Echo and default epenthesis in Kĩsêdjê*

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Abstract: In Kĩsêdjê, a Northern Jê language spoken in Brazil, a ban on utterance-final codas forces the insertion of an epenthetic vowel in words that end in a consonant underlyingly. In most cases, an echo vowel is epenthesized. That is, the inserted vowel is featurally identical to the closest vowel that precedes. However, in cases where the word-final consonant and the vowel that precedes it have different nasality values, a default vowel is inserted. In this paper, I address the question of why such nasality mismatches block vowel echo and force default epenthesis. I propose that echo epenthesis results from Correspondence, as in Kitto and de Lacy (1999), and default epenthesis from failure to establish Correspondence due to inconsistent intervening nasality.

Keywords: echo epenthesis, default epenthesis, Kĩsêdjê (Jê), Correspondence, nasality

1 Introduction

In Kĩsêdjê, a Northern Jê language spoken in Brazil, an epenthetic vowel occurs in utterance-final words whose underlying form ends in a consonant. For example, the verb /kĩn/ 'like' is pronounced [kĩn] utterance-internally, but [kĩnĩ] at the end of an utterance, as shown in (1).[1] Similarly, the *wh*-word /kut^{h}ɛn/ 'why' surfaces as [kut^{h}ɛn], unless it closes an utterance, in which case it must be realized as [kut^{h}ɛni], as in (2).

(1) [kĩn] <kĩn> ∼ [kĩnĩ] <kĩnĩ>[2] 'like'

a. I-mã **kĩn** khêrê.
1-DAT like NEG
'I don't like it.' (Nonato 2014)

b. I-mã wásy ntekhrera **kĩnĩ**.
1-DAT corn soft like
'I like soft corn.' (Nonato 2012a)

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[1] The data used for the present analysis come from three pieces of work by Rafael Nonato: Nonato (2012a,b, 2014). The following abbreviations are used in the glosses: 2 = second person, DAT = dative, NEG = negation, NOM = nominative.

[2] By convention, epenthesis is represented orthographically in Kĩsêdjê.

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(2) [kut^{h}ɛn] <kuthen> ∼ [kut^{h}ɛni] <kutheni> ‘why’

a. **Kuthen** ka i-mã run khêrê?
why 2NOM 1-DAT throw NEG
‘Why didn’t you throw it to me?’ (Nonato 2012a)

b. **Kutheni**?
why
‘Why?’ (Nonato 2012a)

It is the nature of the final VC sequence of words that undergo utterance-final epenthesis in Kĩsêdjê that determines the quality of the epenthetic vowel. If the epenthesized stem ends in an oral consonant preceded by an oral vowel, the featural content of the epenthetic vowel is identical to that of the stem vowel. That is, an *echo vowel* is inserted. In the pairs of words in (3), the left-hand member is the unepenthesized utterance-internal form, whereas the right-hand member is the epenthesized utterance-final form.[3]

(3) **Echoed oral vowels**[4]

a. [wit] ∼ [wir**i**] ‘only’ (Nonato 2012a)

b. [ndɨp] ∼ [ndɨw**ɨ**] ‘new’ (Nonato 2012a)

c. [ajk^{h}ɽut] ∼ [ajk^{h}ɽur**u**] ‘two’ (Nonato 2012a)

d. [hɾek] ∼ [hɾek**e**] ‘grow’ (Nonato 2012a)

e. [ndɘt] ∼ [ndɘɾ**ɘ**] ‘full’ (Nonato 2012a)

f. [ŋgɻot] ∼ [ŋgɻor**o**] ‘the Pleiades’ (Nonato 2014)

g. [t^{h}ɛp] ∼ [t^{h}ɛw**ɛ**] ‘fish’ (Nonato 2014)

h. [ɲjɜt] ∼ [ɲjɜɾ**ɜ**] ‘potato’ (Nonato 2012b)

i. [ɾɔp] ∼ [ɾɔw**ɔ**] ‘jaguar’ (Nonato 2014)

Similarly, if the epenthesized stem ends in a nasal consonant preceded by a nasal vowel, an *echo vowel* is inserted, as shown in (4).

(4) **Echoed nasal vowels**

a. [kĩn] ∼ [kĩn**ĩ**] ‘like’ (Nonato 2014)

b. [t^{h}ũm] ∼ [t^{h}ũm**ũ**] ‘old’ (Nonato 2012a)

c. [k^{h}ɛ̃n] ∼ [k^{h}ɛ̃n**ɛ̃**] ‘rock’ (Nonato 2014)

d. [sumk^{h}ɽɛɲk^{h}ɔ̃n] ∼ [sumk^{h}ɽɛɲk^{h}ɔ̃n**ɔ̃**] ‘ear’ (Nonato 2014)

e. [k^{h}at^{h}ɔ̃ŋ] ∼ [k^{h}at^{h}ɔ̃ŋ**ɔ̃**] ‘explode’ (Nonato 2012a)

[3] Notice that in all the examples in (3), except (3d), the final stem consonant is realized as [p] or [t] in the utterance-internal form, but as [w] and [ɾ] in the epenthesized utterance-final form. Although it is most certainly related to the general epenthesis phenomenon this paper is about, this alternation is irrelevant to the choice between echo and default epenthesis, and I will not discuss it here.

[4] Throughout, epenthetic vowels appear in boldface.

However, if the epenthesized stem ends in a nasal consonant preceded by an oral vowel, a *default vowel* — [i] or [ɨ] — is inserted.[5] In other words, the presence of a stem-final nasal consonant seems to *block* the echoing of oral vowels. Examples of default epenthesis are given in (5).

(5) **Default epenthesis**

a. [mbɛn] ∼ [mbɛn**i**], *[mbɛn**ɛ**] 'honey' (Nonato 2014)

b. [hʷɨsɨsom] ∼ [hʷɨsɨsom**ɨ**], *[hʷɨsɨsom**o**] 'mosquito' (Nonato 2014)

c. [ɲjun] ∼ [ɲjun**i**], *[ɲjun**u**] 'hummingbird' (Nonato 2014)

This paper starts from the generalization that echo epenthesis is observed in words whose stem ends in a sequence of an oral vowel and an oral consonant (VC) or in a sequence of a nasal vowel and a nasal consonant (ṼN), but default epenthesis is observed in words whose stem ends in a sequence of an oral vowel and a nasal consonant (VN),[6] and attempts to answer the question why oral vowels may not be echoed across nasal consonants.[7]

My claims are as follows. Echo epenthesis emerges when a Correspondence relation is established between the epenthetic vowel and the preceding vowel. Default epenthesis emerges when such a Correspondence relation fails to be established, as a result of a high-ranking requirement on linear consistency in nasality between corresponding vowels.

In Section 2, I provide some background on the phonology of Kĩsêdjê. In Section 3, I briefly address problems encountered when trying to account for the Kĩsêdjê facts with existing analyses of consonant opacity in echo epenthesis. Section 4 proposes a Correspondence analysis of Kĩsêdjê epenthesis, and argues that a requirement on nasal consistency between correspondents is responsible for the echo/default alternation. I conclude in Section 5.

2 Some background on the phonology of Kĩsêdjê

Kĩsêdjê belongs to the Northern branch of the Jê language family, along with Tapayuna (often considered a variety of the same language), Mẽbengokre, Apinayé, Timbira and Panará. It is spoken by practically all of the 460 individuals who live in the *Terra Indígena* Wawi, in northeastern Mato Grosso, Brazil.[8]

[5] I'm leaving aside the problem of the [ɨ]/[i] alternation in default epenthesis, which I take to be of an unrelated nature. In short, [i] is inserted after alveolar and palatal consonants, and [ɨ] after bilabial and velar consonants. Nonato (2014) analyzes this alternation as frontness assimilation.

[6] Regarding what drives vowel epenthesis utterance-finally, I assume, following Flack (2009), that this and similar phenomena are due to the work of prosodic domain-specific markedness constraints.

[7] There is an additional context where default epenthesis is observed utterance-finally: [i] or [ɨ] is inserted whenever the stem's last vowel is [a], even in cases where there is no nasality mismatch between the vowel and the stem-final consonant. In other words, [a] may never be echoed.

(i) a. [kʰɽat] ∼ [kʰɽari] 'beginning' (Nonato 2014)

b. [tʰak] ∼ [tʰakɨ] 'to open' (Nonato 2014)

I will not be looking at this problem in the present paper, since I will instead be focusing on nasality-related default epenthesis.

[8] Instituto Socioambiental. URL: https://terrasindigenas.org.br/es/terras-indigenas/4103.

Although Kĩsêdjê exhibits some amount of allophonic variation in consonants, it has a relatively small inventory of consonantal phonemes, provided in Table 1.[9]

Table 1: Kĩsêdjê consonantal phonemes

	Labial	Alveolar	Palatal	Velar	Laryngeal
Stop	**p**	**t**	tʃ	**k**	
Aspirated stop		t^h		k^h	
Nasal	**m**	**n**	**ɲ**	**ŋ**	
Fricative		s			h
Approximant	w	**ɹ**			

The boldfaced symbols in Table 1 form the subset of Kĩsêdjê consonant phonemes that are permitted in coda position and, thus, susceptible to being involved in the type of vowel epenthesis analyzed here. Furthermore, as has been noted by Nonato (2014), Kĩsêdjê disallows complex codas. It was observed above that utterance-final epenthesis targets stems that end in a consonant and that some consonants can *block* echo epenthesis. Consequently, blocking in Kĩsêdjê will always be the effect of single consonants.

Kĩsêdjê has a fairly large vowel inventory that includes contrastive nasal vowels. The sets of oral and nasal phonemes, also based on Nonato (2014)'s analysis, are given in Tables 2 and 3, respectively.

Table 2: Kĩsêdjê oral vowels

	Front	Central	Back
High	i	ɨ	u
Mid-high	e	ɘ	o
Mid-low	ɛ	ɜ	ɔ
Low		a	

Table 3: Kĩsêdjê nasal vowels

	Front	Central	Back
High	ĩ	ɨ̃	ũ
Mid	ɛ̃	ɘ̃	ɔ̃
Low		ã	

Importantly, despite the fact that nasal vowels are highly frequent in the Kĩsêdjê lexicon, tautosyllabic ṼC sequences are not attested: nasal vowels form nuclei in closed syllables only if the coda is a nasal. In turn, oral vowels form nuclei in syllables with both oral or nasal codas, as shown in (6) and (7).

[9] The phonemic analyses are taken from Nonato (2014), and differ to some extent from earlier accounts (Foresti 2005; Guedes 1993; Santos 1997), but they do so minimally and in a way that should not matter for present purposes.

(6) **Oral nucleus, oral coda**

a. [rɔp] ‘jaguar’

b. [ɲjɜt] ‘potato’

c. [hɾek] ‘grow’

(7) **Oral nucleus, nasal coda**

a. [h^{w}ɨsɨsom] ‘mosquito’

b. [mbɛn] ‘honey’

c. [ɲjun] ‘hummingbird’

This will be important to the extent that, while it is possible to see that echo epenthesis emerges in cases where stem-final V and C are either both oral or both nasal, and default epenthesis emerges when V is oral and C nasal, there is no way to know whether an echo or default vowel would be inserted if V were nasal and C oral.

3 Existing approaches to echo and default epenthesis

Earlier constraint-based analyses of echo epenthesis can be grouped under two families of approaches, which diverge on the type of relation that holds between the echoed vowel and the epenthetic vowel. One line of analysis (Gafos and Lombardi 2000; Kawahara 2004, 2007) takes echo epenthesis to be the result of autosegmental feature spreading or sharing between the echoed vowel and the epenthetic vowel. The other (Kitto and de Lacy 1999) rests on the idea that both vowels have their own featural content, but that Correspondence constraints regulate the level of similarity between them.

Both approaches provide ways to account for language-internal alternations between echo and default epenthesis. The feature spreading accounts can deal with some variety of blocking effects, that is, whether consonants that intervene between the echoed vowel and the epenthetic vowel are transparent (i.e., allow vowel echo) or opaque (i.e., block vowel echo and force default insertion). Although this notion seems particularly relevant to the Kĩsêdjê case, where nasals block echoing of oral vowels, I argue that this type of blocking is not straightforwardly handled by feature spreading. The latter approach takes those alternations to be the effect of markedness, an argument which appears not to be directly applicable to Kĩsêdjê.

3.1 Echo epenthesis by feature spreading

Feature spreading analyses of echo epenthesis (Gafos and Lombardi 2000; Kawahara 2004, 2007) take the idea, from Autosegmental Phonology, that segments are structured as hierarchies of features and feature-containing nodes dominated by a root. The following, adapted from Padgett (1995), is an example of the autosegmental representation of a segment.

This way of representing segments allows for features and nodes of features to spread from one segment to another, or, put differently, for segments to share single features or nodes of features. Feature spreading is understood to be operating under *Strict Locality* — that is, long-distance spreading obligatorily affects intervening segments — and to be obeying the *Line-Crossing Principle*: a feature or a node of features may not spread if this implies crossing the line associating the same feature or node to a higher node in the representation of an intervening segment.

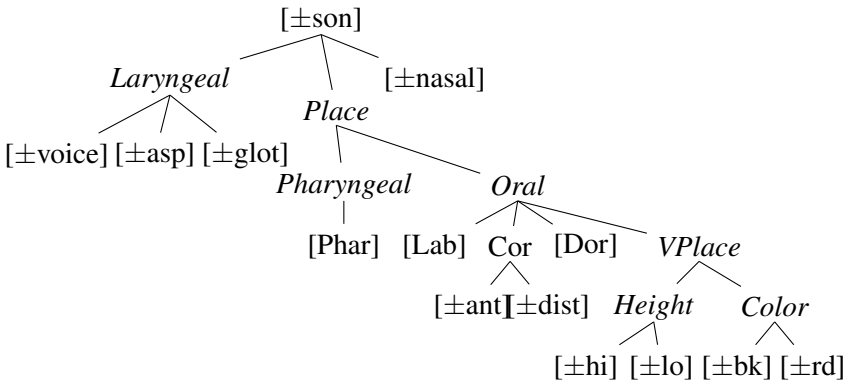

Figure 1: Autosegmental representation of a segment (Padgett 1995:398)

For both Gafos and Lombardi (2000) and Kawahara (2004, 2007), cases of echo epenthesis involve spreading of *V-Place*, the autosegmental node containing the features that are relevant to determining vowel height, backness, and roundedness, from a host location, found under the root node of a stem vowel, to the target epenthetic location, which has no V-Place specifications of its own. Given Strict Locality, V-Place attaches to the root node of any intervening consonants, in addition to that of the target. Figure 2 below, taken from Kawahara (2007), illustrates the general feature spreading pattern thought to underlie cases of vowels being echoed across some consonant. *Rt* stands for the root node, and *C-Place* for a bundle of features that is specific to consonants.

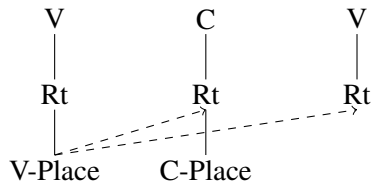

Figure 2: Echo epenthesis by feature spreading (Kawahara 2007:21)

Feature spreading approaches have been shown to be able to deal with blocking of echo epenthesis by intervening consonants of certain *places of articulation*. In OT terms, a consonant blocks vowel echo when there is a high-ranking constraint that penalizes V-Place spreading to this consonant because of its place of articulation. By Strict Locality, if V-Place is disallowed to spread to the consonant found between the host and the epenthetic locations, then it cannot spread to the epenthetic location either. When this happens, a default vowel, assumed to have its own V-Place node, is inserted.

In Japanese, for example, loanwords that end in a consonant surface with an echo vowel when this consonant is laryngeal, but non-laryngeals block echo and trigger the insertion of default [ɯ]:

(8) **Japanese epenthesis in loanwords** (Kawahara 2007:4)

a. /bax/ → [bahh**a**] 'Bach' — Echo after laryngeals

b. /bʌs/ → [bas**ɯ**] 'bus' — Default after non-laryngeals

Kawahara (2007) proposes that echo epenthesis is the work of a constraint that favors words with minimized numbers of V-Place nodes. Hence, if [bahha] surfaces, rather than [bahhɯ], it is because a single V-Place node is necessary to realize the former, but two are necessary to realize the latter. However, this constraint is dominated by another constraint that penalizes forms in which V-Place spreads to non-laryngeal consonants. If [basɯ] surfaces, rather than [basa], it is because the former form requires V-Place to be attached, problematically, to non-laryngeal [s].

This type of account, however, may not be straightforwardly extended to the Kĩsêdjê case. While in Gafos and Lombardi (2000) and Kawahara (2004, 2007) place intervention is identified as being responsible for default epenthesis, place of articulation seems to play no role in blocking echo epenthesis in Kĩsêdjê. Echo epenthesis is observed across consonants of all the places of articulation that are attested in coda position:

(9) **Echo epenthesis across all places of articulation**

a.	[t^{h}ɛp] ∼ [t^{h}ɛwɛ] 'fish'	Labial intervener
b.	[wit] ∼ [wir**i**] 'only'	Coronal intervener
c.	[hɾek] ∼ [hɾek**e**] 'grow'	Dorsal intervener

Rather than place of articulation, *nasality* is the feature that crucially makes an intervening consonant transparent or opaque to vowel echo. Specifically, the presence of a feature [+nasal] on the stem-final consonant makes this consonant opaque to echoing of vowels specified as [–nasal] and forces the insertion of a default vowel. However, there is no obvious reason why different nasal specifications on the vowel and the consonant should block the V-Place node associated with the vowel from spreading. Assuming that the feature [nasal] attaches directly under the root node, following McCarthy (1988) and Padgett (1995), among others, the V-Place node should be able to spread independently. It could be claimed that, in Kĩsêdjê, V-Place and [nasal] form a node, and that it is this node that spreads when echo epenthesis occurs. In this case, nasal blocking and default vowel insertion would be due to a simple Line-Crossing Principle violation: the attempt to spread a node that contains [–nasal] across an intervening [+nasal] consonant would directly violate the Line-Crossing Principle. However, this would be a radical departure from standard views on the position of [nasal] in autosegmental representations. Given the lack of crosslinguistic or Kĩsêdjê-internal evidence for this idea, this is a step I am unwilling to take.[10]

In sum, despite the fact that nasality is responsible for allowing or blocking vowel echo in Kĩsêdjê, autosegmental configurations, on which feature spreading approaches to echo epenthesis are based, do not straightforwardly allow for consonants with particular [nasal] specifications to block V-Place spreading. Thus, I take it to be unlikely that the mechanism at play in cases of echo epenthesis in Kĩsêdjê is feature spreading.

3.2 Echo epenthesis by Correspondence

A second constraint-based approach to echo epenthesis relies on the idea that the relation between the echoed vowel and the epenthetic vowel is one of Correspondence. Under this view, introduced

[10] The alternative proposal that failure to echo is the work of an ad hoc constraint that penalizes V-Place spreading to consonants specified as [+nasal] would be both unmotivated and inadequate, given that echo epenthesis *is* possible across nasal consonants when the echoed vowel is itself nasal.

in Kitto and de Lacy (1999), Correspondence between the epenthetic vowel (E) and a base (B) is established with a constraint BE-CORR:

(10) **BE-CORR** (Kitto and de Lacy 1999:192)
"E must correspond to something."

This constraint penalizes epenthetic segments that have no output correspondent.

The level of similarity between the echoed vowel and the epenthetic vowel is regulated by a set of Identity constraints that evaluate faithfulness between the two corresponding segments in the output:

(11) **BE-IDENT-F** (Kitto and de Lacy 1999:183)
"E and its Base have identical values for feature F."

In this sense, the relation between the epenthetic vowel and the base is analogous to the Base-Reduplicant relation that has been posited to hold in reduplication.

Working with the assumption that when a phonological system makes use of a default epenthetic vowel, this vowel is the least marked vowel in that system, Kitto and de Lacy (1999) propose a way to account for languages in which there are alternations between echo and default epenthesis. In such languages, inserting an echo vowel or a default vowel is determined by whether the alternative strategy *would create marked structures*. In Cook Islands Maori (CIM), the default epenthetic vowel is [i]. It is used, for instance, to create open syllables at the end of consonant-final loanwords:

(12) **Default [i] insertion in CIM** (Kitto and de Lacy 1999:6)
a. [kara:t**i**] 'carrot'
b. [menet**i**] 'minute'
c. [naeron**i**] 'nylon'

In turn, echo vowels are epenthesized after [r]-final words to avoid the creation of [ri] structures, which are marked in CIM, as in (13).

(13) **Echo epenthesis in CIM** (Kitto and de Lacy 1999:6)
a. [ʔa:mar**a**] 'hammer'
b. [vu:r**u**] 'wool'
c. [po:r**o**] 'ball'

In cases where the epenthesized word ends in [ir], the epenthesized vowel is [a] (e.g., [pir**a**] 'bill') because inserting an echo vowel would create another intolerable [ri] sequence.

Hence, in CIM, echo vowels are used as an alternative to the insertion of default [i] to avoid marked [ri] syllables. This suggests that the set of constraints that establish [i] as the most unmarked vowel in CIM — Kitto and de Lacy (1999)'s M(V→i) constraint — dominates BE-IDENT: in most cases, it is preferable to insert unmarked [i] than to insert a more marked echo vowel. However, M(V→i) is dominated by *[ri], the constraint that penalizes [ri] sequences. As a result, when inserting [i] would create a [ri] structure, it is preferable to insert a more marked echo vowel.

Given that default epenthetic vowels are more restricted than echo vowels in Kĩsêdjê, it is perhaps reasonable to say that echoing is the elsewhere strategy, and that default epenthesis is the

special case, contrary to CIM. Kĩsêdjê default vowels, as seen in the introduction, are inserted when the stem-final VC sequence contains a nasal consonant preceded by an oral vowel. By echoing an oral vowel across a nasal consonant, the resulting word would end in a VNV sequence. Such a sequence, which contains both oral and nasal segments, is arguably more marked than uniformly oral VCV or uniformly nasal ṼNṼ. Though, however marked VNV sequences are, the insertion of a default vowel — instead of an echo vowel — also results in the creation of a VNV sequence because default epenthetic vowels in Kĩsêdjê are oral:[11]

(14) **Default epenthesis also creates VNV**

a. [mbɛn] ∼ [mbɛn**i**] 'honey'

b. [h^{w}ɨsɨsom] ∼ [h^{w}ɨsɨsom**ɨ**] 'mosquito'

c. [ɲjun] ∼ [ɲjun**i**] 'hummingbird'

Thus, the advantage of epenthesizing a default vowel after VN sequences is not clear. Consequently, there is no way of directly extending to the present case Kitto and de Lacy (1999)'s argument that, in languages that display an alternation between echo and default epenthesis, an epenthetic strategy is used where its alternative would create marked structures.

In the next section, I will nevertheless try to do so, namely by adopting a Correspondence approach to echo epenthesis in Kĩsêdjê, though I will make a more abstract use of the notion of markedness.

4 Proposal: Correspondence and nasal consistency

4.1 Accounting for cases of vowel echo in Kĩsêdjê

Adopting a Correspondence approach to echo epenthesis, cases of vowel echo in Kĩsêdjê — that is, those cases of epenthesis that involve the VC-final stems in (3) and the ṼN-final stems in (4), but not the VN-final stems in (5) — can be accounted for with a constraint ranking like the following:

(15) {BE-IDENT, BE-CORR} ≫ M(V→ɨ/i)

The ranking in (15) guarantees that whenever a vowel (E) is inserted in the output, this vowel will be required by BE-CORR to have an output correspondent (B), and by BE-IDENT to be identical to it, even if this implies that E is not the most unmarked vowel in the language. In this case, M(V→ɨ/i), the set of markedness constraints that determine that the least marked, and thus default, vowel is [ɨ] or [i] in Kĩsêdjê, will be violated. This is exemplified in tableaux (16) and (17) with the utterance-final epenthesized forms [hɾɛk**e**] 'grow' and [k^{h}ɛn**ɛ̃**] 'rock'. Constraints that force vowel epenthesis utterance-finally are implicit here, hence the absence of unepenthesized candidates.

(16) /hɹɛk/ → [hɾɛk**e**] 'grow'

/hɹɛk/	BE-IDENT	BE-CORR	M(V→ɨ/i)
a. ☞ hɾe$_1$k$_2$**e**$_1$			**
b. hɾe$_1$k$_2$**ɨ**$_3$		*W	*L
c. hɾe$_1$k$_2$**ɨ**$_1$	*W		*L

[11] At least as described in Nonato (2014). The existence of default epenthetic vowels is absent from Guedes's (1993) and Foresti's (2005) descriptions, both of which mention and exemplify cases of echo epenthesis.

(17) /k^{h}ɛ̃n/ → [k^{h}ɛ̃n**ɛ̃**] ‘rock’

/k^{h}ɛ̃n/	BE-IDENT	BE-CORR	M(V→ɨ/i)
a. ☞ k^{h}ɛ̃$_1$n$_2$**ɛ̃**$_1$			**
b. k^{h}ɛ̃$_1$n$_2$**i**$_3$		*W	*L
c. k^{h}ɛ̃$_1$n$_2$**i**$_1$	*W		*L

In both tableaux, candidate (a) contains an epenthetic vowel that corresponds to the preceding vowel (Correspondence being formally represented by coindexation) and is identical to it. Because the constraints that favor such a configuration are high-ranked, candidate (a) wins over candidate (b), in which the epenthetic vowel lacks a correspondent, and candidate (c), in which the epenthetic vowel fails to featurally match its correspondent, despite the fact that both candidate (b) and candidate (c) are favored over candidate (a) by M(V→ɨ/i), which is low-ranked.

4.2 Nasal consistency between correspondents

In order to account for the alternation between echo and default epenthesis in Kĩsêdjê, and indeed to answer the question why oral vowels may not be echoed across nasals, something needs to be added to the system. I now assume that all cases of echo epenthesis involve the existence of a Correspondence relation between the epenthesized vowel and a base, and I propose that there exist linearly-defined BE constraints that penalize BE pairs in which the Correspondence relation between B and E is disrupted by featurally inconsistent intervening material. Such constraints have the following form:

(18) **BE-CONSISTENCY$_F$**
Assign one violation mark for each BE pair such that X intervenes between B and E, if B and E are both specified as [αF] and X is specified as [βF], where F is some feature.

In the case at hand, because the choice between echo and default epenthesis in Kĩsêdjê is determined by the nasal specifications of stem-final V and C, the relevant BE-CONSISTENCY constraint is BE-CONSISTENCY-[NASAL], defined as follows:

(19) **BE-CONSISTENCY[nasal]** (henceforth BE-CONSIST[nas])
Assign one violation mark for each BE pair such that X intervenes between B and E, if B and E are both specified as [αnasal] and X is specified as [βnasal].

This constraint, then, is satisfied by two nasal configurations only, which encompass all cases where echo epenthesis is observed in Kĩsêdjê:

1. All of B, X and E are [–nasal]. In Kĩsêdjê, this corresponds to the cases exemplified in (3), e.g. [t^{h}ɛ$_1$w$_2$**ɛ**$_1$] ‘fish’.[12]

2. All of B, X and E are [+nasal]. In Kĩsêdjê, this corresponds to the cases in (4), e.g., [k^{h}ɛ̃$_1$n$_2$**ɛ̃**$_1$] ‘rock’.

[12] The analysis presented here is not couched in Autosegmental Phonology, but I represent the relevant nasal configurations autosegmentally for illustrative purposes.

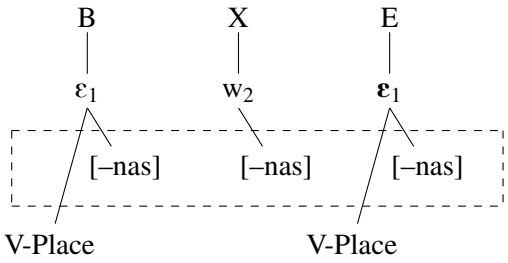

Figure 3: Satisfaction of nasal consistency between oral B and E

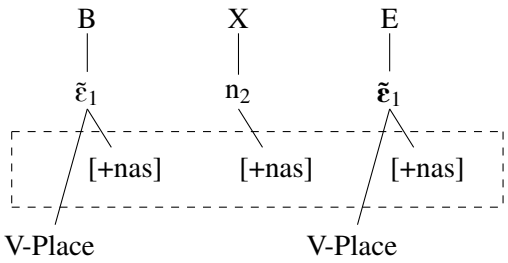

Figure 4: Satisfaction of nasal consistency between nasal B and E

In turn, forms that require default epenthesis in Kĩsêdjê are those that *would* violate BE-CONSIST[nas] if an echo vowel was instead inserted. Take for instance the unepenthesized word [ɲjun] 'hummingbird'. If its epenthesized counterpart were [ɲju$_1$n$_2$**u**$_1$], which contains an echo vowel in a Correspondence relation with the preceding base, this form would incur a violation of the nasal consistency constraint, because the two corresponding oral vowels would be separated by a nasal consonant, as shown in Figure (5).

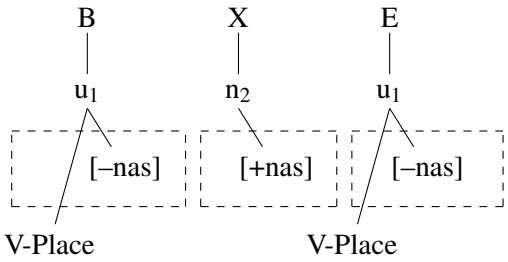

Figure 5: Violation of nasal consistency between nasal B and E

Note that BE-CONSIST[nas] would also be violated in cases of echo epenthesis where two corresponding nasal vowels are separated by an oral consonant ($\tilde{V}_1C_2\tilde{V}_1$). However, as noted above, tautosyllabic $\tilde{V}C$ sequences are unattested in Kĩsêdjê, such that there exist no stems for which the question of whether echo or default epenthesis would be observed is relevant.

In the next section, I look at the interaction between the nasal consistency constraint and the Correspondence-based system I began to develop in Section 4.1.

4.3 Default epenthesis by lack of Correspondence

Under a Correspondence approach to echo epenthesis, and adopting BE-CONSIST[nas], the alternation between echo and default epenthesis receives a straightforward explanation: on the one hand, configurations that emerge through echo epenthesis always satisfy BE-CORR, BE-IDENT, and BE-CONSIST[nas]. Those configurations often contain marked vowels, but since M(V→i̍/i) ranks lower than any of the BE constraints, they remain more harmonic than configurations that contain an unmarked default epenthetic vowel.

I propose that, on the other hand, default epenthesis in Kĩsêdjê is resorted to in order to avoid violations of BE-CONSIST[nas]. Under this view, default epenthetic vowels are characterized by their lack of output correspondents.[13] Structures that result from default epenthesis thus violate BE-CORR, but they vacuously satisfy BE-IDENT, and, crucially, BE-CONSIST[nas], since they contain no BE pair to apply these constraints to.

The use of a default epenthetic vowel when the epenthetic location is preceded by a VN sequence is predicted if BE-CONSIST[nas] dominates BE-CORR, since, in this case, candidates in which the epenthetic vowel has no output correspondent are more harmonic than those that violate the nasal consistency requirement. The ranking proposed is illustrated in the following tableau, which examines the epenthesized counterpart of [hʷi̍si̍som] 'mosquito':

(20) /hʷi̍si̍som/ → [hʷi̍si̍somi̍] 'mosquito'

/hʷi̍si̍som/	IDENT(nas)	BE-CONSIST[nas]	BE-IDENT	BE-CORR	M(V→i̍/i)
a. ☞ hʷi̍si̍so$_1$m$_2$**i̍**$_3$				*	*
b. hʷi̍si̍so$_1$m$_2$**o**$_3$				*	**W
c. hʷi̍si̍so$_1$m$_2$**i̍**$_1$		*W	*W	L	*
d. hʷi̍si̍so$_1$m$_2$**o**$_1$		*W		L	**W
e. hʷi̍si̍so$_1$b$_2$**o**$_1$	*W			L	**W
f. hʷi̍si̍sõ$_1$m$_2$**õ**$_1$	*W			L	**W

In the tableau above, the default epenthesis candidate (a) wins over the echo epenthesis candidate (d) because only the latter violates high-ranking BE-CONSIST[nas]. Candidate (c) satisfies BE-CORR, but it loses to candidate (a) because, like candidate (d), it fails to satisfy high-ranking BE-CONSIST[nas]. Candidate (b) looks like candidate (d) on the surface, but its epenthetic vowel has no output correspondent, so it loses to candidate (a) because the epenthetic vowel is not the most unmarked. The inclusion of high-ranking IDENT(nas) in the tableau, which penalizes nasality mismatches between input and output forms, simply eliminates echo epenthesis candidates that satisfy BE-CONSIST[nas] by changing the nasality value of either the stem-final consonant (e) or vowel (f).

The addition of BE-CONSIST[nas] to the system still allows it to account for cases where an echo vowel is inserted, like those examined in (16-17), since echo epenthesis always satisfies this constraint in Kĩsêdjê.

[13] I am thus indirectly arguing against the idea, assumed in, e.g., Stanton and Zukoff (2018), that epenthetic vowels (echo and default) *always* correspond to a neighboring base.

5 Conclusion

The present paper aimed to understand the alternation between utterance-final echo and default epenthetic vowels in Kĩsêdjê. It was seen that earlier approaches to echo epenthesis — feature spreading and Correspondence approaches — are not well equipped to account for the generalization that stem-final nasal consonants do not allow echoing of oral vowels (though they do of nasal vowels) and force the insertion of a default epenthetic vowel.

I proposed that whenever an echo epenthetic vowel is found in Kĩsêdjê, it and the echoed stem vowel (or base) stand in a Correspondence relation (by BE-CORR), and therefore are forced to be identical (by BE-IDENT), as in Kitto and de Lacy (1999). These are the cases of echo epenthesis.

I further claimed that there exist a class of featurally relativized constraints, which I called BE-CONSISTENCYF, that are satisfied only if the relation between corresponding segments is not linearly disrupted by intervening material that is inconsistent for some feature F.

In Kĩsêdjê, because of high-ranking BE-CONSISTENCY[nasal], no Correspondence relation can be established between the epenthetic vowel and an oral stem vowel if the intervening consonant is nasal. When the epenthetic vowel has no output correspondent to featurally agree with, it surfaces as the least marked vowel in the language, [i] or [ɨ] in the case at hand. These are the cases of default epenthesis.

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