach to state in any simple terms where the game segment(s) should be inserted in forms with diphthongs.

6. Imposition games and non-vocalic peaks

In the preceding description and analysis, focus has been on straightforward cases in which the nuclear segment is a vowel. In this section, we consider what happens in languages when the relevant prosodic unit has a non-vocalic peak (e.g., a syllabic consonant). We first examine language games that involve nasals which cannot be split into demisyllables or demi-moras.

Ndali [eastern Bantu] has a language game in which an interdental
consonant (-ð-) is imposed upon the vowel articulation, as shown in (19). (The Ndali data come from the field notes of the first author.) The language game form in (19b) is interesting because it surfaces with a syllabic nasal. A syllabic nasal would consist of a single demisyllable and so it cannot be split. As seen in (19b), Ndali inserts the "bare" consonant [ð] after the nasal. The presence of this "bare" game consonant also provides additional direct support to our claim that it is a -C- that is imposed, not a -CV- template that is inserted, in this type of game.16

(19) Ndali [Field notes]
-ð- ukutusófyा ‘to lose us’ →
ů-ðů-ku-ðů-tů-ðů-só-ðo-fyáða
/uku-tu-sov-i-a/
INF-1PL-be.lost-CAUS-FV
b. -ð- ukusófyा ‘to lose me’ →
ů-ðů-ku-ðů-ñð-só-ðo-fyáða
/uku-n-sov-i-a/
INF-1SG-be.lost-CAUS-FV

The insertion site of the disrupting consonant with respect to a syllabic consonant such as [n] is determined by language; it is not restricted to post-N position as in Ndali. This can be seen from the Zarma-Songhai language game in (20). As illustrated in (20a) and (20b), an -l- is imposed upon the vowel articulation at the demisyllable break. An initial syllabic nasal, which cannot be split in Zarma-Songhai, resolves the problem by inserting an epenthetic [u] before the nasal, then imposing the -l- on the vowel gesture, shown in (20c). Zarma-Songhai and Ndali can be seen as implementing different strategies in resolving the problem of consonant imposition when the syllable consists of a syllabic consonant.

(20) Zarma-Songhai [Alidou 1997]
-ð- ukutusófyα ‘to lose us’ →
ů-ðů-ku-ðů-tů-ðů-só-ðo-fyáða
/uku-tu-sov-i-a/
INF-1PL-be.lost-CAUS-FV
b. -ð- ukusófyα ‘to lose me’ →
ů-ðů-ku-ðů-ñð-só-ðo-fyáða
/uku-n-sov-i-a/
INF-1SG-be.lost-CAUS-FV

The Japanese babibu game illustrates a similar resolution to the nasal problem in a mora-prominent language (21). Like the case in Ndali above, Japanese inserts the game consonant, -b-, following a moraic nasal. However,
unlike Ndali but like Zarma-Songhai, Japanese also inserts an epenthetic vowel, [u], in order to avoid the realization of an impermissible consonantal sequence. (Note that [u] is the default vowel inserted after labials in Japanese whenever appropriate.)

(21) Japanese *babibu* game

\[ \text{tonde} \rightarrow \text{tobonbudehe} \ 'flying' \]

Nasals are not the only non-vocalic segments involved in certain language games. In mora-prominent languages, consonants may also be moraic and, hence, susceptible to game activity. In Tigrinya (Afro-Asiatic), one game involves imposition of the consonant -g- on each mora, including moraic coda consonants, as illustrated by the examples in (22).

(22) Tigrinya -g- imposition [Bagemihl 1987]

a. \( \\text{k'arma} \ 'gnat' \rightarrow \text{k'a-g-ari-g-ima-g-a} \)

b. \( \\text{?intay} \ 'what' \rightarrow \text{?i-g-ini-g-ita-g-ayi-g-i} \)

The problem is similar to that of the nasals discussed above. The Tigrinya response to the problem is like that of Zarma-Songhai in (20c). In effect, a default vowel [i] is inserted after the moraic C making the (original) moraic consonant the onset for a new syllable, the [i] the new moraic unit. The gesture -g- then is imposed on the vocalic peak [i] of this new syllable. This process is illustrated in (23) for the first syllable of (22a).

(23) \( \\text{k'ar} \rightarrow \text{k'a-g-ari} \rightarrow \text{k'a-g-ari-g-i} \)

7. Multiple imposition

A significant complicating factor in some imposition games is multiple imposition, that is, imposition of more than one consonant on the vocalic gesture of the prosodic peak. Data from three languages — Finnish, Hausa, and Tagalog — are provided in (24)–(26), respectively. These games are complicated not only by the imposition of a second consonant articulation on the vocalic gesture but, also, by their effect on vowel length and tone, which we do not deal with here (but see Alidou 1997 for discussion). These multiple impositions are readily accounted for in our model. The first consonant is imposed at the demisyllable (or demi-mora) break and, in effect, creates a new syllable. Each subsequent consonant is successively
imposed on the vocalic gesture of the new syllable. The greater the number of consonants imposed, the greater the violation to the syllable, and hence, the greater the disguisability achieved.

(24) Finnish [Pound 1963]
   -d-v- nimesi ‘name’ → ni-d-i-v-ime-d-e-v-esi-d-i-v-i

(25) Hausa [Alidou 1997]
   -g-d- tāakālmī ‘shoe’ → tā-g-ā-d-ākā-g-ā-d-ālmi
   -? -s -d- kāasūwā ‘market’ → kāa-? -s -d -āsū-? -ū -s -d -ūwā

(26) Tagalog [Conklin 1956]
   -g -d- tanhālī ‘noon’ → ta-g-ā-d- anja-g-ā-d-ali-g-ī-d-ī?

In a rarer type of game, a fixed string of segments — not just any single consonant — is imposed on the vocalic gesture. In Indonesian, for example, the fixed sequence -den- is imposed on the vocalic gesture of each syllable (27a). A very similar case is found in Cairene Arabic (27b), though here the sequence -tin- is imposed only on the vocalic gesture of the penultimate syllable of the word. In effect, disguisability is enhanced by imposing a longer string at the demisyllable break. In fact, Pound (1963: 33) notes that his Indonesian informants used -den- rather than -p- or -f- because these latter had become too easy for outsiders to understand.

(27) a. Indonesian [Pound 1963]
   -den- kītā ‘we’ → kī-den-itā-den-ā
   b. Cairene Arabic [Burling 1970]
      -tin- huwa hajedihali ‘he will give it to me’ → hu-tin- uwa hajediha-tin-ali

8. The typology of insertion and imposition games

In any particular language game, the number of syllables affected and the way in which each syllable is affected determine the degree of disguise. Typologically, the insertion- and imposition-type framework that we are proposing provides a coherent picture of such games. We have shown that the syllable may be affected structurally by the insertion of a fixed sequence of segments within the syllable or its integrity may be violated by imposing
specified consonant articulations on the vocal gesture. The tables in (28) and (29) summarize the various insertion and imposition-type games, respectively, at the syllable, sub-syllabic, and segmental levels, with typical examples exemplifying each type. (See Appendix for a full listing plus the language game sources used in our study.)

(28) Insertion-type games

<table>
<thead>
<tr>
<th></th>
<th>Syllable pre-σ insertion</th>
<th>post-σ insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st σ</td>
<td>za-</td>
<td>-ta</td>
</tr>
<tr>
<td>sV</td>
<td>Arabic</td>
<td>Finnish</td>
</tr>
<tr>
<td>All σ’s</td>
<td>ka-</td>
<td>ra</td>
</tr>
<tr>
<td></td>
<td>xh-</td>
<td>bi</td>
</tr>
<tr>
<td></td>
<td>in-</td>
<td>sV</td>
</tr>
<tr>
<td></td>
<td>Lebanese Arabic</td>
<td>Spanish; Kannada</td>
</tr>
<tr>
<td></td>
<td>Iraqi Arabic</td>
<td>Bengali; Greek</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Algerian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indonesian</td>
</tr>
<tr>
<td>Final σ</td>
<td></td>
<td>kontti Finnish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-ks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Iraqi Arabic</td>
</tr>
</tbody>
</table>

(29) Imposition-type games

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllable σ</td>
<td>μ</td>
</tr>
<tr>
<td>Initial</td>
<td>-bl- Fula</td>
</tr>
<tr>
<td>All</td>
<td>-p-</td>
</tr>
<tr>
<td></td>
<td>-f-</td>
</tr>
<tr>
<td></td>
<td>-z-</td>
</tr>
<tr>
<td></td>
<td>-den-</td>
</tr>
<tr>
<td>Penult</td>
<td>-tin- Cairene Arabic</td>
</tr>
</tbody>
</table>
At the syllable level, an insert may be affixed to specified syllables in the word. In prefixing games, a prefix (usually of the shape CV) may be attached to the initial syllable of the word, to all but the final syllable, or to all syllables, depending on the game (see 28a). In suffixing games, a suffix may be attached to either the initial or final syllable, or to all syllables. At this level, we observe rare cases of segment copying: V in Lebanese Arabic prefixing, as well as in Spanish and Hausa suffixing games.

At the sub-syllabic level, insertion-type language games can be divided into two types: those where the insertion is after the onset and those where it is after the mora. In these games, the insertion entails a fixed segment sequence, -VC- when the insertion is after the onset (e.g., \(-ayk\) in Chinese) and -CV- when the insertion is after the mora (e.g., \(-pi\) in Estonian). While there appears to be no preference with respect to the consonants used in insertion-type games, the vowel is typically a low vowel or a schwa.

Finally, insertion may occur, though rarely, at the segment level. In the Mandarin and Swedish games, a -VC- sequence with a fixed V is inserted after the initial C or all C's, respectively.

The greatest violation of the syllable and, hence, the greatest disguise, comes with violation of the vocalic gesture in the imposition-type games. At this level, the gesture most commonly consists of -C-, but, as shown in Section 7, may consist of -C-C- or -C-C-C- imposed on the vowel. The imposition of a consonantal gesture is usually at the demisyllable break, but may also occur at the demi-mora break in a mora-sensitive language like Japanese. Though the imposition may affect only a single syllable or mora, it typically affects all syllables (or moras) in a word.

The analysis of language game data that we have developed here suggests that syllable structure is not only relevant, but the basis upon which insertion-type games are structured. Hence, insertion-type games provide insight into the phonological structure of the syllable in a given language. Imposition-type language games, on the other hand, utilize the vowel gesture of a syllable or mora as the focal point of play, as gamesters impose consonantal gestures on it. These games provide evidence for a different type of construct, the demisyllable or demi-mora.

Finally, it is worth noting that the tables in (28) and (29) have various gaps. For example, we know of no language game in which an insert is prefixed to the final syllable. While such a gap may be accidental, we suspect that it is related to the degree of disguisability. A prefixal insert to
the final syllable is probably an insufficient way of disguising polysyllabic words. We leave for future research the matter of determining whether such gaps are accidental or systematic.

9. Conclusion

The focus of this paper has been on language games that violate the integrity of the syllable. We observed that a syllable may be disrupted by the insertion of a fixed language game sequence either after the onset or between moras as discussed in Section 3. Such data support the syllable structure in (7) along the lines of Hayes (1989). What is novel in our paper is the proposal that a common type of language game, reflected in (11), entails the imposition of a consonant articulation (frequently a labial) on the vocal gesture at the demisyllable (or demi-mora) break, thereby splitting the vowel. We maintain that our analysis avoids the problems of the earlier analyses, does not require autosegmental spreading, accounts for the behavior of diphthongs and syllabic consonants, and provides an explanation for the preference for labial consonants in such games.

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Names of the authors are simply arranged in alphabetical order, reflecting equal contribution to the paper. We express thanks to Yoshihisa Kitagawa and Eugene Buckley for discussion of Japanese and Tigrinya, respectively, and to Kenneth de Jong and Philip LeSourd for general discussion on various aspects of this paper. We also thank two reviewers for this journal for their constructive comments and suggestions.
### APPENDIX

**Insertion-type games**

<table>
<thead>
<tr>
<th>Syllable</th>
<th>pre-σ insertion</th>
<th>post-σ insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st σ</td>
<td>za- : Lebanese Arabic</td>
<td>-ta : Finnish</td>
</tr>
<tr>
<td></td>
<td>ka- : Lebanese Arabic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sV- : Iraqi Arabic</td>
<td></td>
</tr>
<tr>
<td>All σ’s</td>
<td>pa- : Malayalam</td>
<td>-pa : Latvian</td>
</tr>
<tr>
<td></td>
<td>da- : Hausa</td>
<td>-ra : Bengali; Greek</td>
</tr>
<tr>
<td></td>
<td>ra- : Bengali; Telugu</td>
<td>-la : Greek</td>
</tr>
<tr>
<td></td>
<td>la- : Kannada</td>
<td>-na : Okinawan</td>
</tr>
<tr>
<td></td>
<td>na- : Telugu</td>
<td>-ka : Greek</td>
</tr>
<tr>
<td></td>
<td>ka- : Kannada; Spanish; Telugu</td>
<td>-bi : German</td>
</tr>
<tr>
<td></td>
<td>ga- : Kannada</td>
<td>-te : Maori</td>
</tr>
<tr>
<td></td>
<td>ċi- : Bengali</td>
<td>-dzi : Greek</td>
</tr>
<tr>
<td></td>
<td>kri- : Russian</td>
<td>-guš/-gi : Turkish</td>
</tr>
<tr>
<td></td>
<td>xh- : Albanian</td>
<td>-tagsa : Hanunoo</td>
</tr>
<tr>
<td></td>
<td>in- : Indonesian</td>
<td>-ful : English</td>
</tr>
<tr>
<td></td>
<td>kuti- : Spanish</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-pV : Spanish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-gtV : Hausa</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-sV : Hausa</td>
</tr>
<tr>
<td>Final σ</td>
<td>kontti : Finnish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-kum : Iraqi Arabic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-ks : Iraqi Arabic</td>
<td></td>
</tr>
<tr>
<td>Sub-syllabic</td>
<td>post-onset [onset-µ]</td>
<td>between moras [µ-*-µ]</td>
</tr>
<tr>
<td>Initial σ</td>
<td>-um- : Tagalog</td>
<td>-nosa : Japanese</td>
</tr>
<tr>
<td></td>
<td>-igod- : English</td>
<td>-pi- : Estonian</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All σ’s</td>
<td>-ayk- : Chinese</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-ælf- : English</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-otw- : Tamajaq</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-ons- : Tamajaq</td>
<td></td>
</tr>
<tr>
<td>Final σ</td>
<td>-ark- : Indonesian</td>
<td></td>
</tr>
</tbody>
</table>

**Segment**

<table>
<thead>
<tr>
<th>pre-C insertion</th>
<th>post-C insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial C</td>
<td>-oC- : Mandarin Chinese</td>
</tr>
<tr>
<td>All C’s</td>
<td>-oC- : Swedish</td>
</tr>
</tbody>
</table>

**Morphological level**

<table>
<thead>
<tr>
<th>Post-morpheme insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>-yi : Tamil</td>
</tr>
</tbody>
</table>
## Imposition-type games

<table>
<thead>
<tr>
<th>Vowel gesture</th>
<th>Initial</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-bl-</td>
<td>Fula</td>
</tr>
<tr>
<td></td>
<td>-pp-</td>
<td>Cuna</td>
</tr>
<tr>
<td></td>
<td>-p-</td>
<td>English; German; Italian; Kekchi; Korean; Javanese Maori; Tagalog</td>
</tr>
<tr>
<td></td>
<td>-b-</td>
<td>Fula; German; Hebrew; Okinawan</td>
</tr>
<tr>
<td></td>
<td>-s-</td>
<td>Albanian; Javanese; Spanish</td>
</tr>
<tr>
<td></td>
<td>-v-</td>
<td>Hungarian</td>
</tr>
<tr>
<td></td>
<td>-r-</td>
<td>Cuna</td>
</tr>
<tr>
<td></td>
<td>-l-</td>
<td>Korean; Zarma</td>
</tr>
<tr>
<td></td>
<td>-d-</td>
<td>Ndali</td>
</tr>
<tr>
<td></td>
<td>-s-</td>
<td>Italian; Maori</td>
</tr>
<tr>
<td></td>
<td>-z-</td>
<td>Albanian; Amharic; Italian; Persian; Zarma</td>
</tr>
<tr>
<td></td>
<td>-dz-</td>
<td>Greek</td>
</tr>
<tr>
<td></td>
<td>-t-</td>
<td>Italian</td>
</tr>
<tr>
<td></td>
<td>-n-</td>
<td>Korean</td>
</tr>
<tr>
<td></td>
<td>-k-</td>
<td>Greek; Okinawan</td>
</tr>
<tr>
<td></td>
<td>-g-</td>
<td>Tagalog; Turkish</td>
</tr>
<tr>
<td></td>
<td>-gr-</td>
<td>Greek</td>
</tr>
<tr>
<td></td>
<td>-ngr-</td>
<td>Chaga</td>
</tr>
<tr>
<td></td>
<td>-den-</td>
<td>Indonesian</td>
</tr>
<tr>
<td></td>
<td>-l-</td>
<td>Saramaccan</td>
</tr>
<tr>
<td></td>
<td>-d-v-</td>
<td>Finnish</td>
</tr>
<tr>
<td></td>
<td>-?:-r-</td>
<td>Hausa</td>
</tr>
<tr>
<td></td>
<td>-?:-s-d-</td>
<td>Hausa</td>
</tr>
<tr>
<td></td>
<td>-g-d-</td>
<td>Hausa; Tagalog</td>
</tr>
</tbody>
</table>

### Sources of language games in our study

- Alidou (1997): Fula, Hausa, Tamajaq, Zarma-Songhai
- Bagemihl (1987): Tigrinya
- Bagemihl (1988): Swedish
- Botne (field notes): Ndali
- Burling (1970): Cairene Arabic
- Campbell (1974): Kekchi
- Campbell (1980): Finnish
NOTES

1. In the examples, language game forms are on the right of the arrowhead, while the corresponding word is italicized and on the left of the arrowhead. Inserted sequences in the language game forms are set off by dashes and are underlined. Our transcriptions reflect those that are given in our sources.

2. In the language game form, vowel lengthening of the /i/ of the original second syllable occurs since the Hausa language game requires the output to have alternating light and heavy syllables. See Alidou (1997) for an analysis of this in terms of iambic feet.


4. We assume that the onset is a formal constituent of the syllable, though our analysis is not affected by a view in which the syllable-initial consonants link directly to the syllable node. See Davis (1990) for arguments regarding the constituency of the onset within moraic theory.

5. Though Yip (1982) only provides monosyllabic examples, San Duanmu (p.c.) informs us that insertion would apply to each syllable in longer words such as in borrowings or compounds.

6. In this Hausa game, [b] is imposed on all vowels except the last.

7. We are not aware of any analyses of this type of game in Optimality Theory, though see Ito, Kitagawa, and Mester (1996) for an optimality-theoretic analysis of a Japanese transposition game.

8. In fact, McCarthy (1991) analyzes the Cuna game and others like those in (11), with the inserted language game infix being vowel-initial, unlike McCarthy (1982). The inserted vowel acquires its phonemic content by autosegmental spreading from the following
vowel. As evidence for the VC analysis of the inserted sequence, McCarthy (1991) cites the occurrence of VC infixes in the morphology of such languages as Tagalog.

9. Alternatively, this game can be analyzed with the prefix C- prefixed to each syllable, as in Pound (1963). However, we choose to analyze it as an infix since we know of no other language games that are described as containing an empty prefixal C element.

10. We view the result of the consonantal imposition to be a new syllable. Thus, for example, Spanish grafande in (11g) has four syllables, not two supersyllables. The resulting language game form may have a unique stress pattern or tone pattern that can be independent of the source word. This is seen clearly in the Zarma-Songhai examples in (20) where the game form has a low-high tone pattern regardless of the tonal melody of the source word. A full examination of tone and stress in language games is beyond the scope of this paper; but see McCarthy (1991) for discussion regarding stress and Alidou (1997) for discussion on tone.

11. As mentioned earlier, Bagemihl’s (1987) analysis of games like those in (11) where a CV sequence is inserted after each vowel (with the consonant prespecified and the vowel unspecified) requires an autosegmental spreading rule so that the inserted vowel acquires the melodic content of the preceding vowel. Our imposition analysis requires no rule of autosegmental spreading.

12. From Pound (1963), Davis (1993) and others, we have found that of 37 games in 26 languages that impose a single consonant on the vocalic gesture, 17 impose a labial obstruent (13 stops, 4 fricatives), 12 a coronal continuant (including liquids), 5 a velar stop, and 2 a coronal stop. An imposed nasal consonant occurs only once in our survey.

13. As pointed out by one reviewer, the hierarchy does appear to accord with Jakobson’s hierarchy of acquisition. If one considers coronal nasals, liquids and stops “unmarked” because of their tendency to assimilate, then it may not be surprising that coronal continuants, which are less likely to assimilate, are ranked higher than coronal stops.

14. Given our claim that the consonants that tend to be imposed upon vowels in imposition type language games are those that are least likely to interfere with the vowel articulation, one might think that imposed glottal consonants should be extremely common in such language games. However, they are extremely rare in imposition games even in languages that do have glottals in their inventory. One possible reason for this may have to do with disguisability. Imposing a glottal consonant on a vowel may sound like a hiccup or a stutter and would be too obvious as to what the intended word is. With respect to disguisability, perhaps a contributing reason for the frequency of imposed labials in language games has to do with the visual effect of the labial gesture creating greater visual disguisability than other consonant types. It is worth noting that Bagemihl (1989:525) seems to downplay the role of disguisability in language games. It seems to us that there is an inherent tension in language games between disguisability, on the one hand, and ease of production, on the other. That is, language game forms should be disguised but gamesters should not try too hard to disguise them. An imposed labial seems to strike the preferred balance between achieving a good degree of disguisability and minimal linguistic effort.

15. One problem in doing a typology of language games comes from the possible role of borrowing in contact situations. The Cuna game in (11a) and the Kekchi game in (11f) are
probably influenced by Spanish contact. Similarly, the Hebrew labial imposition game may be influenced by the German one. Also, Japanese-Korean contact may be a reason why both languages have labial imposition games, though the exact details of these games are different, reflecting the phonology of each language. Nonetheless, while the possibility of borrowing would be a factor hard to control for in doing a language game typology, the observation that games with labial insertion appear to be most susceptible to borrowing in contact situations is suggestive of the ease of imposing a labial as opposed to other consonants along the lines of the hierarchy shown in (15).

16. [ð] only occurs in the language game. As an interesting side point, the [n] in the language game form in (19b) reflects a property of the underlying representation and not the actual phonetic form of the word, [uku:sófyá]. In [uku:sófyá] the /n/ has deleted before the fricative with compensatory lengthening of the preceding vowel. While we do not offer an optimality-theoretic analysis in this paper, we do note that the language game form in (19b) presents a problem for Ito, Kitagawa, and Mester’s (1996) assumption that language game words reflect an output-output relation since the [n] of the language game word in (19b) is a property of the underlying representation and not of the phonetic form of the word.

17. It should be noted that when the coda consonant is the first part of an underlying geminate in Tigrinya, [i] is not inserted; this can be understood as an effect of geminate integrity. The behavior of geminates in language games is varied and complicated. In an optimality-theoretic grammar, the different behavior would reflect differences in constraint ranking. In Tigrinya, a constraint like geminate integrity would be inviolable. On the other hand, Jarvis (1994) shows that geminate consonants are systematically split up in a Finnish language game. Thus, geminate integrity would not be inviolable in that language. In the Japanese babibu game, geminate consonants are given an interpretation that reflects their orthography rather than their actual pronunciation. A full discussion of geminate behavior in language games is beyond the scope of this paper, but see Bagemihl (1988: 474–477) for discussion; for an optimality-theoretic account, see Jarvis (1994).

REFERENCES


