Phonotactic Reduplication and the Ende Mora

Kate L. Lindsey *Stanford University*

1 Introduction There is a phonotactic restriction in Ende, a Pahoturi River language of Papua New Guinea, that all verbs must be multimoraic or multimorphemic. Any verb that would paradigmatically result in a monomoraic, monomorphemic form is reduplicated. This talk is based on an original dataset of 424 verbs, introduces a new function of reduplication as a phonotactic repair, and justifies the need for the abstract concept of a mora in Ende phonology.

2 Data Ende verbs must be multimorphemic or multimoraic (henceforth *binary*), in which a mora is defined as a non-epenthetic vowel. This is a phonotactic constraint on minimal word length. Of 809 infinitival verb forms, 798 (98.6%) are binary. Nearly one quarter of the forms (191) have repeated phonological material, commonly called *reduplication* or *phonological doubling* (Inkelas 2014). Of those forms, 187 (97.9%) would be monomorphemic and monomoraic, if not for the copied material. This nearly universal pattern compels an analysis, in which reduplication repairs violations of minimal verb length.

Two classes of infinitival roots are represented below. In class A, nonplural roots are marked with a suffix while plurals are unmarked. Plural infinitival forms reduplicate if monomoraic or take the plural suffix *-nen*. In class B, nonplural roots are unmarked but infinitival plurals are obligatorily marked with *-nen*. In both classes, unmarked (monomorphemic) infinitival forms are subject to reduplication if their inflected root is monomoraic, (e.g., *ga~ge* and *ug~ug*), but not if it is multimoraic (e.g., *koɽwa* and *imonz*). Marked (multimorphemic) infinitival forms are never subject to reduplication, even if monomoraic (e.g., *ga-ɲ*).

	Gloss	Inflected nonplural	Inflected plural	Infinitive nonplural	Infinitive plural	Class[1]
1.	'plant'	-ga-ɲ	-ga	ga-ɲ	**ga~ge**/ga-nen	A (20)
2.	'hang on branch'	-kuɽwe-ɲ	-kuɽwe	koɽwa-ɲ	koɽwa-nen	A (18)
3.	'make earth oven'	-ug	-ug	**ug~ug**	ug-nen	B (159)
4.	'touch'	-imunz	-imunz	imonz	imonz-nen	B (44)
5.	'sit'	-dmen	-dme	dəmen	**dəma~dəme**/dəma-nen	A (32)
6.	'close'	-s	-s	**si~s**	si-nen	B (8)

Although monomoraic roots such as *ga-ɲ, ug,* and *ga*, are also monosyllabic, defining the phonotactic constraint in terms of syllable count does not capture all the data. 36 (18.8%) reduplicated forms have multisyllabic inflected roots. Of these, 32 (88.8%) contain an epenthetic vowel. Consider *dəmen* (5), which exhibits reduplication when plural, and no schwa when inflected. The epenthetic schwa that breaks up the otherwise illicit onset cluster *dm-* necessarily contributes a syllable. Moreover, the schwa is copied in the reduplicated form, indicating that epenthesis precedes reduplication. Because of data like these, the phonotactic constraint must be sensitive to something more abstract that distinguishes vowels by quality or weight: a mora.

Why should this repair, which has no grammatical function, be termed reduplication and not phonological doubling or epenthetic copying (cf. Inkelas 2014)? Two pieces of evidence support a morphological analysis. First, some outputs of the copying result in forms that are still monomoraic. In the nonplural form of *si~s* (6), the output is a reduplicated form of the monoconsonantal root *s* with at most one mora. To satisfy minimal verb length, *si~s* must have two morphemes, an output that reduplication provides but copying does not. Second, if the purpose of epenthetic copying were to add an extra mora, what motivates the copying of non-moraic material such as onsets and epenthetic vowels? This also comes for free in a reduplication analysis, as reduplication often requires faithfulness to the base (McCarthy & Prince 1995).

3 Analysis The data and patterns presented above can be modeled using Base-Reduplicant Correspondence Theory (McCarthy & Prince 1995), which assumes that each input is of the form RED(uplicant)-base, and outputs are generated based on a language-specific ranking of universal faithfulness and markedness constraints (Optimality Theory; Prince & Smolensky 2004).[2]
By ranking the four constraints BINARITY-VERB (a phonotactic constraint that penalizes monosyllabic, monomorphemic outputs), BR-MAX (a faithfulness constraint that penalizes outputs in which the reduplicant does not contain all the segments of the base), *RED (a morphological markedness constraint that penalizes reduplication), and DEP (a faithfulness constraint that penalizes adding segments) in the order shown in the OT tableau below,[3] reduplicated outputs are optimal in cases where the base is monomoraic and monomorphemic (e.g., RED-ug), but non-reduplicated outputs are optimal in cases where the base is multimoraic or multimorphemic (e.g., RED-imonz). This is because *RED is ranked above BR-MAX. Moreover, because DEP is ranked above *RED, the reduplicative repair (b) is more optimal than an epenthetic repair (d).

RED-ug		BINARITY-VERB	DEP	*RED	BR-MAX
	a. ug	* (W)		(L)	* (W)
☞	b. ug~ug			*	
	c. u~ug			*	* (W)
	d. uga		* (W)	(L)	
RED-imonz		BINARITY-VERB	DEP	*RED	BR-MAX
☞	e. imonz				*
	f. imonz~imonz			* (W)	(L)

4 Discussion The data above show that Ende verb roots have a minimal size restriction of two mora or two morphemes and that phonotactic reduplication serves as a repair for this constraint. While minimal word constraints are known to be sensitive to phonology, such as syllables and mora, it is much rarer for such a constraint to be sensitive to morpheme counts as well. Since repairs to phonologically-sensitive phonotactic constraints are typically phonological in nature (epenthesis, lengthening, etc.), it is not surprising that a morphologically-sensitive phonotactic constraint may co-occur with a morphological repair like reduplication.
It is uncommon for morphological reduplication to lack co-indexation with a grammatical meaning such as 'plural'. In the handful of examples where reduplication indeed seems to be for minimal size reasons, e.g., in Kinande (Mutaka & Hyman 1990) or Bantu (Inkelas 2014), the reduplicant is still lexically or grammatically triggered. However, the Ende pattern also does not seem at home in the category of *phonological* or *prosodic reduplication*, which is often optional (e.g., Tarahumara 'expletive' reduplication; Hurch 2002). Instead, Ende phonotactic reduplication shows a more general use of reduplication by applying the reduplicative prefix not to a semantic category (e.g., 'plural'), but to a class of words (i.e., verbs).

Endnotes [1]Numbers in parentheses represent the number of verbs with this pattern in the dataset. [2]This analysis covers full reduplication. Additional constraints and processes are necessary to explain partial reduplication and vowel changes. These are not contraindicated by this analysis but are outside the domain of this talk. [3](*) = penalty, (W) cells favor the winner, (L) cells favor a loser. Dashed vertical lines indicate an unordered ranking.

References Hurch, B. 2002. Die sogenannte expletive Reduplikation im Tarahumara. Plädoyer für einen verpönten Begriff: Euponie. **Inkelas, S.** 2014. *The Interplay of Morphology and Phonology*. OUP. **McCarthy, J & A Prince.** 1995. Faithfulness and reduplicative identity. In *University of Massachusetts occasional papers in linguistics* 18: Papers in OT, 249-384. GLSA, University of Massachusetts, Amherst. **Mutaka, N & L M Hyman.** 1990. Syllables and morpheme integrity in Kinande reduplication. *Phonology* 7(1), 73-119. **Prince, A & P Smolensky.** 2004. *Optimality Theory: Constraint interaction in generative grammar*. Blackwell Publishing, Malden, Massachusetts.