GHOST ELEMENTS IN ENDE PHONOLOGY

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Abstract

Ghosts are phonological elements, whether consonants, vowels, features, or moras, that surface or delete in phonologically predictable contexts. This alternation with zero means that ghosts are sometimes visible and sometimes hidden. However, the quality or underlying distribution of these elements is idiosyncratic or unpredictable, which differentiates these elements from canonical epenthetic or syncopic elements. This dissertation provides an analysis for and an explanation of a critical behavioral property of ghost elements, namely the default realizational state of ghost elements in their underlying form (Zimmermann, 2019). The term default realizational state refers to the observation that some ghost elements surface by default, while others delete by default. Ghost elements that are typically absent, but appear under markedness pressure, are called hero ghosts, while those that are usually present, but disappear under markedness pressure, are called martyr ghosts.

Some phonological systems have ghost element patterns of both types, where one ghost element is typically absent, and another is typically present. This pattern is evident in the phonological systems of languages like Yowlumne (formerly Yawelmani; Zimmermann, 2019), a Yokutsan language of central California, and Ende, a Pahoturi River language of Papua New Guinea.

In Yowlumne, an example of a martyr ghost is a ghost consonant pattern, in which some suffixal consonants are present by default but disappear if they would cause complex codas. An example of a hero ghost in Yowlumne is a ghost vowel pattern, in which certain suffixal vowels, such as the /i/ in the precative suffix, only surface to repair a complex coda, but otherwise fail to surface by default. These two ghost elements are not only distinguishable by their realizational behavior, but also by their subsegmental specification: Yowlumne ghost consonants are specified for their melodic features while Yowlumne ghost vowels are specified for their skeletal features.

A very similar pattern occurs in Ende. In Ende, an example of a martyr ghost is the floating nasal pattern: lexically specified nasal segments that float through words to precede the leftmost non-initial obstruent but disappear if a such an obstruent is not available. An example of a hero ghost in Ende is infinitival theme vowels that appear in a class of infinitival verb forms and trigger reduplication, but only if the infinitival verb roots

are monosyllabic. Again, the martyr ghost pattern involves ghost elements specified only for melodic features, and the hero ghost pattern involves ghost elements specified only for skeletal features.

In Optimality Theory (Prince & Smolensky, 2004), ranked and violable constraints regulate the presence and absence of phonological elements in the output. If a constraint that penalizes non-realization of a phonological element is ranked higher than a constraint that penalizes realization, then the optimal output will include the element in question. This constraint ranking is necessary for a ghost element that exhibits martyr-type behavior. The flipped ranking of those two faithfulness constraints generates hero-type behavior. If ghost elements are represented uniformly as subsegments (cf. Zoll, 1996/1998), then this grammar would predict only two types of phonological systems: one in which all ghost elements are martyrs and one in which all ghost elements are heroes. This theoretical typology undergenerates the empirically observed typology of phonological patterns, as exhibited by Yowlumne and Ende.

A representational distinction that splits ghost elements into two subsegmental types—those that are specified for their melodic features and those that are specified for their skeletal features—remedies this issue. This representational distinction engenders faithfulness constraints which can be ranked to indicate a language's preference to realize or not realize melodic or skeletal subsegments. This typology predicts four types of phonological systems, including Yowlumne and Ende.

This work includes analyses for both of the Ende patterns and other languages with multiple ghost elements in an Autosegmental Phonology (Goldsmith, 1976) and an Optimality Theory framework. Besides illuminating some critical behavioral characteristics of ghost elements, these analyses also provide new data to exemplify rare linguistic phenomena. For example, Chapter 3 takes a closer look at morpheme-level phonemic features like floating nasalization (also found in Máíhɨ̃̀kì (Sylak-Glassman, Farmer, & Michael, 2014)), and Chapter 4 utilizes insights from the Dual Theory of reduplication (Inkelas, 2008) to provide another example of partial and total phonological duplication. This duplication is accounted for in an Agreement-by-Correspondence theory framework (Hansson, 2001; Rose & Walker, 2004). This work also provides the first descriptive analyses of the phonotactics, phonology, and morphology of Ende, introduces the basic typological profile of the language and the language family, and provides some basic cultural and anthropological information, including information on family structures, agriculture and subsistence, and a history of the community and the Ende language project.

To Warama Kurupel (Suwede) , Wagiba Geser, & Tonny (Tonzah) Warama,
your unwavering teaching, dedication, and care can be found on every page.

And to the Ende tribe of Limol, Malam, and Kinkin villages,
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Table of contents

List of tables

List of figures

List of glossing abbreviations

| = or
> = acting on
- = morpheme boundary
‘=‘ = clitic boundary
~ = reduplicant boundary
I, II, III, IV = refer to the four conjugation classes of verb roots
1 = first person
2 = second person
3 = third person
A = agent-like argument of a canonical transitive verb
ABL = ablative
ACC = accusative
ADV = adverb(ial)
AGT = agent nominalizer
ALL = allative
ANIM = animate
ATT = attributive
AUX = auxiliary
COM = comitative
COP = copula
DAT = dative
DUR = durative
ERG = ergative
EXCL = exclusive
FUT = future
HAB = habitual
INCL = inclusive
INF = infinitive
INS = instrumental
INT = interrogative
IRR = irrealis
LOC = locative
NMLZ = action nominalizer
NOM = nominative
NSG = nonsingular
OBJ = object nominalizer
P = patient-like argument of a canonical transitive verb
PERF = perfective
PERL = perlative
PL = plural
POSS = possessive
PRIV = privative
PRS = present
PST = past
REC = recent past
REFL = reflexive
REL = relativizer
REM = remote past
RES = restrictive
RT.EXT = root extension
S = single argument of a canonical intransitive verb
SG = singular
SIM = simulative
VEN = venitive
VOC = vocative

List of constraint definitions

Chapter 1: Introduction

This dissertation presents a new theory to explain the nature and behavior of ghost elements. Ghosts are an abstract representation used in theoretical phonology to describe, for example, the disappearing act of Slavic *yer* vowels such as in Polish, (1).

(1) Polish *yer* vowels (Szpyra, 1992, p. 279)

	Nominative	Genitive	Gloss
a.	*swetEr*	*swetr-a*	'sweater'
b.	*seter*	*seter-a*	'setter'
c.	*pIEs*	*ps-a*	'dog'
d.	*bies*	*bies-a*	'devil'

As can be seen by comparing the two minimally contrastive pairs, the phonetically identical front-mid vowels can be classified into two types: *yer* vowels (capitalized) are present in the nominative but absent in the genitive form (1)(a,c), while non-*yer* vowels persist in both nominative and genitive forms (1)(b,d). The differential behavior of the two types of vowels is regulated by a distinction in representation in Szpyra's analysis. In contrast to non-*yer* vowels, which are represented as fully present in the underlying form, *yer* vowels are often represented as only partially present or partially specified in the input. This partial presence explains their increased vulnerability to deletion in the genitive form.

The term ghost element has been used to distinguish phonological elements that exhibit these types of patterns. Other terms in use in the literature include: floating features, such as Chaha object labialization (McCarthy, 1983; Rose, 1994; Zoll, 1994, 1996/1998), latent segments, such as French liaison consonants (Gabriel & Meisenburg, 2009; Smolensky & Goldrick, 2016; Tranel, 1996a, 1996b), phantom consonants, such as in Basaa (Schmidt, 1994), and ghost consonants, such as those that lurk before French *h-aspiré* (Gabriel & Meisenburg, 2009) and after some Finnish nouns (Kiparsky, 2003).

Ghosts are phonological elements, whether consonants, vowels, features, or moras, that surface or delete in phonologically predictable contexts. This alternation with zero means that ghosts are sometimes visible and sometimes hidden. However, the quality or underlying distribution of these elements is idiosyncratic or unpredictable, which differentiates these elements from canonical epenthetic or syncopic elements. For example, a ghost vowel may disappear in contexts where other vowels would not, as seen in (1), or a ghost vowel may appear in a predictable phonological environment but have unpredictable vowel quality. For this reason, ghost elements must be represented in the underlying form to account for their unpredictable quality, but their representation must be deficient in some way to account for their idiosyncratic behavior. The notion of a phonological ghost expands the set of possible elements that can be posited in the input (underlying form) or output (surface form) of a phonological process. Along with fully present segments, phonological theory must now account for partially present segments (=ghosts) as input or output material for any given form.

In this thesis, I argue that a binary representational distinction between fully present segments and partially present segments is not enough to account for the range of ghost element behaviors cross-linguistically. Instead, I propose that the typology of partially present segments be expanded to include at least two abstract representations, a melodic ghost and a skeletal ghost, schematized in (2). A melodic ghost is a ghost element that is only specified for melodic features, such as vowel quality or featural specifications, while a skeletal ghost is a ghost element that is only specified for metrical features, such as a timing slot, or mora.

(2)	Binary distinction:	segment	subsegment = ghost	
	Present proposal:	segment	melodic ghost	skeletal ghost

The distinction between melodic ghosts and skeletal ghosts is necessary in order to account for the differential behavior of ghosts to be preferentially present or absent in the output form, a pattern reported by (Zimmermann, 2019). I differentiate these two types of ghosts by dividing them into martyr ghosts, which are present by default, and hero ghosts, which are absent by default.

The Polish *yer* vowels, shown in (1), are an example of a hero ghost because their default state is to be absent unless needed to resolve a phonotactic issue, like an illicit consonant cluster. An example of a martyr ghost is the floating labial feature pattern in Chaha object labialization, illustrated below in (3).

(3) Chaha object labialization (Banksira, 2013; Data adapted from McCarthy, 1983, p. 179)

	Underlying form		Surface form	Gloss
a.	//dənəg-w//[1]	→	/dənə**g**ʷ/	'hit something'
b.	//məkər-w//	→	/mə**k**ʷər/	'burn something'
c.	//qətər-w//	→	/**q**ʷətər/	'kill something'
d.	//sədəd-w//	→	/sədəd/	'chase something'

Chaha glides, like /w/, are realized as full segments word-initially and intervocalically but coalesce with labial or dorsal consonants in post-consonantal positions (3)(a). If the glide is aligned following a non-labial or -dorsal consonant in the underlying form, it may float leftwards to coalesce with the rightmost labializable consonant (3)(b,c). If there are no labial or dorsal consonants in the word, the glide will disappear (3)(d). Chaha floating labials are present by default and will only be deleted if their presence violates a phonotactic principle, such as not labializing coronal consonants. This martyr behavior, in which the floating labial feature sacrifices itself for the phonotactic integrity of the word is in direct contrast to the hero behavior of the Polish *yer* vowels, which are only realized to save phonotactic integrity by intervening in illicit consonant clusters.

The fact that Polish *yer* vowels exhibit hero behavior while Chaha floating labials exhibit martyr behavior is not an issue for the binary representational schema in (2) that only distinguishes segments from subsegments. If all ghost elements within a language have the same preferential realization status, their behavior can be analyzed singularly as subsegmental behavior. It is only when a language has two types of ghost elements, one that exhibits hero behavior and another that exhibits martyr behavior, that the need for a more specific representational distinction arises.

This is because in Optimality Theory (Prince & Smolensky, 2004), the presence (or absence) of any element in the output is regulated by a system-specific ranking of

[1] I will use the following conventions for representing linguistic data in writing. All data presented in a standard orthography will be in italics. This may or may not represent the surface phonetic form of the item. All transcriptions of the surface form written in the standard International Phonetic Alphabet will be presented in /single slashes/. These will always at the broad phonemic level. Any presentation of data at a finer-grained phonetic level will be in [brackets]. Any presentation of an underlying form that is abstracted from the surface form will be presented in //double slashes//.

faithfulness and markedness principles that constrain the set of possible outputs in the language. A phonological system with intolerance of *deletion* from the underlying form, a type of faithfulness, will evaluate outputs in which both segments and ghost elements are present as optimal. Conversely, a phonological system with intolerance of *addition* of phonological material will evaluate outputs in which ghost elements are absent from the output as optimal. This output results from the fact that realizing a partial segment as a full segment requires the addition of phonological material. If all ghost elements are represented identically (the binary analysis in (2)), then we would expect all ghost elements in that system to be governed by the same faithfulness principles. Thus, a linguistic system with differential behaviors regulated by faithfulness constraints requires a more nuanced representational system.

The nature of this new representational distinction that I will put forward is motivated by empirical data from a system in which two ghost elements exhibit opposing types of preferential realizational behavior. Ende, a Pahoturi River language spoken in southern Papua New Guinea, features complex verbal phonology including two types of ghost elements: floating nasals and infinitival theme vowels. Ende floating nasals are a type of martyr ghost while Ende infinitival theme vowels are a type of hero ghost.

A quick illustration of the two types is as follows: Ende floating nasals are characterized by the floating pattern in (4), in which you can observe how the floating nasals (bolded) are in root-initial position in the inflected form, but root-medial position in the infinitival form.

(4) Ende floating nasals (data collected and archived by Lindsey, 2015)

	Inflected form	Infinitival form
a.	*go**ng**käbagän*[2]	*kä**m**bag e*
	/go-**ŋ**kəba-g-ən/[3]	/kə**m**ba-g=e/
	REM-dive-III.NPL-3SGS[4]	dive-III.NPL=ALL
	‘He dived.’	‘to dive’
b.	*dä**ng**gugän*	*gu**ng**g e*
	/d-ə-**ŋ**gu-g-ən/	/gu-**ŋ**g=e/
	REM-3NDUP-disturb.bees-III.NPL-3SGA	disturb.bees-III.NPL=ALL
	‘He disturbed a beehive.’	‘to disturb bees’

Let’s take a closer look at example (4)a. The inflected form contains an inflectional prefix /go-/, a lexical verb stem //kəba-Ng//, and an inflectional suffix /-ən/. The infinitival form contains the same lexical verb stem //kəba-Ng//, and the allative case clitic /=e/. Notice how what is represented as an //N// in the underlying form is realized on the surface as an /ŋ/ in stem-initial position of the inflected form and as an /m/ in stem-medial position of the infinitival form. This nasal element is not fixed in position within the lexical stem, nor is it fixed in place of articulation. Rather, it floats to the leftmost non-initial, preobstruental position in the word and assimilates with that obstruent in place.

Not all nasals exhibit this property, however. Consider the root-initial nasals (bolded) in (5), which do not shift to root-medial position in their infinitival forms.

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[2] The Ende orthography was developed by the Ende Language Project, namely Ende speakers Warama Kurupel (Suwede) and Tonny (Tonzah) Warama in collaboration with the Lewada Bible Translation Center. Many graphemes represent their homologous counterparts in the International Phonetic Alphabet, but non-transparent graphemes may be converted as follows: <ä> /ə/, <ɨ> /ɪ/, <dd> /ɖʐ/, <ll> /ɽ/, <ng> /ŋ/, <ny> /ɲ/, <tt> /ʈʂ/, <y> /j/. The grapheme <e> represents both the phoneme /e/ and post-vocalic /j/.

[3] Ende examples include an orthographic form (italicized), a phonemic form (in /slashes/), an underlying form (in //double slashes//), a gloss using the Leipzig Glossing Rules (Comrie, Haspelmath, & Bickel, 2015), and/or a free translation (in ‘single quotes’).

[4] See *List of glossing abbreviations* on page xix for abbreviation definitions.

(5)	Inflected form	Infinitival form
a.	*go**m**ättän*	***m**ättmätt e*
	/go-**m**ət͡ʂ-ən/	/**m**ət͡ʂmət͡ʂ=e/
	REM-wear-3SGS	wear.NPL=ALL
	'He wore.'	'to wear'
b.	*dä**ng**äsmällän*	***ng**äsmäll e*
	/də-**ŋ**əsməɽ-ən/	/**ŋ**əsməɽ=e/
	REM-return.PL-3SGS	return.PL=ALL
	'They returned.'	'to return'

Two essential properties of floating nasals are that they do not occur in word-initial position and that they must precede an obstruent, *i.e.*, a voiced or voiceless fricative or stop. If a word with a floating nasal does not have a non-word-initial obstruent, the floating nasal will fail to appear, as shown in the infinitival form in (6).

(6) *Disappearing nature of floating nasals in Ende verbs (data from Ende verb corpus)*

Inflected form	Infinitival form
*go**n**zämenyän*	*zämeny e*
/go-**n**zə-meɲ-ən/	/zə-meɲ=e/
REM-be.in.heaps-III.PL-3SGS	be.in.heaps-III.PL=ALL
'They were in heaps.'	'to be in heaps'

Examples (4)-(6) show that Ende floating nasals are present by default but disappear when their presence would cause a phonotactic violation, like a word-initial nasal-stop cluster. This qualifies Ende floating nasals as a type of martyr ghost.

Conversely, a different phonological element in Ende, infinitival theme vowels, display hero ghost behavior. As will be motivated in §4.2, infinitival verbs are formed via affixation to a verb root of four possible affixes: (a) a semantically vacuous theme vowel, (b) a pluractional suffix, (c) an applicative suffix, or (d) both a pluractional and applicative suffix, exemplified in (7).

(7) *Various types of Ende infinitival verbs (data from Ende verb corpus)*

	Underlying form	Surface form	Gloss
a.	//V-məʈ͡ʂ//	*m<u>ä</u>ttmätt* /m<u>ə</u>ʈ͡ʂməʈ͡ʂ/	wear.NPL
b.	//bl-ab//	*blab* /blab/	mature-IV.NPL’[5]
c.	//ko-ng//[6]	*kongg* /koŋg/	cut-APPL.NPL
d.	//k-ən-ng//	*känängg* /kənəŋg/	take.out-II.NPL-APPL.NPL

The surface form of (7)(a) shows that the infinitival theme vowel (V in the underlying form and underlined in the surface form) not only duplicates the vowel from the root but triggers partial or full syllabic duplication as well. This duplication, however, only occurs when the root is monosyllabic; when infinitival theme vowels are affixed on multisyllabic roots, they do not duplicate any features from the root and instead disappear, like in the surface form in (8).

(8) *Non-reduplication in Ende infinitival verbs (data from Ende verb corpus)*

	Underlying form	Surface form	Gloss
a.	//V-ŋemen//	*ngämen* /ŋəmen/	reach.I.NPL
b.	//V-ŋonoj//	*ngonoe* /ŋonoj/	ask.I.NPL
c.	//V-təli//	*täli* /təli/	repeat.I.NPL
d.	//V-ærgod//	*ergod* /ergod/	crawl.I.NPL

In my analysis of Ende infinitival reduplication, I have motivated the realization of these theme vowels as a phonotactic repair in words that violate word minimality, which holds that words are optimally two syllables or longer. Epenthesis of a full vowel that is absent in the underlying form would be too costly, which is why monosyllabic forms, *e.g.*, *lla* /ɽa/ ‘man, person’, still abound in the lexicon. However, epenthesis of a partial segment to complete a ghost element in the underlying form is permitted to avoid the minimality violation. In this way, Ende infinitival theme vowels qualify as a hero ghost because they are absent by default and only present to solve a phonotactic violation, like a violation of word minimality.

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5 The roman numerals refer to one of four conjugation classes distinguished by their pluractional suffix form, see §3.2.

6 The small caps N represents a floating nasal that is unspecified for place in the underlying form, see §3.2.

Because both floating nasals and infinitival theme vowels are attested in Ende verbs, there are some infinitival verbs that exhibit both. For example, the underlying form of the infinitival form of the verb *mändmänd* /məndmənd/ 'to adopt' in (9)(a) is //V-N,məd//. It contains both an infinitival theme vowel (V) and a floating nasal (N).

(9) *Co-occurrence of Ende floating nasals and infinitival theme vowels*

	Underlying form	Surface form	Gloss
a.	//V-N,məd//	*mä̲**n**dmä**n**d* /mə̲**n**dmə**n**d/	adopt.NPL
b.	//V-N,zagaj//	*za**ng**gae* /za**ŋ**gaj/	strut.NPL

In the surface form, both the theme vowel (underlined) and the floating nasal (bolded) are realized. Note that a surface form without the floating nasals realized (*i.e.*, /mə̲dməd/) does not violate any segmental structure principles, but a surface form without the infinitival theme vowels (*i.e.*, /mə**n**d/) does violate word minimality.

In contrast, the infinitival form of the verb *zanggae* /za**ŋ**gaj/ 'to strut around' from //V-N,zagaj//, (9)(b), has only the floating nasal realized in the surface form but not the infinitival theme vowel. Both potential surface forms with and without the floating nasal (*cf*. /za**ŋ**gaj/, /zagaj/) are equivalent in that neither of them violates any phonotactic or word minimality principles, and yet the floating nasal is realized. This indicates that the grammar regulating the realization of this ghost element prefers for floating nasals to be realized, all else being equal. However, now consider the two potential surface forms with and without the infinitival theme vowel (*cf*. /za̲n-za**ŋ**gaj/, /za**ŋ**gaj/). Once more, both forms are equal in that neither of them violates phonotactic or word minimality violations. However, the infinitival theme vowel is *not* realized in the surface form. This indicates that the grammar prefers for theme vowels not to be realized, all else being equal. This kind of differential behavior would not be possible if the grammar treated all ghost elements identically, i.e., with faithfulness constraints that refer to all ghost elements as "subsegments". Instead, there must be a way for the grammar to differentiate between the different types of ghost elements, and that is facilitated by a distinction in representation in the underlying form.

Yowlumne (formerly Yawelmani) displays a similar profile in that two well-known ghost patterns exhibit contrasting behavior in their default realizational state (Zimmermann, 2019). Ghost consonants in Yowlumne are a type of martyr ghost while ghost vowels in Yowlumne are a type of hero ghost. Interestingly, these two patterns share similar representational characteristics as the Ende data. In both cases, ghosts that show martyr type behavior are only specified for melodic features, while ghosts that show hero type behavior are only specified for skeletal features. (As the factorial typology for this pattern illustrates in §5.1, this is one of four possible patterns. It just so happens that Ende and Yowlumne exhibit the same pattern.)

Consider the ghost consonant pattern, in which Yowlumne glottalization appears variously as a dependent feature, a full segment, or not at all, depending on the phonological environment, see (10). As Zoll (1996/1998, 28) explains, these suffixes in Yowlumne begin with a glottal element that is preferentially realized as a glottal feature on the rightmost post-vocalic sonorant in the word (a-b). In contrast, if the root does not contain a sonorant, the glottal element will be realized independently as a stop in its original position (c) but will not be parsed if being realized in its original position makes the form phonotactically illicit (d).

(10) *Glottalization in Yowlumne (Data from Archangeli & Pulleybank, 1994)*

	Underlying form	Surface form	Gloss	
a.	//caaw -(ʔ)aa// →	/caawˀaa/	‘shout’	
b.	//ʔelk -(ʔ)aa// →	/ʔelˀkaa/	‘sing’	
c.	//max -(ʔ)aa// →	/maxʔaa/	‘procure’	
d.	//hogn -(ʔ)aa// →	/hognaa/	‘float’	(*hognʔaa, *hognaʔ)

The glottalization feature in this pattern is a type of martyr ghost because the element is preferentially realized and only fails to surface if its presence incurs a phonotactic violation.

In comparison, consider the martyr-type pattern alongside the hero-type ghost vowel pattern in (11). Note how the final /i/ vowel in the precative marker //-mi// surfaces when the suffix is affixed to a consonant-final verb form //amic-// but does not surface when affixed to a vowel-final verb form, like //panaa-//.

(11) *-m(i) precative in Yowlumne*

(Data from Newman, 1944, p. 135; cited in Zoll, 1996/1998)

	Underlying form	Surface form	Unattested form	Gloss
a.	//amic-m(i)//	/amicmi/	*amic-m	‘having approached’
b.	//panaa-m(i)//	/panam/	*panaa-mi	‘having arrived’

If the ghost vowel in the precative suffix were not to have surfaced in the consonant-final form in (11)(a), this would have resulted in an illegal consonant cluster in the coda.

In this way, insertion of the vowel saves the otherwise illicit form. Compare this behavior with the vowel-final form in (11)(b). Whether or not the vowel surfaces in the suffix, the verb is phonotactically well-formed. This ghost vowel does not surface unnecessarily because its preferential realizational state is to be absent. This is characteristic of a hero-type of ghost element.

Recall from our earlier discussion of typological characteristics of ghost elements, that ghosts can also be split into two groups based on representational characteristics: melodic ghosts and skeletal ghosts. Interestingly, both martyr-type patterns displayed in Ende and Yowlumne involve melodic ghosts, elements that are specified for melodic features but underspecified for skeletal or structural features. Similarly, both hero-type patterns involve skeletal ghosts, elements that are specified for skeletal or structural features but underspecified for melodic features. For example, while Ende floating nasals are specified for the melodic feature of nasality, their position in the skeletal tier is entirely predictable: they precede the leftmost obstruent without being word-initial. This skeletal underspecification is in stark contrast to typical segments whose linear position in the word must be specified in the underlying form. In this way, we can qualify Ende floating nasals as a melodic ghost because the features for which they are specified are all melodic in nature, but their skeletal features are predictable. Ende infinitival theme vowels cannot be considered melodic ghosts because their underlying specifications are not melodic, but skeletal. The quality of the theme vowel is copied indiscriminately from the root vowel, suggesting a complete melodic deficiency. However, theme vowels are consistent in that they precede the root and project a syllable structure. These structural, or skeletal, qualities qualify Ende infinitival theme vowels as skeletal ghosts.

Similar facts underlie the classification of the Yowlumne ghost elements. Yowlumne glottalization is underlyingly melodic as the melodic feature of glottalization is specified, but the skeletal feature that determines whether the element is dependent upon another element or occupies an independent root node in the word is underspecified. Yowlumne ghost vowels are underlyingly skeletal: the vowel necessarily projects a syllable to host the suffixal consonant and occurs word-finally in the skeletal tier, but melodically the ghost element adopts the default vowel quality in the language, /i/. This vowel cannot be considered a true epenthetic vowel as typical epenthetic vowels are inserted before extra-metrical consonants (Archangeli, 1984).

The fact that ghosts with martyr-like behavior pattern consistently with melodic ghosts in these two languages and ghosts with hero-like behavior with skeletal ghosts means that we can use this representational distinction in the grammar to regulate the realization of melodic and skeletal ghosts as classes without having to make direct reference to the ghost element in question.

Indeed, there is nothing that indicates any apparent relationship between martyr behavior and melodic ghosts or hero behavior and skeletal ghosts. In terms of realizational patterns, this representational typology predicts four possible phonological systems: (1) in which both melodic and skeletal ghosts are realized by default (*i.e.*, martyr ghosts), (2) in which both melodic and skeletal ghosts are absent by default (*i.e.,* hero ghosts), (3) in which melodic ghosts are realized and skeletal ghosts are absent by default (as in Ende and Yowlumne), and (4) in which skeletal ghosts are realized and melodic ghosts are absent by default.

To provide a precise framework and analysis for my claim that ghost elements must have at least one representational distinction to account for phonological systems like in Ende, I will be grounding my analysis using established phonological theories of representation and grammar. In my analysis, I will follow Zoll (1998) in characterizing ghost element representation using Autosegmental Phonology (Goldsmith, 1976), which puts forth the idea that sequences of sounds in a language are not composed of a single linear sequence of segments but multiple linear sequences that can be manipulated or specified independently. Thus, if a full segment consists of both a melody (or features) and a skeleton (or root node to a timing tier), then ghost elements may be deficient along one of those tiers (being specified for only a melody or only a skeleton) triggering their deviant behavior. The grammatical processes of my analysis will be framed in Optimality Theory (Prince & Smolensky, 2004), which provides an elegant way of modeling constraint interactions, variation via the cophonology approach (Anttila, 1997b, 2002), and systematic typologies via constraint reranking.

As a case study of martyr ghosts, hero ghosts, and the interaction between the two, I will show how my theory of ghost element representation is able to account for the interaction of Ende floating nasals and infinitival reduplication by offering full analyses of both of these patterns as well. This analysis requires a formalization of the correspondence and agreement that takes place between consonants (*e.g.*, nasal assimilation), between vowels (*e.g.*, height vowel harmony), and between syllables (Surface Correspondence Percolation (Inkelas, 2008; Yu, 2003, 2004, 2005, 2007)). I will account for these patterns using Agreement-by-Correspondence Theory (Bennett, 2013; ABC; Hansson, 2001, 2010; Rose & Walker, 2004; Zuraw, 2002), as ABC has been shown to account for both consonant harmony patterns (needed for the analysis of Ende floating nasals) and phonological duplication (needed for the analysis of Ende infinitival reduplication).

The rest of this dissertation is organized as follows. Chapter 2 offers a background on the three main theories and formalisms (Autosegmental Phonology, Optimality Theory, and ABC), as they relate to the present analysis of ghost elements and summarizes the existing literature on the nature and behavior of ghost elements. Chapters 3 and 4 detail martyr ghosts and hero ghosts, respectively, and offer full analyses of Ende floating nasals and Ende infinitival reduplication. Chapter 5 focuses on the interaction of multiple ghost elements within a linguistic system and provides the factorial typology of possible linguistic systems as predicted by the analysis. This section also details the interaction of ghost elements within Ende. Finally, Chapter 6 concludes the paper and highlights further implications and directions for the study of ghost elements.

For any readers who want to know more about the linguistics, culture, and history of Ende and other languages in the South Fly area of Papua New Guinea, I invite you to dive into Appendices A, B, C, and D. I hope that the information provided there will not satisfy your curiosity, but instead inspire you to learn more about these languages and to conduct your research in this fascinating and understudied area of the world.

Chapter 2: Background

The descriptive and formal analyses in Chapters 3-5 and within the appendices require a formal framework to represent phonological elements and correspondences between those elements, and a grammar that models the selection of an optimal surface form based on an underlying representation of the elements and their correspondences.

While much contemporary work in constraint-based phonology adopts a whole-segment approach to phonological representation (Garvin, Lapierre, & Inkelas, 2018; but see work in Q-theory by Inkelas & Shih, 2016, 2017; Shih & Inkelas, 2019), earlier work in Autosegmental Phonology (Goldsmith, 1976; Leben, 1973; Sagey, 1986; and others) and Aperture Theory (Steriade, 1993, 1994) exploded the singular notion of a segment as a feature matrix into autonomous tiers that represent featural distinctions below and above the level of the segment. These subsegmental distinctions proved useful for discussing ghost elements, which had previously just been written with a special diacritic to mark them as deficient or extrametrical (Zoll, 2001, p. 47). Zoll made particular use of autosegmental representations in her extensive work on subsegmental representations, focusing particularly on the alignment of melodic ghosts (latent segments, quasi-segments, and dependent features in her terminology) in Amharic, Chaha, Inor, and Yowlumne (Zoll, 1994, 1996/1998, 2001). I will follow Zoll's lead in using an autosegmental framework for representing the underlying differences between segments and melodic ghosts (subsegments lacking a skeletal root note), but I will make a further representational distinction between melodic ghosts and skeletal ghosts (subsegments lacking melodic features). The essentials of autosegmental representations needed to follow the analyses in this paper are presented in §2.1.

I will also be implementing representational notations from the theory of Agreement-by-Correspondence (Bennett, 2013; ABC; Hansson, 2001, 2010; Rose & Walker, 2004; Zuraw, 2002). Many of the ghost elements that I will be discussing in this paper feature melodic underspecification; for example, they may be underspecified for features place of articulation, height, backness, etc. On the surface, these elements become specified for these features by agreeing with a local and similar element, for instance via processes of duplication, harmony, and assimilation. Some of these processes, like nasal place assimilation whereby floating nasals agree in place with adjacent obstruents, could be modeled using traditional approaches to spreading like autosegmental spreading rules or local AGREE constraints. However, these approaches cannot account for other types of agreement processes in the language, such as height vowel harmony which may spread through or be blocked by transparent and opaque vowels (McCarthy, 2011a). As can be seen in (12), a high vowel, such as the venitive prefix /i-/ triggers leftward spreading of the feature [+high] to mid vowels like /e/ (12)(a) and /o/ (12)(c), but is blocked by an opaque vowel /ə/, (12)(c), though it spreads through the transparent vowel //æ// (which alternately surfaces as /a/ or /e/), (12)(b).

(12)		Ablative/neutral	Venitive
	a.	*dägneg*	*d**i**gn**i**g*
		//d-ᵊ-g-neg//	//d-i-g-neg//
		/d-ə-g-neg/	/d-i-g-nig/
		REM-3NDUP-AUX-SG>PL	REM-VEN.3NDUP-AUX-SG>PL
		‘I/you (acted upon) them.’	‘I/you (acted upon) them towards here.’
	b.	*dägageyo*	*d**i**geg**i**y**u***
		//d-ᵊ-gæg-ejo//	//d-i-gæg-ejo//
		/d-ə-gag-ejo/	/d-i-geg-iyu/
		REM-3NDUP-AUX.3SGP-3NSGA	REM-VEN.3NDUP-AUX.3SGP-3NSGA
		‘They (acted upon) it.’	‘They (acted upon) it towards here.’
	c.	*dängkoenmällnegän*	*d**i**ngk**u**inmällnegän*
		//d-ᵊ-ŋkojnməɽ-neg-ən//	//d-i-ŋkojnməɽ-neg-ən//
		/d-ə-ŋkojnməɽ-neg-ən/	/d-i-ŋkujnməɽ-neg-ən/
		REM-3NDUP-follow.PLP-SG>PL-3SGA	REM-VEN.3NDUP-follow.PLP-SG>PL-3SGA
		‘S/he followed them.’	‘S/he followed them towards here.’

The basic local AGREE approach is inadequate as it has a “sour grapes” effect in its typological predictions, meaning that all agreeing elements in the word must agree for a given feature, else none of them (McCarthy, 2011a). For Ende, such an approach would only generate height spreading if all vowels in the word share the feature [+high], (12)(a), but would prohibit any height spreading if the word contained any blocking or transparent vowels.

For this reason, I will adopt Agreement-by-Correspondence, a theory of agreement that has been shown to predict both local and long-distance patterns of agreement between segmental, subsegmental, and suprasegmental elements. The essentials of ABC theory needed to follow the analyses in this paper are presented in §2.2.

Finally, I follow a long tradition of modeling complex phonological processes and variation using Optimality Theory (OT; Prince & Smolensky, 2004), a grammatical model comprised of a universal set of ranked and violable constraints that selects the optimal candidate from a generated set of all possible output candidates for any given input. The essentials of OT needed to follow the analyses in this paper are presented in §2.3.

2.1 Autosegmental Phonology and ghosts

Autosegmental Phonology (AP; Goldsmith, 1976) was developed to account for the independence of subsegments, such as features, and suprasegments, such as tone, which do not always have a one-to-one mapping with segments in the underlying or surface forms. These independent elements, called autosegments, operate independently on individual tiers and are associated with segments using association lines with root nodes. These root nodes align the bundles of melodic features with the skeletal tier, which contains structural features that determine alignment and visibility to the syllable. Simply, segments can be said to made up of features (melodic subsegments and suprasegments) and roots (skeletal features).

Zoll's doctoral work provides an analysis of what has been called floating features and latent segments in languages like Chaha, Yowlumne, and Inor. She claims that "a single underlying distinction between full segments and all subsegmental elements" is needed to differentiate full segments and subsegments. Full segments are underlyingly specified for both melodic autosegments (such as being [+round]) and skeletal autosegments (such as being visible to the syllable), while subsegmental elements are only specified for their melodic features and may or may not be associated with a segment in their underlying form (1996/1998, 8). That is, Zoll's floating features and latent segments are phonological elements that consist of a melody but lack a link to the skeletal tier. I call these types of ghost elements melodic ghosts.

Following Zoll (1996/1998), melodic subsegments can be represented as schematized in (13).

(13)

SURFACE:	FULL SEGMENT	FLOATING FEATURE/ LATENT SEGMENT
	Root |	
UNDERLYING:	features	features

By splitting the autosegmental representation of the segment into two parts, the root and features, one can imagine a ghost element of the opposite type: a skeletal ghost. This type of ghost element can be characterized by having the opposing property: underspecification for skeletal autosegments and no underlying specification for melodic autosegments, as schematized in (14).

(14)

SURFACE:	FULL SEGMENT	MELODIC GHOST	SKELETAL GHOST
	Root |		Root |
UNDERLYING:	features	features	

This schematic distinction between melodic and skeletal ghosts is not only descriptive, but the type of subsegmental deficiency (melodic or skeletal) has consequences for predicted subsegmental behavior. For example, because of their deficiency in skeletal features (such as alignment and visibility to the syllable), melodic ghosts may surface as floating or dependent features (Zoll, 1996/1998). These characteristics are called heterotropicity and dependency, respectively, where heterotropic elements are not fixed within the word, and dependent elements are not independently visible to the syllable. Zoll shows that it is the grammar that determines these behaviors, meaning that any given melodic ghost may be heterotropic or fixed, independent, or dependent, or even may vacillate between these categories depending on the phonological environment. (An illustrative example of a melodic ghost that vacillates between these attributes is Yowlumne glottalization, shown in (10).)

In order to diagnose an element as a ghost element, the element must be shown to be segmentally deficient in some way. Melodic ghosts are shown to be deficient structurally. They may be more immune to parsing faithfulness and may not receive stress, for example, if they do not project a mora. Skeletal ghosts are deficient melodically, and we would thus expect to see default melodic insertion for these elements (either via phonological copying from nearby elements or epenthesis of default features). To illustrate, consider the following examples of a melodic ghost, Ende light vowels, and a skeletal ghost, Finnish ghost consonants.

Ende light vowels, represented in (15)-(19) in superscript font, are a type of melodic ghost. They are unlike other vowels in Ende, as they exhibit less visibility to the syllable. For example, consider how the light vowels in the verb pairs in (15)-(17) surface in infinitival forms (a) but are absent in inflected forms (b). These vowels cannot be classified as epenthetic vowels because their quality cannot be predicted from their phonological environment (*cf*. (15)b and (16)b). Crucially, their behavior differs from full vowels, such as //æ// and //i// (18)-(19), which surface in both infinitival (a) and inflected forms (b).

		Orthography	Underlying form	Surface form	Gloss
(15)	a.	*källakälle*	//k^{ə}ɽæ~k^{ə}ɽæ//	/kəɽakəɽe/	‘to poison’ (I;NPL)
	b.	*daklle*	//d-a-k^{ə}ɽæ//	/dakɽe/	REM-RT.EXT-poison
(16)	a.	*kɨllakɨlle*	//k^{ɪ}ɽæ~k^{ɪ}ɽæ//	/kɪɽakɪɽe/	‘to scrape’ (I;NPL)
	b.	*daklle*	//d-a-k^{ɪ}ɽæ//	/dakɽe/	REM-RT.EXT-scrape
(17)	a.	*gonagone*	//g^{o}næ~g^{o}næ//	/gonagone/	‘to cook’ (I;NPL)
	b.	*dagne*	//d-a-g^{o}næ//	/dagne/	REM-RT.EXT-cook
(18)	a.	*pisam*	//pis-am//	/pisam/	tear-IV;NPL
	b.	*dapisam*	//d-a-pis-am//	/dapisam/	REM-RT.EXT-tear-IV;NPL
(19)	a.	*gazen*	//gæz-en//	/gazen/	remove-II;NPL
	b.	*dagezän*	//d-a-gæz-ən//	/dagezən/	REM-RT.EXT-remove-II;NPL

A melodic ghost analysis of the Ende light vowels also explains why light vowels are ignored in the process of surface //æ// realization. Ende's vowel inventory contains only one open vowel, /a/, while all other language varieties in the Pahoturi River family contain two, /a/ and /æ/. In words that can be historically reconstructed to have contained a low front vowel, this vowel is realized as /a/ when in the initial syllable of the word and /e/ when in any other syllable of the word. This pattern is especially evident in reduplicated forms, as in (20). Synchronically, this pattern is reminiscent of English ablaut reduplication in which the quality of the vowels in the base and the reduplicant are fixed (*e.g.*, *flip-flop*, *ding-dong*, *criss-cross*). However, this /a/-/e/ pattern extends beyond just reduplicated forms, such as those in (20), and is visible in any verb that historically contained a low front vowel, such as those in (21).

(20)	Historical form	Current form	Gloss
a.	*p**æ**ɲ~p**æ**ɲ	/p**a**ɲp**e**ɲ/	'to discuss' (I;NPL)
b.	*w**æ**s~w**æ**s	/w**a**sw**e**s/	'to beg' (I;NPL)
c.	*p**æ**~p**æ**	/p**a**p**e**/	'to crush' (I;NPL)
d.	*n**æ**~n**æ**	/n**a**n**e**/	'to drink' (I;NPL)
e.	*g$^{\text{ə}}$d**æ**~g$^{\text{ə}}$d**æ**	/gəd**a**gəd**e**/	'to beat' (I;NPL)

(21)	Historical form	Current form	Gloss
a.	*dət͡ʂ**æ**mənən	/dət͡ʂ**e**mənən/	'S/he finished it.'
b.	*gog**æ**zənən	/gog**e**zənən/	'It came out.'
c.	*p**æ**ɲ-n**æ**n	/p**a**ɲ-n**e**n/	'to discuss' (I;PL)
d.	*ɖ͡ʐ$^{\text{ə}}$g-n**æ**n	/ɖ͡ʐəg-n**a**n/	'to bite' (I;PL)

Proto-/æ/ is realized as /a/ when in the first syllable of the word and /e/ when in the second syllable in the word. Light vowels (represented in superscript in the historical form) are skipped in the evaluation of syllable number ((20)e, (21)d), suggesting that light vowels do not project independent syllables. (Yet another way in which light vowels differ from fully-specified or vowels is that they are also ignored in the evaluation of word minimality (see p. 89), a further indication of the skeletal deficiency.)

Next, a type of skeletal ghost element is the Finnish ghost consonant pattern in (22). Consider the behavior of Finnish final ghost consonants (represented as C), which block /e/-raising word-finally (cf. (22)a, b), block /e/-deletion before suffixes (cf. (22)c, d), and moreover, trigger gemination of the initial segment of the partitive to fill the empty skeletal slot (22)(d).

(22) Finnish ghost consonants (Data from Kiparsky, 2003)

	Underlying form	Surface form	Gloss
a.	//piene// →	/pieni/	'small'
b.	//liikkeC// →	/liike/	'movement, shop'
c.	//piene-tä// →	/pientä/	'small-part'
d.	//liikkeC-tä// →	/liikettä/	'movement, shop-part'

Unlike melodic ghosts, this Finnish skeletal ghost is visible to the syllable, in that the syllable behaves as if it is closed for purposes of general phonological processes. It also duplicates the melodic features of adjacent consonants when it surfaces. I distinguish melodic ghosts, which consist of a melody but do not attach to the skeletal tier, from skeletal ghosts, which attach to the skeletal tier but lack a melody.

The importance of this distinction is crucial for a proper analysis of Ende ghost elements, which consist of both melodic and skeletal ghosts. The concepts of autosegmental feature tiers and the root node from Autosegmental Phonology allow us to make direct reference to the behavioral distinction between these two types of ghost elements.

2.2 Agreement-by-Correspondence theory and ghosts

One characteristic that all ghost elements share, whether melodic or skeletal, is that they are underspecified in some way. The previous section classified these types of underspecification into two major classes: melodic ghosts and skeletal ghosts, which are underspecified for skeletal and melodic features, respectively. Typically, ghost elements become fully specified in the surface form,[7] either by affixing themselves as features on other elements, epenthesizing the necessary features, or duplicating melodic or skeletal features from other elements in the word. This section will motivate an approach to this type of phonological duplication using Agreement-by-Correspondence theory (ABC) as initially laid out in Rose and Walker (2004) and Hansson (2001).

Traditional methods of representing the sharing, spreading or harmonizing of a single feature across multiple segments, such as local iterative spreading rules (Anderson, 1980; Howard, 1972; C. D. Johnson, 1972; Kenstowicz & Kisseberth, 1977; and others) or a local spreading constraint (*e.g.*, local Agree; Bakovic, 2000; Eisner, 1999; Lombardi, 1995/2001, 1999; Pulleyblank, 2004) are not adequate for handling unbounded harmony systems with myopic or partial harmony (McCarthy, 2011a) or harmony systems with non-local triggers (Walker, 2014).

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[7] It is not always the case, however, that subsegments must be made segmentally whole in the output. Skeletal ghosts, like Finnish ghost consonants (Kiparsky, 2003) and Basaa phantom consonants (Schmidt, 1994) may consist of an underlying skeletal node in the input that does not get filled or deleted in the output. In the case of Finnish, the final consonant slot in a word like liike (/liikeC/) ((22)d) is not filled, but may still trigger gemination post-lexically if followed by a word beginning with /t/ (Anttila, p.c.; Kiparsky, 2003). Similarly, phantom consonants in Basaa are remnants of a skeletal template (e.g., CV.CVC) being mapped onto a subminimal melody (e.g., /so/). In this process, the extra heavy syllable is apparent in the surface form (/sóóò/) as the vowel lengthens to incorporate the additional moraic content for the second vowel and the coda. Neither of the second or third consonantal slots are realized with consonantal melodies but their presence is apparent in morphophonological processes (Schmidt, 1994).

Importantly, ABC rises to the challenge of handling long-distance consonant harmony systems (Hansson, 2001; Walker, 2000), such as Kikongo nasal harmony and Chaha laryngeal harmony (Rose & Walker, 2004). In these systems, non-adjacent consonants harmonize in features such as [+nasal] and [-voice], even though the intervening segments (such as vowels and non-participating consonants) do not undergo harmony. This skipping pattern is feasible because the theory is based on the principle that the more similar two segments are and the closer the segments are to one another, the more likely the two are to assimilate (become identical) or dissimilate (become more distinct). For this reason, researchers have also tested this theory while investigating other local and long-distance interactions (see a compiled list in Shih & Inkelas, 2014b) including vowel harmony (Bowman & Lokshin, 2014; Hansson, 2006; Rhodes, 2012; Sasa, 2009; Walker, 2009, 2015), dissimilation (Bennett, 2013), and tone assimilation (Shih & Inkelas, 2014a, 2019).

ABC has also gained traction in modeling patterns of phonological duplication, a type of reduplication (Inkelas, 2008). Thus, for the two analyses of Ende ghost elements which involve both consonant assimilation and phonological duplication, I will use this single framework to model correspondence instead of piecemealing an analysis using, for example, Agree constraints to account for harmony or Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince, 1995) to account for the phonological reduplication. Not only is the use of a single framework more elegant, but the tenets of ABC also explain why it is that agreement does not hold indiscriminately between any two phonological elements but contingently between sufficiently similar or local elements and only then between less similar or less local elements. Moreover, ABC does not require an abstract concept such as RED- to trigger phonological duplication as does BRCT. Instead, ABC uses the same principles of correspondence and agreement that account for patterns such as vowel harmony to account for phonological reduplication as well.

These principles assume a stringent hierarchy of which elements should or could be in correspondence and make two predictions. First, if two segments α and β are in correspondence and two segments α and ɣ have more phonological features in common than α and β, then α and ɣ should also be in correspondence. Similarly, if two segments α and β are in correspondence and two segments α and ɣ are more local than α and β, then α and ɣ should also be in correspondence. These predictions align with the intuition that phonological elements that are more similar to one another, that is they have more phonological features in common, are more likely to correspond.

These stringent hierarchies are rooted in Optimality Theory as two families of constraints. The first is a family of correspondence constraints, CORR-XX[αF], that assigns a violation if two segments (X) that share a feature (αF) are not in correspondence. This correspondence relation is represented visually as matching superscript numbers following a segment in an output. Thus, the two vowels in (23)(a) can be said to be in correspondence, while the two vowels in (23)(b) are not.

(23) a. /d$ə_1$ga_1/
b. /dəga/

Correspondence is a property that only holds between two elements, so correspondence between vowels in a trisyllabic word could look like (24)(a), in which vowels 1 and 2 are in correspondence, and 2 and 3 are in correspondence, or any other permutation (b-d), but a three-way correspondence is not permitted within the framework (e).

(24) a. /d$ə_1$g$a_{1,2}$g$ə_2$n/
b. /d$ə_1$ga_1gən/
c. /dəga_1g$ə_1$n/
d. /d$ə_1$gag$ə_1$n/
e. */d$ə_1$ga_1g$ə_1$n/

The second family of constraints is IDENTITY, which regulates agreement of features (F) either traditionally between corresponding elements in the input and the output (IDENT-IO[αF]) or between two corresponding elements in the output (IDENT-XX[αF]). For example, the corresponding vowels in (24)(a) would violate IDENT-XX[αHeight] twice, as neither of the corresponding pairs agrees in height. Only the output in (24)(d) satisfies this type of IDENTITY constraint. (The next section (§2.3) will illustrate these constraints in an Optimality Theory framework).

Correspondence is not restricted to relationships between segments. Recently, it has been shown to hold between subsegmental units (Garvin et al., 2018; See work on Q-theory by Inkelas & Shih, 2013, 2016, 2017) and suprasegmental units, like syllables (Inkelas, 2008; Yu, 2005) as well. When correspondence holds between syllables, the syllables are demarcated in square brackets and the subscript numerals refer to correspondence with the syllable as a whole, as shown in (25)(a).

(25) a. $[\text{kəd}]_1[\text{kəd}]_1$
b. kəd.kəd

Syllables that are in correspondence may then be accountable to IDENTITY constraints that regulate identical features between corresponding elements. For two corresponding syllables to be identical, the corresponding syllables must contain elements that are in correspondence with one another and any deviations in identity between these corresponding elements will violate the IDENTITY constraint.

Given that correspondence and, therefore, identity between any two elements in the output is theoretically possible, a stringent hierarchy of constraints is assumed in an Optimality Theoretic framework. The next section details the mechanics of Optimality Theory and how the subsegmental components assumed in AP and the lattice of correspondences assumed in ABC are regulated and optimized.

2.3 Optimality Theory and ghosts

2.3.1 The basics

Optimality Theory is a theoretical framework that models the optimal selection of a surface form from any underlying form supposed in a phonological system. (For a thorough introduction to Optimality Theory, see *e.g.*, Kager, 1999; McCarthy, 2002, 2011b.) This selection process, called EVAL, is regulated by a constraint set (CON) in the form of a strictly ranked set of universal, violable constraints. These constraints are used to decide between an infinite number of output surface forms. Outputs that violate (=*) higher-ranked constraints are removed from consideration (=!) until the candidate that violates the least egregious constraints (or no constraints at all), the optimal candidate (=☞), is the only candidate remaining (McCarthy, 2008, §2.2).

Tableau 1: Illustration of CON and EVAL

//Input//		Constraint1	Constraint2
a.	Output1	*!	
☞b.	Output2		*

The constraints in CON are universal, meaning every phonological system has every constraint in its set. The systems differ in that each has an independent ranking. Theoretically, every possible reranking of CON should be a possible language. Thus, constraints are identified and defined so that they generate typologies of known or possible languages and do not generate what we assume to be impossible languages.

There are multiple families of constraints, as alluded to in the previous section regarding CORRESPONDENCE and IDENTITY constraints, and the two most central are faithfulness constraints and markedness constraints. Faithfulness constraints regulate the presence and absence of phonological elements in the output with two primary constraints: MAX (do not delete elements from the input) and DEP (do not insert elements into the output).

(26) MAX
Assign one violation for every element in the input that does not have a correspondent in the output.

(27) DEP
Assign one violation for every element in the output that does not have a correspondent in the input.

Markedness constraints are constraints that prohibit typologically marked structure such as codas (*CODA) or consonant clusters (*CC), for example.

(28) *CODA
Assign one violation for every coda comprising at least one full segment.

(29) *CC
Assign one violation for every onset or coda comprising two segments or subsegments.

2.3.2 Regulating faithfulness of subsegments

Zoll (1996/1998) persuasively shows that faithfulness constraints, such as MAX and DEP, are sensitive to subsegmental elements. Some phonological systems, such as Yowlumne, exhibit differential faithfulness to full segments as opposed to subsegments. For example, consider how the following underlying consonant clusters (underlined) are repaired when one contains two full segments (Tableau 2), and the other contains one subsegment (Tableau 3).

*Tableau 2: //woʔy-hin// → /wo.ʔ**u**y.hin/ 'sleep (passive aorist)'*

//woʔy-hin//		MAX(SEG)	*STRUC(σ)
☞a.	/wo.ʔ**u**y.hin/		***
b.	/woy.hin/	*!	**

Tableau 3: //hogn(ʔ)aa// → /hog.naa/

//hogn(ʔ)aa//		MAX(SEG)	*STRUC(σ)	MAX(SUBSEG)
a.	/ho.gɪn.ʔaa/		***!	
☞b.	/hog.naa/		**	*

In Tableau 2, the illicit triple consonant sequence //ʔyh// is repaired via epenthesis of /u/ in the surface form, resulting in three well-formed syllables (candidate a). An alternative repair would involve the deletion of one of the consonants (candidate b). The first repair incurs more violations of the constraint *STRUC(σ), which prohibits superfluous syllables, (30), but deletion of a full syllable incurs a violation of MAX(SEG). The ranking of MAX(SEG) over *STRUC(σ) results in candidate (a) being the most optimal.

(30) *STRUC(σ)
Assign one violation for every syllable. (Zoll, 1993)

In contrast, the optimal repair in Tableau 3 is deletion, not epenthesis. This is because deletion of the melodic subsegment (in candidate b) does not violate MAX(SEG), as the melodic subsegment is not a full segment. Instead, deletion violates MAX(SUBSEG), (31), which is ranked lower than *STRUC(σ). This ranking indicates that it is more costly to increase the syllable count of the word than it is to delete the subsegment.

(31) MAX(SUBSEG)
Assign one violation for every input subsegment that does not have a correspondent in the output.

The ranking of MAX(SEG), do not delete a full segment, over MAX(SUBSEG), do not delete a subsegmental element, is expected to be a strict ranking as deletion of a full segment (roots and features) would always be more egregious than deletion of a partial segment. This line of thinking extends to DEP: DEP(SEG), do not insert a full segment, is stringently ordered above DEP(SUBSEG), do not insert a subsegment.

(32) DEP(SEG)
Assign one violation for every full segment in the output that does not have a correspondent in the input.

(33) DEP(SUBSEG)
Assign one violation for every subsegment in the output that does not have a correspondent in the input.

Ghost elements differ from full segments (fully specified in the input) and epenthetic segments (fully unspecified in the input), in that ghost elements are only partially specified in the input. For ghost elements that surface fully specified in the output, this means that whether the ghost element is realized or not realized in the surface form, both candidates will violate one of the faithfulness constraints. If the subsegment in the input does not surface in the output form, this violates MAX(SUBSEG) because some subsegmental material is present in the input but not in the output. If the subsegment is realized as a full segment in the output, this violates DEP(SUBSEG) because there is subsegmental material that is present in the output that is not present in the input. In this way, we can rank these two constraints to generate the two types of realizational behaviors. If MAX(SUBSEG) is ranked higher than DEP(SUBSEG), the ghost element will be preferentially realized, as it will be more costly to delete the subsegment than to insert the additional subsegmental material (Tableau 4). However, if DEP(SUBSEG) is ranked higher than MAX(SUBSEG), the ghost element will be preferentially deleted, as this indicates that it is more costly to insert additional subsegmental material than to delete the underlying subsegment (Tableau 5). The correct ranking for the Yowlumne ghost consonant in the suffix *–(h)nel* is that in Tableau 4, because the ghost consonant is observed in surface forms, such as *dosohnel* 'report (consequent passive adjunctive)' (Zimmermann, 2019).

Tableau 4: //doso-(h)nel// → /dosohnel/ 'report-(consequent passive adjunctive)'

//doso-(h)nel//		MAX(SUBSEG)	DEP(SUBSEG)
☞a.	/dosohnel/		*
b.	/dosonel/	*!	

Tableau 5: //doso-(h)nel// → 💣/dosonel/ 'report-(consequent passive adjunctive)'

//doso-(h)nel//		DEP(SUBSEG)	MAX(SUBSEG)
a.	/dosohnel/	*!	
💣b.	/dosonel/		*

These two constraints thus predict two types of phonological systems: one in which all ghost elements are preferentially realized and one in which all ghost elements are preferentially deleted. It cannot, however, account for a system in which some ghost elements are preferentially realized and others are preferentially deleted.

Table 1: Effect of ranking on subsegmental behavior

Ranking	Phonological system
MAX(SUBSEG) » DEP(SUBSEG)	All subsegments preferentially realized.
DEP(SUBSEG) » MAX(SUBSEG)	All subsegments preferentially deleted.
(see below)	Some subsegments preferentially realized, some deleted.

For this reason, a representational distinction must be made within types of subsegments in order to prevent the ranking paradox that results if they are treated identically. I propose a representational distinction that is both simple and intuitive within the autosegmental and Optimality Theory frameworks. The class of ghost elements can be split into two basic subsegmental types: (1) those that are primarily specified for their melodic features (*e.g.*, floating labialization, palatalization, liaison consonants, etc.) and (2) those that are primarily specified for their skeletal features (*e.g.*, floating moras, ghost consonant or vowel slots, etc.). These are called melodic ghosts and skeletal ghosts, respectively. By classifying each ghost element as a melodic ghost or a skeletal ghost, straightforward faithfulness constraints (defined in (34)-(37)), can be ranked with respect to one another to indicate a language's preference to realize or not realize melodic or skeletal subsegments.

(34) MAX(MEL)
Assign one violation for every melodic subsegment present in the input that is absent in the output.

(35) MAX(SKEL)
Assign a violation for every skeletal subsegment that is present in the input that is absent in the output.

(36) DEP(MEL)
Assign one violation for every melodic subsegment present in the output that is absent in the input.

(37) DEP(SKEL)
Assign one violation for every skeletal subsegment present in the output that is absent in the input.

The reranking of these four constraints predicts four possible phonological systems, in which: (1) all ghost elements are preferentially realized, (2) skeletal ghosts are preferentially realized and melodic ghosts are preferentially deleted, (3) melodic ghosts are preferentially realized and skeletal ghosts are preferentially deleted, and (4) all ghost elements are preferentially deleted. (For more on this typology, see §5.1.)

To illustrate how this works, let us look again at Ende light vowels (first discussed in §2.1 on p. 17). To recap, Ende light vowels are susceptible to deletion in forms where their presence is not necessary to mitigate illicit syllable structures (38)(b), unlike full vowels, which consistently surface (39).

		Orthography	Underlying form	Surface form	Gloss
(38)	a.	*källakälle*	//kᵊɽæ~kᵊɽæ//	/kəɽakəɽe/	‘to poison’ (I;NPL)
	b.	*daklle*	//d-a-kᵊɽæ//	/dakɽe/	REM-RT.EXT-poison
(39)	a.	*pisam*	//pis-am//	/pisam/	tear-IV;NPL
	b.	*dapisam*	//d-a-pis-am//	/dapisam/	REM-RT.EXT-tear-IV;NPL

Ende light vowels are specified melodically, as the quality of the vowel is unpredictable from the phonological environment, but they are structurally deficient, leading to this aberrant parsing behavior. By ranking faithfulness constraints that are sensitive to both segments and subsegments, we can model the distinctive behavior of the light vowels.

For example, if we compare the evaluations of the two inputs //dakᵊɽæ// and //dapisam// in Tableau 6 and Tableau 7, we see that deletion of the full vowel /i/ in Tableau 7 (b) violates the faithfulness constraint Max(Seg), which assigns a violation for every segment in the input that is not represented in the output. It follows that any violation of Max(Seg) also incurs at least one violation of Max(Subseg). As the light vowel in the input of Tableau 6 is not a full segment, deletion of this vowel in Tableau 6 (b) does not violate Max(Seg). However, the realization of the light vowel does violate the faithfulness constraint Dep(Skel), which assigns a violation for every skeletal subsegment in the output that is not present in the input. Because Max(Seg) is ranked higher than Dep(Skel), the full vowel is preserved in the output, but the light vowel is not.

(40) Max(Seg)
Assign one violation for every full segment in the input that is absent in the output.

Tableau 6: MAX(SEG) » DEP(SKEL), (syncopation of light vowel)

//dakᵊɽæ//		MAX(SEG)	DEP(SKEL)
a.	/dakəɽe/		*!
☞b.	/dakɽe/		

Tableau 7: MAX(SEG) » DEP(SKEL), (preservation of full vowel)

//dapisam//		MAX(SEG)	DEP(SKEL)
☞a.	/dapisam/		
b.	/dapsam/	*!	

The light vowels do appear in the infinitival form of the verb form, Tableau 8. Their appearance is because the constraint *CC, which assigns a violation for every complex onset in the output, is also ranked higher than DEP(SKEL).

*Tableau 8: *CC, MAX(SEG) » DEP(SKEL), (preservation of light vowels)*[8]

//kᵊɽækᵊɽæ//		*CC	MAX(SEG)	DEP(SKEL)
☞a.	/kəɽa.kəɽe/			**
b.	/kɽa.kɽe	*!*		

2.3.3 Regulating correspondence and identity

Now that we have seen how the OT grammar regulates basic faithfulness between inputs and outputs and distinguishes input segments, melodic subsegments, and skeletal subsegments, we can now consider how an OT framework models correspondence between phonological elements in the output. Let us consider a brief sample analysis based on Sylak-Glassman, Farmer, and Michael's (2014) analysis of Máíhɨ̀kì nasal harmony[9] to illustrate how ABC works.

In Máíhɨ̀kì, nasalization is contrastive and treated as a morpheme-level feature, that is nasal consonants and vowels are not underlying, but oral consonants and vowels may surface as nasal if they occur in [+nasal] morphemes. If a morpheme is specified as nasal,

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[8] The dashed line separating the two constraints *CC and MAX(SEG) indicates that the constraints have not yet been shown to be ranked with respect to one another.

[9] The data and analysis are solely by Sylak-Glassman, Farmer, and Michael (2014). The only minor modifications I have made are in constraint terminology for continuity within the paper.

a [+nasal] feature will surface on the leftmost voiced consonant (D; (41)), else the leftmost vowel (V) if a voiced consonant is not available (42), but never on a voiceless consonant (T). If a voiced consonant is realized as [+nasal], nasalization will spread to any following voiced consonants within the word (43). If a vowel is realized as [+nasal], nasalization will spread to adjacent vowels (44), but not adjacent consonants, and through /h/ to the following vowel (45). Morpheme boundaries also block the spread of nasality, whether triggered by a consonant or a vowel.

(41) //[NAS] TVDV// → /TVNV/
(42) //[NAS] TVTV// → /TṼTV/
(43) //[NAS] DVDV// → /NVNV/
(44) //[NAS] VV// → /ṼṼ/
(45) //[NAS] VhV// → /ṼhṼ/

The first generalization to capture in our model is that the feature of nasalization spreads through consonants if they share the feature [+voice]. This duplication is regulated via a correspondence constraint CORR-$[DD]_{\mu}$ that establishes correspondence between voiced consonants within a morpheme.

(46) CORR-$[DD]_{\mu}$
Assign one violation for each local pair of voiced, non-continuant segments within a morpheme that do not correspond.

Now, an identity constraint, IDENT-XX[αNAS] enforces agreement in nasality between any two corresponding elements.

(47) IDENT-XX[NAS]
Assign one violation for every pair of corresponding elements that do not agree in the feature [nasal].

In Tableau 9, the hypothetical input //[NAS] DVDV// is realized as /NVNV/, as this is the only candidate that does not violate these correspondence or identity constraints.

Tableau 9: Illustration of CORR-$[DD]_{\mu}$ and IDENT-XX[NAS]

//[NAS] DVDV//		CORR-$[DD]_{\mu}$	IDENT-XX[NAS]
a.	NVDV	*!	
b.	N_1VD_1V		*!
☞c.	N_1VN_1V		

CORR-[DD]$_{\mu}$ and IDENT-XX[αNAS] are not ranked with respect to one another, as they are undominated in this phonological system. Crucially, they must dominate an additional identity constraint that regulates faithfulness in identity between the input and the output in terms of nasality, IDENT-IO[NAS], because the observed candidate, candidate (c), violates this constraint twice, while the more faithful candidates only violate the constraint once, see Tableau 10.

(48) IDENT-IO[NAS]
Assign one violation for every segment in the input whose corresponding segment in the output does not agree in the feature [NAS].

Tableau 10: CORR-[DD]$_{\mu}$, IDENT-XX[NAS] » IDENT-IO[NAS]

//[NAS] DVDV//		CORR-[DD]$_{\mu}$	IDENT-XX[NAS]	IDENT-IO[NAS]
a.	NVDV	*!		*
b.	N$_1$VD$_1$V		*!	*
☞c.	N$_1$VN$_1$V			**

Finally, to ensure that the floating feature [+nasal] is not deleted, a faithfulness constraint that prohibits the deletion of melodic subsegment, which I call MAX(MEL), is ranked above IDENT-IO[NAS].

Tableau 11: MAX(MEL) » IDENT-IO[NAS]

//[NAS] DVDV//		MAX(MEL)	CORR-[DD]$_{\mu}$	IDENT-XX[NAS]	IDENT-IO[NAS]
a.	NVDV		*!		*
b.	N$_1$VD$_1$V			*!	*
☞c.	N$_1$VN$_1$V				**
d.	D$_1$VD$_1$V	*!			

Tableau 12 illustrates the surface realization of *náɲà* 'hair' from //[NAS] dád͡ʒà//.

Tableau 12: //[NAS] dád͡ʒà// → náɲà 'hair'

//[NAS] dád͡ʒà//		MAX(MEL)	CORR-[DD]$_{\mu}$	IDENT-XX[NAS]	IDENT-IO[NAS]
a.	nád͡ʒà		*!		*
b.	n$_1$ád͡ʒ$_1$à			*!	*
☞c.	n$_1$áɲ$_1$à				**
d.	d$_1$ád͡ʒ$_1$à	*!			

In contrast to nasal consonant harmony, nasal vowel harmony is strictly local. For nasalization to spread from a vowel, it must be adjacent to either another vowel or an /h/, which the authors treat as [-consonantal]. This pattern is generated using many of the same constraints that were used for the nasal consonant harmony: MAX(SUBSEG), IDENT-XX[NAS], and IDENT-IO[NAS]. However, the correspondence constraint needed to enforce correspondence only between adjacent [-consonantal] segments, CORR-S-S[-CONS] is stricter than it was for the voiced consonants, which could be anywhere in the word. A hyphen in between the two segments (S-S) indicates that the correspondence only holds between adjacent segments.

(49) CORR-S-S[-CONS]
Assign one violation for every pair of adjacent segments that share the feature [-consonantal] and do not correspond.

If this correspondence constraint is also ranked above IDENT-IO[NAS], then this ranking will generate nasal spreading through adjacent non-consonantal segments (Tableau 13) but will not spread through consonantal segments (Tableau 14). None of the elements in the outputs of Tableau 14 are in correspondence because the relevant conditions for the active correspondence constraints (*i.e.*, sequential voiced non-continuants or adjacent non-consonantal segments) are not present in any output without violating MAX.

Tableau 13: //[NAS] gúhí// → gṹh̃ĩ́ 'tooth'

//[NAS] guhi//		MAX(MEL)	CORR-S-S[-CONS]	IDENT-XX[NAS]	IDENT-IO[NAS]
a.	gṹhi		*!*		*
b.	$\text{gṹ}_1\text{h}_{1,2}\text{i}_2$			*!*	*
☞c.	$\text{gṹ}_1\text{h̃}_{1,2}\text{ĩ́}_2$				***
d.	gúhí	*!			

Tableau 14: //[NAS] tákè// → tã́kè 'monkey sp.'

//[NAS] tákè//		MAX(MEL)	CORR-S-S[-CONS]	IDENT-XX[NAS]	IDENT-IO[NAS]
☞a.	tã́kè				*
b.	tã́kẽ̀				*!*
c.	tákè	*!			

I will be using this theory of representation, correspondence, and agreement in my analysis of martyr ghosts and hero ghosts in the next two sections.

Chapter 3: Martyr ghosts

In these next two chapters, I will illustrate the two types of ghost behaviors, martyr ghosts and hero ghosts, that I introduced in §1. I will show that because they can occur simultaneously in languages like Ende and Yowlumne, we need a finer classification of ghost element types: namely, melodic ghosts and skeletal ghosts.

3.1 Description

Recall that one of the critical behavioral characteristics of ghost elements is that they alternate with zero. However, ghost elements differ with regards to their apparent default state of being present or absent. Zimmermann presented this pattern in her typology of ghost patterns in (2019) and calls these two types “disappearing ghosts” and “appearing ghosts”, respectively. In my work, I use the terms martyr ghost and hero ghost to draw the same distinction.

The behavior of martyr ghosts can be likened to syncope, a phonological process in which phonological elements delete in order to repair a markedness structure. Like syncopic elements, martyr ghosts are present by default unless they cause a problem. If there is a problem, martyr ghosts are the first to go.

One example of a martyr ghost is Ahousaht Nuu-chah-nulth suffixal consonants (E.-S. Kim, 2003; Zimmermann, 2019). These consonants are suffix-initial and only delete when following a consonant. Compare the realization of the suffixes /-(q)umł/ ‘round’ and /-(k)ła:/ ‘to be called’ when following vowel-final and consonant-final roots in (50). The ghost consonants (in parentheses) surface unless they would cause a markedness problem, such as an additional coda (cf. tł’i.suml, *tł’i$\underline{\text{s}}$.quml) or a complex coda (cf. $\text{k}^{\text{w}}$is-ła:, *k^{w}i$\underline{\text{sk}}$.ła:).

(50) Ahousaht Nuu-chah-nulth suffix consonants (E.-S. Kim, 2003; Zimmermann, 2018)

	a. /-(q)umł/ ‘round’	b. /-(k)ła:/ ‘to be called’
V_	ʔatła-qumł	ʔu-kła:
C_	tł’is-umł	$\text{k}^{\text{w}}$is-ła:

Interestingly, ghost consonants are allowed if they occupy the coda position /ʔu($\underline{\text{k}}$).ła:/, but not if they force a full segment into the coda position, */tł’i$\underline{\text{s}}$.(q)umł/. It is as if they are "less of a coda." This fact persuades Zimmermann to analyze these ghost elements as only partially realized in the output. Although Zimmermann uses Gradient Symbolic Representations (Smolensky & Goldrick, 2016) to represent this partial realization, we can also use an autosegmental framework to capture these facts. Just as Finnish ghost consonantal slots may be realized in the output with an unfilled melody, Nuu-chah-nulth suffix consonants may be realized in the output without a skeletal subsegment. Such an output violates Parse, which requires all underlying input material to be parsed into syllable structure (Tesar & Smolensky, 1998).

(51) PARSE
Assign one violation for every melodic subsegment in the output without a skeletal subsegment.

Returning to the syncopic nature of these elements, we can see that these consonants are most closely related to syncope because they are only absent if they cause a markedness issue; otherwise, they are present. Compare the output candidates (b) and (c) in Tableau 15. Neither candidate (b) nor candidate (c) violate any markedness constraints such as *CC or *CODA. Candidate (b), in which the ghost consonant is only partially realized in the output is the optimal candidate because MAX(MEL), which regulates faithfulness to melodic elements in the input is ranked higher than PARSE or DEP(SKEL). PARSE is violated if the melodic element is only partially realized (PARSE requires all segments to be fully realized in the output), while DEP(SKEL) is violated if the melodic element is fully realized in the output because a skeletal subsegment that is absent in the input is present in the output. The optimal output is one in which the melodic /k/ is only partially realized, even though it violates PARSE.

*Tableau 15: *CODA, DEP(SEG), MAX(MEL) » PARSE*

/ʔu-(k)ɬaː/		MAX(SEG)	DEP(SEG)	*CC	*CODA	MAX(MEL)	DEP(SKEL)	PARSE
a.	ʔuk.ɬaː				k!		k	
☞b.	ʔu(k).ɬaː							k
c.	ʔu.ɬaː					k!		
d.	ʔu.(k)ə.ɬaː		ə!				ə	k

The ghost element is only deleted if its presence would force a full segment into the coda (Tableau 16, a-b) or produce a complex coda (Tableau 17, a-b). The ranking of the markedness constraints (*CC, *CODA) and the segment faithfulness constraints

(MAX(SEG), DEP(SEG)) over the subsegment faithfulness constraints (MAX(MEL)) generates the observed pattern in which violating faithfulness to the subsegment is more optimal for repairing markedness than violating faithfulness to full segments (Tableau 16). Notice how the deletion of /s/ in candidate (d) violates both MAX(SEG) and MAX(MEL), while the deletion of the melodic subsegment /q/ in candidate (c) only violates MAX(MEL).

*Tableau 16: *CODA, MAX(SEG), DEP(SEG) » MAX(MEL)*

/tɬ’is-(q)umɬ/		MAX(SEG)	DEP(SEG)	*CC	*CODA	MAX(MEL)	DEP(SKEL)	PARSE
a.	tɬ’is.qumɬ			mɬ	s!mɬ		q	
b.	tɬ’is.(q)umɬ			mɬ	s!mɬ			q
☞c.	tɬ’i.sumɬ			mɬ	mɬ	q		
d.	tɬ’i.(q)umɬ	s!		mɬ	mɬ	s		q
e.	tɬ’i.sə.(q)umɬ		ə!	mɬ	mɬ		ə	q

Finally, segmental faithfulness must be ranked higher than the markedness constraints, such as *CC and *CODA, to explain why simplex and complex codas do occur in the language if fully specified in the input (Tableau 17).

*Tableau 17: *CC, MAX(SEG), DEP(SEG) » *CODA*

/kʷis-(k)ɬaː/		MAX(SEG)	DEP(SEG)	*CC	*CODA	MAX(MEL)	DEP(SKEL)	PARSE
a.	kʷisk.ɬaː			sk!	sk		k	
b.	kʷis(k).ɬaː			s(k)!	s(k)			k
☞c.	kʷis.ɬaː				s	k		
d.	kʷi(k).ɬaː	s!				s		k
e.	kʷi.sə(k).ɬaː		ə!				ə	k

To summarize, martyr ghosts are underspecified elements that are present by default but are the first to delete if their presence causes a markedness violation. Other syncopic ghost elements include Ende floating nasals (see §3.2), Chaha labialization (McCarthy, 1983; Zoll, 1996/1998), Yowlumne consonants (Zoll, 1996/1998), and the /n/ in the English indefinite determiner *a(n)* (Yang, 2004).

To illustrate how martyr ghosts and hero ghosts can coexist in the same phonological system, I will use Ende as a case study. In §3.2, I present an analysis of Ende floating nasals, a type of martyr ghost. In §4.2, I present an analysis of Ende infinitival theme vowels, a type of skeletal ghost. Finally, in §5.2, I show how these two types of ghost behaviors co-occur.

3.2 Case study: Ende floating nasals

Another example of a martyr ghost is the pattern of floating nasals in Ende, a Pahoturi River language of southern Papua New Guinea. The term floating nasals refers to the floating-like pattern observed of nasal segments that exhibit morphophonological alternations in alignment and assimilation. This alternation is salient when we compare the inflected and infinitival forms[10] of verbs specified for floating nasals (bolded in (52)). Notice how the floating nasal (bolded) in (52)(a) is root-initial and velar in the inflected form, but root-medial and labial in the infinitival form. The floating pattern results from the fact that floating nasals are never word-initial, are aligned to the left edge of the word, and always precede an obstruent.

(52) *Ende floating nasals (repeated from (4))*

	Inflected form	Infinitival form
a.	*go**ng**käbagän*	*kä**m**bag e*
	/go-**ŋ**kəbag-ən/	/kə**m**bag=e/
	REM-dive.NPL-3SGS	dive.NPL=ALL
	‘He dived.’	‘to dive’
b.	*dä**ng**gugän*	*gu**ng**g e*
	/d-ə-**ŋ**gug-ən/	/gu**ŋ**g=e/
	REM-3NDUP-disturb.bees.NPL-3SGA	disturb.bees.NPL=ALL
	‘He disturbed a beehive.’	‘to disturb bees’

Again, we can take a closer look at the surface data in (52) by considering the underlying forms. The inflected form of (52)b consists of inflectional prefixes //d-// and //ə-//, followed by the lexical verb stem //gu-Ng//, which is composed of a root and a conjugation class III suffix, and an inflectional suffix //-ən//. The infinitival form is composed of the same lexical stem //gu-Ng// and the allative case clitic //=e//. The nasal element represented as //N// in the underlying form surfaces as /ŋ/ in root-initial position in the inflected form and in stem-medial position in the infinitival form.

Floating nasals can be identified as the initial nasal segment in any homorganic nasal-obstruent sequence, *i.e.*, the /n/ in the sequence /nd/. These sequences may consist of

[10] The inflected form of a verb consists of a verb root, an obligatory inflectional prefix, and any inflectional or derivational suffixes. The infinitival form of a verb consists of the verb root and any inflectional or derivational suffixes or case clitics. For a longer description see §A.3.3 on page 80.

any three of the four phonemic nasal segments (/m/, /n/, and /ŋ/ (but not /ɲ/)) and any of the ten obstruents (/p/, /b/, /t/, /d/, /t͡ʂ/, /d͡ʐ/, /k/, /ɡ/, /s/, and /z/).[11] Morphophonological evidence supports an analysis, in which these homorganic nasal-obstruent sequences (*e.g.*, the /nd/ in *e**nd**e* /e**nd**e/ 'what, language name') are not considered phonemic monosegments (*i.e.*, not a prenasalized obstruent (/ⁿd/) or a postoralized nasal (/nᵈ/)), even though many minimal pairs have been identified (*cf. ede* /ede/ 'so'), and the sequence may have monosegmental origins. Instead, these floating nasals are best analyzed as non-linearized, morphemically-specified nasal segments that precede the leftmost, non-initial obstruent in the word. This analysis is necessary because the distribution and behavior of homorganic nasal-obstruent sequences are not compatible with a monosegmental analysis or even a typical sequential analysis.[12] This chapter provides a constraint-based analysis that accounts for the distribution and behavior of the floating nasals in Ende, which act much like floating labialization or palatalization in Chaha (McCarthy, 1983; Zoll, 1996/1998). This analysis will account for the following facts:

1. Floating nasals are nasal segments that precede and match in place with an obstruent.
2. Floating nasals are limited in occurrence to once per morpheme.
3. Floating nasals are aligned to the left edge of the word but are never word-initial. This condition is persistent, meaning floating nasals alternate in position when their host morphemes are preceded by phonological material, as shown in (53) where the /m/ preceding the /b/ in *kä**m**bmeny* /kə**m**bmeɲ/ (a) appears to float leftwards to precede and match in place with the /k/ in *go**ng**kəbmenynän* /ɡo**ŋ**kəbmeɲnən/ (b).

[11] For more information about the phoneme inventory, see §A.2 on page 130.

[12] A thorough analysis evaluating the phonetic, phonological, and morphological aspects of these sequences is presented in §A.2.1 on page 133.

(53) a.

Felix	*ngattong*	*abal*	*ine*	*kä**mb**meny*	*gongkamän.*
feliks	ŋat͡ʂoŋ	abal	ine	kə**mb-**meɲ	go-ŋkam-ən
Felix	first	very	water	dive-III.PL	REM-start-3SGS

‘Felix started to dive in the water first.’
(W. Warama, 2017a SE_PN021 #13)

b.

Felix	*ine*	*go**ngk**äbmenynän*	*ge-e.*
feliks	ine	go-**ŋk**əb-meɲ-n-ən	ge-e
Felix	water	REM-dive-III.PL-DUR-3SGS	this-VOC

‘Felix was diving and diving.’
(W. Warama, 2017b SE_SN048 #22)

The following two sections will first describe the Ende floating nasals pattern in detail and then provide a formal analysis treating the floating nasals as melodic, martyr ghosts using Autosegmental Phonology, Optimality Theory, and Agreement-by-Correspondence theories as analytical frameworks.[13]

3.2.1 Description of Ende floating nasals

Before I present the analysis, I will describe the static and dynamic phonotactic properties of floating nasals in Ende and compare them to similar alternations in languages to the west such as Idi (Pahoturi River) and Nen (Yam), and languages further afield such as Máíhɨ̃̀kì (Western Tukanoan) and Quechua (Quechuan).

The pattern of floating nasals in Ende involves a morpheme-level feature of nasalization, meaning that every morpheme in Ende can be classified as [+nasal] or [-nasal] (much like morphemes in Máíhɨ̃ki, illustrated on p. 28). An Ende word containing a [+nasal] morpheme will have a nasal segment that place-matches and precedes the leftmost non-initial obstruent in any word that contains that morpheme if such an obstruent is available. If such an obstruent is not available, the nasal segment is not realized. In the underlying form, this nasal segment can be represented as a non-linearized element [n] specified for the features [+nasal]. Only in the output will this feature be realized as a nasal segment that precedes and matches in place with an obstruent. The minimal pair in (12) represents two verbal roots that are identical, except that one is [+nasal] (a) and the other

[13] See §2 on page 11 for backgrounds to and motivation for use of these formal frameworks.

is [-nasal] (b). Notice that both roots also contain a non-floating nasal segment: the /m/ root-finally.

(54)	Infinitival	Inflected
a.	kam	na**ng**kaman[14]
	//N,k-am//	//n-a-N,k-am-an//
	/k-am/	/n-a-**ŋ**k-am-an/
	start-IV.NPL	REC-RT.EXT-start-IV.NPL-1|3SGA[15]
	‘to start’	‘I started it.’
b.	kam	nakaman
	//k-am//	//n-a-k-am-an//
	/k-am/	/n-a-k-am-an/
	cut-IV.NPL	REC-RT.EXT-cut-IV.NPL-1|3SGA
	‘to cut’	‘I cut it.’

If a word does not contain an obstruent (55)(a) or if the only obstruent in the word is word-initial position (55)(b), the nasal will fail to be realized. However, if the [+nasal] morpheme follows a morpheme that contains an obstruent (56)(a) or shifts a morpheme-initial obstruent into word-medial position (56)(b), the nasal will be realized.

(55) a. *ngonomeny*
//ŋonoj-N,meɲ// → /ŋono-meɲ/
ask-APPL.PL
‘to ask multiple people’

b. *kam*
//N, k-am// → /kam/
start-IV.NPL
‘to start’

(56) a. *ttä**ng**komeny*
//t̪͡ʂəkoj-N,meɲ// → /t̪͡ʂə**ŋ**ko-meɲ/
chop-APPL.PL
‘to chop for multiple beneficiaries’

b. *da**ng**kam*
//da-N,k-am// → /da-**ŋ**kam/
REM.SGP-start-IV.NPL
‘I started it.’

[14]Ende examples may include an orthographic form (italicized), a phonemic form (in /slashes/), an underlying form (in //double slashes//), a gloss using the Leipzig Glossing Rules (Comrie et al., 2015), and/or a free translation (in ‘single quotes’).

[15] The roman numerals refer to one of four conjugation classes distinguished by their pluractional suffix form, see §A.3.3.

Nearly all examples of homorganic nasal-obstruent sequences can be analyzed as consisting of at least one [+nasal] morpheme underlyingly. The only homorganic nasal-obstruent sequences that should not be analyzed as containing floating nasals are those in which a morpheme boundary separates the nasal and the obstruent in the sequence. For instance, the word *pampem* /pampem/ 'to fish a pond' is the nonplural infinitival form of the [-nasal] verb root √*pam*, formed via infinitival reduplication.[16]

(57) *pampem*
/pam-pem/
INF-pond.fish
'to fish a pond'

The /mp/ sequence in the infinitival form is a homorganic nasal-obstruent sequence. However, the nasal /m/ segment is not a floating nasal. If it were, we would expect to see a floating nasal appear in a homorganic nasal-obstruent sequence in other words that contain the morpheme *pam*, such as in (58).

(58) *däpem*
/d-ə-pem/
REM-3NDUP-pond.fish
'I fished a pond.'

The fact that no /m/ segment precedes the leftmost non-initial obstruent in *däpem* indicates that the word does not contain a [+nasal] morpheme. The /mp/ sequence in the infinitival form is an accidental artifact of infinitival reduplication, not an underlying [+nasal] morpheme.

The homorganic nasal-obstruent sequences, such as those in (52)-(56), cannot be considered monosegmental prenasalized obstruents (i.e., /^{n}d/ or /^{m}p/). This is because the nasal stops and obstruents that make up these sequences are also independent phonemes in the language. If we were to analyze these sequences as monosegments, there must be enough evidence in the phonology of the language that these sequences contrast with, are distributed like, or behave like other segments. As shown in greater detail in §A.2.1, homorganic nasal-obstruent sequences do not meaningfully contrast with heterorganic

[16] See §4.2 on page 36 for more on infinitival reduplication.

sequences of nasals and obstruents. That is, there is not any evidence that we should treat homorganic sequences as monosegments or phonemic instead of just as sequences. Moreover, they are not distributed like phonemic segments. Finally, they are impermissible in onset position and rare or absent in coda position, unlike other segments in the language.

Another compelling feature of these floating nasals is that they only occur once per morpheme and are aligned to the left edge of the word, as shown by the 100 most common words with homorganic nasal-obstruent sequences listed in Table 2. This distribution is also not typical of segments or other sequences of segments in the language. If a word has two non-initial obstruents and one of them is preceded by a nasal, it will always be the leftmost obstruent that follows the nasal, as shown by the 15 most common words with two non-initial obstruents in Table 3. This pattern is true across the entire lexicon (N=5,000+) and the corpus (N=11,542 unique words).

Table 2: 100 most frequent words with homorganic nasal-obstruent sequences

ende	en**ɖ͡ʐ**əna	di**nd**ug	goɲno**ŋg**ən	sərə**mb**ajnen
a**ŋg**an	mo**nd**rog	a**ŋg**aɽo	di**nd**ugməɽnən	go**ŋk**əbmeɲnən
ka**nd**ərmaɲ	dan**ʈ͡ʂ**ogən	go**nt**emeɲne	a**nd**ərmom	go**nt**emeɲaemne
i**nd**raɲ	a**ŋg**aɽe	də**ŋk**ameja	go**ŋk**aemom	do**ŋk**i
go**ŋk**amən	ʈ͡ʂo**ŋg**	nowa**ns**egan	ni**nd**ug	də**ŋk**ələn
i**ŋg**ojmeɲ	ʈ͡ʂə**nʈ͡ʂ**əm	**end**ag	go**nz**er	a**nd**reɖ͡ʐ
di**nd**ugən	baɲerə**ŋg**	sərə**mb**ajnen	peno**ŋg**	a**ŋk**aman
ŋono**ŋg**	ma**ŋg**eja	da**nd**ər	dowa**ns**egeja	**end**ru
ko**ŋk**om	di**nd**uag	da**nd**ərən	mə**nd**a	ni**nd**ugan
ba**nd**ra	ba**ŋg**u	go**ŋk**amejo	kə**mb**əmeɲ	deja**nd**mojən
bə**nt**ameɲ	go**ŋg**kam	do**nʈ͡ʂ**ogən	ɲə**ŋk**aɽbiɖ͡ʐ	go**ŋk**amaɽe
də**ŋk**amən	də**ŋk**amejo	ɲo**ŋk**oj	kə**ŋk**əm	ka**ŋg**e
də**nd**ər	ŋə**nʈ͡ʂ**əg	nowa**ns**eg	go**ŋk**əbəgən	so**ŋg**orag
enda	pə**ŋg**meɲ	kə**mb**əgag	kə**ŋk**əl	no**nʈ͡ʂ**ogan
bu**nd**aj	nə**ŋk**ələn	bo**ns**erbeaebne	ɽa**nd**rəg	pe**nt**aj
dowa**ns**egən	damə**nd**ən	dowa**ns**eg	ʈ͡ʂo**ŋg**ag	no**nʈ͡ʂ**og
ŋəmi**ŋg**	go**nd**ərən	**endɖ͡ʐ**əna	dowa**ns**egaɽo	go**ŋk**ən
mo**nd**re	dowa**ns**egejo	ʈ͡ʂə**nʈ͡ʂ**əmaɲ	sərə**mb**aj	də**ŋk**amaɽo
endan	wa**ns**eg	nə**ŋk**aman	**enz**ul	di**ŋg**i
kə**mb**meɲ	mə**nd**mə**nd**ag	mə**nɖ͡ʐ**mə**nɖ͡ʐ**	sa**nd**e	ba**nʈ͡ʂ**og

Table 3: 15 most frequent words with two non-initial obstruents

Word	Transcription	Gloss
di**nd**u**g**än	/di**nd**u**g**ən/	run.REM.3SGS
dowa**ns**e**g**än	/dowa**ns**e**g**ən/	leave.REM.3SGA>3SGP
mo**nd**ro**g**	/mo**nd**ro**g**/	garden worker
da**ntt**o**g**än	/da**n͡ʈʂ**o**g**ən/	give.REM.3SGA>sgR
Ko**nd**o**b**oll	/ko**nd**o**b**oɽ/	place name
di**nd**ua**g**	/di**nd**ua**g**/	runner
ngä**ntt**ä**g**	/ŋə**n͡ʈʂ**ə**g**/	to arrive
nowa**ns**e**g**an	/nowa**ns**e**g**an/	leave.REC.1sgA>3SGP
dowa**ns**e**g**eyo	/dowa**ns**e**g**ejo/	put.REM.3NSGA>3SGP
wa**ns**e**g**	/wa**ns**e**g**/	to leave alone
di**nd**u**g**	/di**nd**u**g**/	run.REM.1SGS
dä**nt**amenyne**g**nän	/də**nt**ameɲne**g**nən/	teach.REM.DUR.3SGA>3PLP
endag	/**end**a**g**/	COP.what.PLS
do**ntt**o**g**än	/do**n͡ʈʂ**o**g**ən/	give.REM.3SGA>SGP
kä**mb**ä**g**ag	/kə**mb**ə**g**ag/	babtizer

This restriction of homorganic nasal-obstruent sequences to once per morpheme is reminiscent of Quechua consonant co-occurrence restrictions. In Quechua, a word may only have one ejective or aspirate stop, and it must be the leftmost stop in the word (59).

(59) Consonant co-occurrence restrictions in Quechua (Gouskova & Gallagher, 2019)
a. initial ejectives and aspirates allowed: k'utuj 'to cut' kʰanij 'to bite'
b. medial ejectives and aspirates allowed: rit'i 'snow' jutʰu 'partridge'
c. no stop-ejective combinations: *kut'u *k'ut'u *kʰut'u
d. no stop-aspirate combinations: *kutʰu *k'utʰu *kʰutʰu

Ende does not share this word-level restriction for homorganic nasal-obstruent sequences. Words may contain multiple sequences if the form is also multimorphemic, consisting of two [+nasal] morphemes. For example, if a [+nasal] verb root, like *pänya**nz*** /pəɲa**nz**/ 'to grow' is affixed with a [+nasal] suffix, like *-(ä)**ng**g* /-(ə)**ŋ**g/ the nonplural applicative marker, the resulting word will have two homorganic nasal-obstruent sequences (60). Another context in which a word may have multiple sequences is in cases of total reduplication of a [+nasal] verb root, like the infinitival verbal stems in (61).

(60) a. *pänyanzängg* /pəɲa**nz**-ə**ŋg**/ 'to grow-APPL.NPL'
b. *dandämoengg* /da-**nd**əmoj-**ŋg**/ 'REM-send-APPL.NPL'

(61) a. *mändmänd* /mə**nd**-mə**nd**/ 'INF-adopt'
b. *mänddmändd* /mə**n͡ɖʐ**-mə**n͡ɖʐ**/ 'INF-drown'

Nasalization as a feature of the morpheme has also been observed in other languages. For instance, in Idi (Pahoturi River) homorganic nasal-obstruent sequences have similar phonotactic patterns, such that the nasals in these sequences are also (i) aligned to the left edge of the word, (ii) restricted to the coda, and (iii) only occur once per morpheme. However, in Idi, only voiced obstruents (b, d, z, d͡ʐ, g) may host these floating nasals, while all voiced and voiceless obstruents may host floating nasals in Ende. This means that a homorganic nasal-obstruent sequence may be preceded by a simple voiceless obstruent in Idi, (62), which would not be possible in Ende, (63).

(62) //N, bokog// → /boko**ŋ**g/ [Idi; J. Dipa p.c.]
*Bo moko wa dhdhg a yaya ble boko**ng**g.*

/bo	moko=wa	d͡ʐəd͡ʐəg=a	jaja=ble	b-o-ko-**ŋ**g/
1.SG.POSS	desire=CORE	meat=CORE	father=DAT	NPST-3NDUP-cut-APPL

'I want to cut the meat for my father.'

(63) //N, bokog// → /bo**ŋ**kog/ [Ende; J. Dipa p.c.]
*Ngämo moko da ddäddäg de yaya bälle bo**ng**kog.*

/ŋəmo	moko=da	d͡ʐəd͡ʐəg=de	jaja=bəɽe	b-o-**ŋ**ko-g/
1.SG.POSS	desire=NOM	meat=ACC	father=DAT	NPST-3NDUP-cut-APPL

'I want to cut the meat for my father.'

In Máíhɨ̃̀kì (Western Tukanoan), nasalization is also contrastive and treated as a morpheme-level feature (Sylak-Glassman et al., 2014). Like in Ende and Idi, Máíhɨ̃̀kì nasalization is also aligned leftward and docks preferably on the leftmost voiced obstruent (b, d, dʒ), which is then realized as a nasal consonant (64). If there are no voiced obstruents, the nasalization docks on the leftmost vowel (65).

(64) /[NAS] tɨdó/ → [tɨnó] 'hear (tr.)' [Máíhɨ̃̀kì, Sylak-Glassman, et al., 2014, 217]
(65) /[NAS] tákè/ → [tã́kè] 'monkey sp.' [Máíhɨ̃̀kì, Sylak-Glassman, et al., 2014, 217]

Finally, nasal segments within homorganic nasal-obstruent sequences behave remarkably unlike any other segment in the language: in derived environments, the nasal segments may float to less marked positions within the word.

Floating behavior

The floating nature of floating nasals can be observed when comparing [+nasal] morphemes in different morphological environments. For example, lexical verb roots appear in two basic forms: an infinitival and an inflected form. Verb roots are necessarily word-initial in infinitival form and word-medial in inflected forms. If a [+nasal] verb root contains at least two obstruents, one of which is word-initial, the infinitival and inflected forms will contrast in terms of the position of the floating nasal.

To illustrate this pattern, the infinitival and inflected forms of ‘to go off-road’ are *änz* /kə**nz**/ and *gongkäz* /ɡo-**ŋk**əz/ respectively. In the infinitival form, the nasal segment is linearized before the second obstruent, /z/, as the first obstruent, /k/ is also word-initial. However, in the inflected form, the nasal segment is linearized before the first root obstruent, as the prefixal vowel in the inflected form shifts the first root obstruent into word-medial position, providing a coda position for the nasal segment. Though floating nasals show an alignment preference to the left edge of the word, they are not observed in word-initial position. Such a sequence in word-initial position would violate the Sonority Sequencing Principle (Clements, 1990; SSP, Hooper, 1976; Kiparsky, 1979; Selkirk, 1984; Steriade, 1982; Zec, 1995, among others), which states that any clusters in onsets must be rising in sonority throughout the cluster. As nasals are more sonorous than obstruents, a nasal-obstruent sequence in the onset would be falling in sonority not rising, thereby violating the principle. Ten additional examples of the floating pattern are shown in (66).

(66)	Infinitival	Inflected
a.	pä**ngg**meny	ba**m**pägmenynän
	/pə**ŋ**g-meɲ/	/ba-**m**pəg-meɲ-n-ən/
	protect-III.PL	FUT.SGP-protect-III.PL-DUR-FUT.3SGA
	‘to protect’	‘S/he will be protecting them.’
b.	tto**ngg**	da**n**ttogän
	/ʈ͡ʂo-**ŋ**g/	/da-**n**ʈ͡ʂo-g-ən/
	give-III.NPL	REM-RT.EXT-give-III.NPL-REM.3SGA
	‘to give’	‘S/he gave it to her/him.’
c.	ple**n**z	go**m**plez
	/ple**n**z**/**	/go-**m**plez /
	shock.I.NPL	REM.REFL-shock
	‘to shock’	‘I was shocked.’
d.	büna**m**b	da**m**bänab
	/bən-a**m**b**/**	/d-a-**m**bən-ab/
	open-IV.NPL	REM-RT.EXT-open-IV.NPL
	‘to open’	‘I opened it.’
e.	za**ngg**ae	gu**n**zagae
	/za**ŋ**gaj/	/gu-**n**zagaj/
	strut.I.NPL	REM-strut
	‘to strut’	‘I strut (around).’
f.	pä**n**ddäg	go**m**päddäg
	/pə**n**ɖ͡ʐ-əg/	/go-**m**pəɖ͡ʐ-əg-ən/
	hatch-III.NPL	REM-hatch-III.NPL-3SGS
	‘to hatch’	‘It hatched.’
g.	kä**m**bäg	go**ng**käbäg
	/kə**m**b-əg/	/go-**ŋ**kəb-əg/
	dive-III.NPL	REM-dive-III.NPL
	‘to dive’	‘I dived.’
h.	pae**ngg**	da**m**paeg
	/paj-**ŋ**g/	/d-a-**mp**aj-g/
	guess-III.NPL	REM-RT.EXT-guess-III.NPL
	‘to guess’	‘I guessed it.’
i.	gu**ngg**	da**ngg**ug
	/gu-**ŋ**g/	/d-a-**ŋ**gu-g/
	marry.a.widow-III.NPL	REM-RT.EXT-marry.a.widow-III.NPL
	‘to marry a widow’	‘I married a widow.’
j.	pollo**ngg**	go**m**pllog
	/poɽo-**ŋ**g/	/go-**mp**ɽo-g/
	burst.into.tears-III.NPL	REM-burst.into.tears-III.NPL
	‘to burst into tears’	‘I burst into tears.’

Another context for the floating behavior occurs when [+nasal] suffixes such as the applicative suffixes //-Ng// and //-Nmeɲ// are affixed to verb roots containing obstruents. In these cases, the nasal segment from the suffix will float leftward into the root to the leftmost word-medial obstruent. Some examples are shown in (67).

(67)	Infinitival	Inflected	Infinitival-APPL	Inflected-APPL
a.	*koko*	*doko*	*ko**ngg***	*do**ng**kog*
	/ko-ko/	/d-o-ko/	/ko-**ŋ**g/	/d-o-**ŋ**ko-g/
	INF-cut	REM-3NDUP-cut	cut-APPL.NPL	REM-3NDUP-cut-APPL.NPL
	'to cut'	'I cut it.'	'to cut (for s.o.)'	'I cut it (for s.o.)'
b.	*ttäkoe*	*dattkoe*	*ttä**ng**koeg*	*da**n**ttäkoeg*
	/ʈ͡ʂəkoj/	/d-a-ʈ͡ʂəkoj/	/ʈ͡ʂə**ŋ**koj-g/	/d-a-**n**ʈ͡ʂəkoj-g/
	chop.I.NPL	REM-RT.EXT-chop	chop-APPL.NPL	REM-RT.EXT-chop-APPL.NPL
	'to chop'	'I chopped it.'	'to chop (for s.o.)'	'I chopped it (for s.o.)'
c.	*gogo*	*dogo*	*go**ngg***	*do**ng**gog*
	/go-go/	/d-o-go/	/go-**ŋ**g/	/d-o-**ŋ**go-g/
	INF-build	REM-3NDUP-build	build-APPL.NPL	REM-3NDUP-build-APPL.NPL
	'to build'	'I built it.'	'to build (for s.o.)'	'I built it (for s.o.)'
d.	*spull*	*gospull*	*spullä**ngg***	*dä**n**spulläg*
	/spu-ɽ/	/go-spu-ɽ/	/spu-ɽ-ə**ŋ**g/	/d-ə-**ns**pu-ɽ-əg/
	fall-II.NPL	REM-fall-II.NPL	fall-II.NPL-APPL.NPL	REM-3NDUP-fall-II.NPL-APPL.NPL
	'to fall'	'I fell.'	'to make s.o. fall'	'I made s.o. fall.'
e.	*popo*	*dupo*	*pomeny*	*du**m**pomeny*
	/po-po/	/d-u-po/	/po-meɲ/	/d-u-**mp**o-meɲ/
	INF-sharpen	REM-3NDUP-sharpen	sharpen-APPL.PL	REM-3NDUP-sharpen-APPL.PL
	'to sharpen'	'I sharpened it.'	'to sharpen (for some ppl)'	'I sharpened it (for some ppl).'
f.	*llɨtɨt*	*dɨllɨt*	*llɨ**n**tmeny*	*dɨllɨ**n**tmeny*
	/ɽɪt-ɪt/	/d-ɪ-ɽɪt/	/ɽɪ**n**t-meɲ/	/d-ɪ-ɽɪ**n**t-meɲ/
	INF-tell	REM-3NDUP-tell	tell-APPL.PL	REM-3NDUP-tell-APPL.PL
	'to tell'	'I told it.'	'to tell (for some ppl)'	'I told it (for some ppl).'

Disappearing behavior

The floating nasal segments may not be realized in the surface form if any [+nasal] morpheme occurs in a word without a non-initial obstruent (for example, see the infinitival applicative form of (67)(e)).[17] Disappearing alternations are observed when comparing infinitival and inflected forms of nasal verb roots in which only one form has a permissible pre-obstruent coda context for the nasal segment. For example, the infinitival and inflected forms for the [+nasal] verb root 'to start' are *kam* /kam/ and -***ng**kam* /-**ŋk**am/ respectively.

[17] At least one verb in Nen (Yam; Papuan), exhibits something like this disappearing nasal pattern. The infinitival form of the verb root *bars* 'chop (wood)' can be contrasted with finite forms like *ymbane* 'he is chopping it' in which the nasal *m* segment reappears (Evans, p.c.).

In these cases, the nasal segment only appears in one of the forms. The examples in (68) showcase examples of verb roots in which the nasal segment only appears in the inflected forms. The example in (69) showcases an example of a verb root in which the nasal segment only appears in the infinitival form.

(68)	Infinitival	Inflected
a.	*kam*	*da**ng**kam*
	/k-am/	/d-a-**ŋ**k-am/
	start-IV.NPL	REM-RT.EXT-start-IV.NPL
	‘to start’	‘I started it.’
b.	*zämae*	*da**n**zämae*
	/zəmaj/	/d-a-**n**zəmaj/
	fill.I.NPL	REM-RT.EXT-fill
	‘to fill’	‘I filled it.’
c.	*kollmäll*	*da**ng**kollmäll*
	/koɽməɽ/	/d-a-**ŋ**koɽməɽ/
	follow.I.NPL	REM-RT.EXT-follow
	‘to follow’	‘I followed it.’
d.	*koenmäll*	*da**ng**koenmäll*
	/kojnməɽ/	/d-a-**ŋ**kojnməɽ/
	chase.I.NPL	REM-RT.EXT-chase
	‘to chase’	‘I chased it.’
e.	*dämoe*	*da**n**dämoe*
	/dəmoj/	/d-a-**n**dəmoj/
	INF-push	REM-RT.EXT-push
	‘to push’	‘I pushed it.’
f.	*dumdum*	*da**n**dumyu*
	/dum-dum/	/d-a-**n**dum-ju/
	INF-surround	REM-RT.EXT-surround-3NSGA
	‘to surround’	‘I surrounded them.’
g.	*ttaem*	*dä**n**ttaem*
	/ʈ͡ʂ-ajm/	/d-ə-**n**ʈ͡ʂ-ajm/
	call-IV.PL	REM-3NDUP-call-IV.PL
	‘to call’	‘I called them.’
h.	*pallängkmeny*	*go**m**pallängkmenynegän*
	/paɽəŋk-meɲ/	/ɡo-**m**paɽəŋk-meɲ-negən/
	divide-III.PL	REM.REFL-divide-III.PL-3PLS
	‘to divide’	‘They were divided.’
i.	*tameny*	*da**n**tameny*
	/tameɲ/	/d-a-**n**tameɲ/
	teach.INF	REM-RT.EXT-teach
	‘to teach’	‘I taught it.’

(69)	Infinitival	Inflected
a.	nyo**ng**koe	danykoeyän
	/ɲo**ŋ**koj/	/d-a-ɲkoj-jən/
	pull.I.NPL	REM-RT.EXT-pull-3SGA
	'to pull'	'S/he pulled it.'

Static behaviors

Finally, there are nasal verb roots in which the leftmost non-initial obstruent is the same in both the infinitival and inflected form of the root. For example, in the infinitival and inflected forms for the verb root 'to start weaving', *erongg* /ero**ŋɡ**/ and *-erongg* /-ero**ŋɡ**/, the leftmost non-initial obstruent, /g/, is the same in both forms. In this way, the floating nasal appears to be static or in the same position in both forms. This static pattern occurs when verb roots only contain non-initial obstruents, like /ero**ŋɡ**/, (70).

(70)	Infinitival	Inflected
a.	ero**ng**g	daero**ng**g
	/ero-**ŋ**g/	/d-a-ero-**ŋ**g/
	start.weaving-III.NPL	REM-RT.EXT-start.weaving-III.NPL
	‘to start weaving’	‘I started weaving it.’
b.	ngämi**ng**g	dangmi**ng**g
	/ŋəmi-**ŋ**g/	/d-a-ŋgmi-**ŋ**g/
	help-III.NPL	REM-RT.EXT-help-III.NPL
	‘to help’	‘I helped it.’
c.	mä**n**dmä**n**d	damä**n**d
	/mə**n**d-mə**n**d/	/d-a-mə**n**d/
	INF-adopt	REM-RT.EXT-adopt
	‘to adopt’	‘I adopted her/him.’
d.	wɨ**n**dwɨ**n**d	dawɨ**n**d
	/wɪ**n**d-wɪ**n**d/	/d-a-wɪ**n**d/
	INF-cover.pit	REM-RT.EXT-cover.pit
	‘to cover a pit’	‘I covered the pit.’
e.	wa**n**dae	dawe**n**dae
	/wa**n**daj/	/d-a-we**n**daj/
	burn.I.NPL	REM-RT.EXT-burn
	‘to burn’	‘I burned it.’
f.	imo**n**z	dimo**n**z
	/imo**n**z/	/d-imo**n**z/
	touch.I.NPL	REM-touch
	‘to touch’	‘I touched it.’
g.	wä**n**dɨg	dawä**n**dɨgeya
	/wə**n**d-ɪg/	/d-a-wə**n**d-ɪg-eja/
	crowd-III.NPL	REM-RT.EXT-crowd-III.NPL-1|2NSGA
	‘to crowd’	‘We crowded him/her.’
h.	ngono**ng**g	gongno**ng**gän
	/ŋono-**ŋ**g/	/go-ŋno-**ŋ**g-ən/
	think-III.NPL/	REM-think-III.NPL-3SGS
	‘to think’	‘S/he thought.’
i.	mäla**n**zeg	dämäla**n**zeg
	/məla**n**ze-g/	/d-ə-məla**n**ze-g/
	tie-III.NPL	REM-3NDUP-tie-III.NPL
	‘to tie’	‘I tied it.’
j.	poper i**ng**koeg	poper dai**ng**koeg
	/poper i**ŋ**koj-g/	/poper d-a-i**ŋ**koj-g/
	scare scare-III.NPL	scare REM-RT.EXT-scare-III.NPL/
	‘to scare’	‘I scared it.’

This static pattern where the floating nasal appears in the same position in both the infinitival and inflected forms also occurs when nasal verb roots undergo phonological reduplication in their infinitival form, see (71). Briefly, infinitival reduplication is a phonological process that copies the root partially (CV) or fully into an empty prefix slot (see §4.2). In these examples, the reduplicant in the infinitival form and the inflectional prefix in the inflected form both provide a context for the floating nasal to appear in root-initial position. Because of this, the floating nasal docks in what appears to be the same position of the root in both forms.

(71)

	Infinitival	Inflected
a.	kä**ng**käl	dä**ng**käl
	/kə-**ŋ**kəl/	/d-ə-**ŋ**kəl/
	INF-climb	REM-3NDUP-climb
	'to climb'	'I climbed it.'
b.	dä**n**där	da**n**där
	/də-**n**dər/	/d-a-**n**dər/
	INF-hear	REM-RT.EXT-hear
	'to hear'	'I heard it.'
c.	ko**ng**kottom	dä**ng**kottom
	/ko-**ŋ**kot͡ʂom/	/d-ə-**ŋ**kot͡ʂom/
	INF-gulp	REM-3NDUP-gulp
	'to gulp'	'I gulped it.'
d.	ddo**n**ddo	go**n**ddo
	/d͡ʐo-**n**d͡ʐo/	/ɡo-**n**d͡ʐo/
	INF-boast	REM-boast
	'to boast'	'I boasted.'
e.	gä**ngg**gälläm	dä**ngg**gälläm
	/ɡə-**ŋ**ɡəɽəm/	/d-ə-**ŋ**ɡəɽəm/
	INF-wash	REM-3NDUP-wash
	'to wash'	'I washed it.'
f.	bäl**m**bäl	dä**m**bäl
	/bəl-**m**bəl/	/d-ə-mbəl/
	INF-remember	REM-3NDUP-remember
	'to remember'	'I remembered it.'
g.	ddä**n**ddäm	dänddäm
	/d͡ʐə-**n**d͡ʐəm/	/d-ə-nd͡ʐəm/
	INF-worry	REM-3NDUP-worry
	'to worry'	'I worried about it.'
h.	gä**ngg**glläd	dänggglläd
	/ɡə-**ŋ**ɡɽəd/	/d-ə-ŋɡɽəd/
	INF-shove	REM-3NDUP-shove
	'to shove'	'I shoved it.'
i.	bä**m**blläd	dä**m**bllädän
	/bə-**m**bɽəd/	/d-ə-**m**bɽəd-ən/
	INF-expand	REM-RT.EXT-expand-3SGS
	'to expand'	'It expanded.'
j.	ddä**n**ddäl	go**n**ddäl
	/d͡ʐə-**n**d͡ʐəl/	/ɡo-**n**d͡ʐəl/
	INF-climb	REM-climb
	'to climb'	'I climbed.'

Finally, a static pattern is observed when nasal suffixes such as *-ngg* /-**ŋ**g/ ‘nonplural applicative’ attach to verb roots without any obstruents, (72).

(72)

	Infinitival	Inflected
a.	ngonoe**ng**g	dangnoe**ng**g
	/ŋonoj-**ŋ**g/	/d-a-ŋnoj-**ŋ**g/
	ask-APPL.NPL	REM-RT.EXT-ask-APPL.NPL
	‘to ask for someone’	‘I asked for someone.’

An alternative analysis for the static patterns in the data shown in (70)-(72) is that these homorganic nasal-obstruent sequences are not composed of a floating nasal but of a static nasal. Such an analysis would predict that there are two types of homorganic nasal-obstruent sequences (instead of one), perhaps with phonological or morphological implication. The static nature of these floating nasals is not an issue for an analysis in which these nasals are treated just like the floating nasals in the other datasets. They are predicted to be stable.

Are floating nasal segments articulatory gestures?

In this section, I have interpreted the floating nasalization feature as a segment that precedes an obstruent when available but disappears without an obstruental host. Nasalization is a prime candidate for floating behavior as nasalization is regulated by an independent articulator, the velum, that can be raised or lowered throughout the utterance. From my observations and from investigating recorded sound files, I have not found or heard any evidence that suggests that any intervening vowels are nasalized, nor that any residual nasalization lingers if the floating nasal does not surface as a segment.

To summarize, nearly all homorganic nasal-obstruent sequences in Ende are lexically specified, but their position in the word is phonologically predictable. Each sequence corresponds with one morpheme in the word that can be lexically specified as [+nasal] and consists of one floating nasal that precedes the leftmost non-initial obstruent if one is available, else it fails to be realized. In this way, Ende floating nasals resemble canonical ghost patterns, such as Chaha floating labialization (see (3) on p. 3).

3.2.2 Analysis of Ende floating nasals

The following synchronic analysis accounts for the following five properties of Ende floating nasals: (1) floating nasals only occur once per [+nasal] morpheme, (2) floating nasals must precede and match in place with an obstruent, (3) floating nasals must be in coda position, (4) floating nasals are aligned left but may float to the right, and (5) floating nasals are more likely to delete than other segments.

Floating nasals only occur once per [+nasal] morpheme

The input representation of [+nasal] morphemes includes one floating nasal feature [n], which could be positioned anywhere in the input representation but for accounting purposes will be systematically represented in morpheme-initial position. A monomorphemic word with one [+nasal] morpheme, like *dompak* /dompak/ 'eel' will be represented in the input as //N,dopak//. Similarly, a multimorphemic word with one [+nasal] morpheme, like *dängkäl* /dəŋkəl/ 'I climbed it' will only have one floating nasal [n] in the input preceding the [+nasal] morpheme: //də-N,kəl//. A multimorphemic word with two [+nasal] morphemes, like *dandämoengg* /dandəmojŋɡ/ 'I sent it' will have two floating nasals [n] in the input: /da-N,dəmoj-N,ɡ/. In this way, floating nasals are limited in occurrence to only once per [+nasal] morpheme.

Floating nasals are aligned left but may float to the right

The fact that floating nasals always precede the leftmost obstruent in the world is a testament to an inherent leftward alignment of the feature. As Zoll (1996/1998, p. 104) illustrates for melodic ghost elements in Chaha and Inor, this alignment characteristic can be attributed to a family of alignment constraints within Optimality Theory called NO-INTERVENING(y;E), which prohibits any elements of the base from intervening between any part of the element in (y) and a given edge (E) of the word. If the melodic ghost is confined to the right edge of the word, like Inor palatalization ([+high], (73)), this behavior can be accounted for by ranking the alignment constraint (NO-INTERVENING([+high];R)) above the faithfulness to the subsegment constraint (*e.g.,* MAX(SUBSEG)), as illustrated in Tableau 18 and Tableau 19.

(73) Inor verb forms (Data from Rose, 1994; cited in Zoll, 1996/1998, p. 113)

	Underlying form	Surface form	Translation
a.	//kəfəd[+high]-a-m//	/kəfə**j**-a-m/	'they (FEM) opened'
b.	//nəkəs[+high]-a-m//	/nəkə**ʃ**-a-m/	'they (FEM) bit'
c.	//dərəɡ[+high]-a-m//	/dənəɡ-a-m/	'they (FEM) hit'
d.	//səpər[+high]-a-m//	/səpər-a-m/	'they (FEM) broke'

Tableau 18: Inor palatalization realizes on final coronal (Analysis by Zoll, 1996/1998)

//kəfəd[+high]-a-m//		Segment Structure	NO-INTERVENING([+high];R)	MAX(SUBSEG)
a.	/kəfəd-am/			*!
☞ b.	/kəfə**j**-am/			

Tableau 19: Inor palatalization cannot float (Analysis by Zoll, 1996/1998)

//dənəg[+high]-a-m//		Segment Structure	NO-INTERVENING([+high];R)	MAX(SUBSEG)
a.	/dənəg-am/			*!
b.	/dənə**g**ʲ-am/	*!		
☞ c.	/**j**ənəg-am/		*!***	

On the other hand, if the melodic ghost can "float" away from the edge to which it is aligned, also known as heterotropicity, this behavior can be accounted for by ranking the constraint that prohibits deletion of the subsegment (MAX(SUBSEG)) higher than the alignment constraint (NO-INTERVENING(Y;E). This constraint ranking is necessary to generate Chaha floating labialization, in which the labial /-w/ is aligned to the right edge of the word but may float leftward to be hosted by the rightmost labial or dorsal consonant, illustrated in (74).

(74) *Chaha object labialization (Banksira, 2013; Data from McCarthy, 1983, p. 179)*

	Underlying form		Surface form	Gloss
a.	//dənəg-w//	→	/dənə**g**ʷ/	'hit something'
b.	//məkər-w//	→	/mə**k**ʷər/	'burn something'
c.	//qətər-w//	→	/**q**ʷətər/	'kill something'
d.	//sədəd-w//	→	/sədəd/	'chase something'

The Ende floating nasal pattern is identical to Chaha floating labialization because while Ende floating nasals are aligned to the left edge, they are also permitted to float away from the edge in search of a suitable docking spot. The relevant constraint for alignment of Ende floating nasals is in (75).

(75) NO-INTERVENING(N;L)
Assign one violation for every element of the base that intervenes between n (the realization of the [+nasal] feature) and the left edge of the word.

This alignment effect is illustrated in Tableau 20 for the infinitival form of the verb /N,dobak/ 'to expand'.

Tableau 20: SEGMENT STRUCTURE » NO-INTERVENING(N;L)

/Ndobak/		SEGMENT STRUCTURE	NO-INTERVENING(N;L)
a.	**n**dobak	*!	
b.	d**n**obak	*!	d
☞ c.	do**m**bak		do
d.	dob**m**ak	*!	dob
e.	doba**ŋ**k		dob!a
f.	dobak**ŋ**	*!	dobak

Of the six possible alignments of the floating nasal [N] within the base /dobak/, four of these alignments violate SEGMENT STRUCTURE in some way. (This vague constraint, used for exposition by Zoll, is a compilation of various markedness constraints that regulate segment structure and phonotactics within the phonological system. We will replace this constraint with more specific markedness constraints below.) Of the two candidates that satisfy SEGMENT STRUCTURE, (c) /do**m**bak/ violates NO-INTERVENING(N;L) twice because two elements of the base, /do/, intervene between the left edge of the word and the floating nasal. However, candidate (c) violates NO-INTERVENING(N;L) fewer times than (e) /doba**ŋ**k/, which has four elements of the base intervening between the left edge and the floating nasal. Candidate (c) is, therefore, the optimal form, illustrating the effect of leftward alignment on the floating nasal.

The fact that candidate (c) in Tableau 20, which does indeed violate NO-INTERVENING(N;L), is the observed output in the language also illustrates that the Ende grammar orders faithfulness to the floating segment higher than the alignment of the floating segment. A candidate that would vacuously satisfy the alignment constraint is candidate (b) in Tableau 21, which does not realize the floating nasal whatsoever, satisfying both the SEGMENT STRUCTURE and NO-INTERVENING constraints simultaneously. Deletion of this melodic ghost, however, does violate MAX(MEL), as a melodic feature in the input (i.e., [+nasal]) is present in the input but absent in the input. MAX(MEL) is ranked higher than NO-INTERVENING(N;L), leaving candidate (a) as the most faithful output.

Tableau 21: MAX(MEL) » NO-INTERVENING(N;L)

/Ndobak/		SEGMENT STRUCTURE	MAX(MEL)	NO-INTERVENING(N;L)
☞a.	do**m**bak			do
b.	dobak		n!	

Floating nasals are in coda position

Of the 1,758 unique words in the Ende spoken corpus with floating nasals (N=11,542 unique words), 100% of these floating nasals are in coda position within the syllable. This categorical observation is because floating nasals are necessarily pre-obstruental and therefore, cannot be in the onset. As described in §A.2.2 (p. 151), nasal-obstruent sequences, whether heterorganic or homorganic, are not permissible onsets in Ende. Not only are these sequences never found in word-initial position, but this sequence also violates the SONORITY SEQUENCING PRINCIPLE (SSP). The SSP is a general principle that states that optimal syllables must be composed of a maximally sonorous peak (typically a vowel) with an onset that rises in sonority and a coda that falls in sonority according to the sonority scale in (76).

(76) *Sonority scale* (Bell & Hooper, 1978, Clements, 1990)
vowels > glides > liquids > nasals > obstruents (abbreviated as v > g > l > n > o)

If a nasal is to be part of a complex onset and satisfy the SSP, it must be followed by a liquid or a glide, or it must be preceded by an obstruent. Nasal-liquid and obstruent-nasal sequences are not observed in Ende, and nasal-glide sequences are found only rarely in ideophone or loan words. Complex onsets more commonly include obstruents followed by liquids or glides. §A.2.2 details how this restriction in possible complex onset sequences can be attributed to the active ranking of a minimal sonority distance constraint (MSD; Greenberg, 1978), which states that adjacent segments in the onset must have a sonority distance of two steps or greater.

In contrast, nasal segments are much less restricted in complex coda contexts. If a nasal is to be part of a complex coda and satisfy the SSP, it must be preceded by a liquid or a glide, or it must be followed by an obstruent. All these sequences are observed in Ende codas. There is not a minimal sonority distance constraint active for Ende codas.

The Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance (MSD) can be reformulated as Optimality Theoretic constraints as defined in (77) and (78). These two constraints must be ranked higher than NO-INTERVENING(N;L), as shown in Tableau 22. These competing principles explain why floating nasals do not occur in syllable contexts that violate the SSP or the MSD, although realization in those positions may maximally satisfy the NO-INTERVENING alignment constraint.

(77) SONORITY SEQUENCING PRINCIPLE (SSP)
Assign one violation for every syllable in which the sequence of elements before the most sonorous element in the syllable does not rise in sonority and for every syllable in which the sequence of elements after the most sonorous element in the syllable does not fall in sonority, as defined by the sonority scale in (76).

(78) MINIMAL SONORITY DISTANCE (MSD(Onset;2))
Assign one violation for every tautosyllabic consonant sequence in the onset, in which the distance in sonority level between the two consonants is not two steps or greater.

Tableau 22: SSP, MSD » NO-INTERVENING(n;L)

//N,dobak//		SSP	MSD	MAX(MEL)	NO-INTERVENING(n;L)
a.	/**n**do.bak/	*!			
b.	/d**n**o.bak/		*!		d
☞c.	/do**m.**bak/				do
d.	/do.bak**ŋ**/	*!			dobak

The SSP and MSD constraints are also ranked higher than MAX(MEL). If there is not a position in the word in which realization of the floating nasal satisfies both the SSP and the MSD constraints, the floating nasal will fail to be realized. This pattern is shown for the input /N,daɲkoj/ in Tableau 23, in which the observed candidate (h) violates MAX(MEL) due to deletion of the floating nasal, but satisfies the SSP and the MSD, unlike nearly every other output candidate. Candidates (i) and (j) also satisfy the SSP and the MSD but violate a different set of constraints, combined here as NO, which require floating nasals to precede obstruents (see next section).

Tableau 23: SSP, MSD, NO » MAX(MEL)

/N,daɲkoj/		SSP	MSD	NO	MAX(MEL)	NO-INTERVENING(n;L)
a.	**n**daɲ.koj	*!				
b.	d**n**aɲ.koj		*!			d
c.	da**n.**ɲkoj	*!				da
d.	da**n**ɲ.koj	*!				da
e.	daɲ.**ŋ**koj	*!				daɲ
f.	daɲ**ŋ**.koj	*!				daɲ
g.	daɲ.ko**ɲ**j	*!				daɲko
☞ h.	daɲ.koj				*	
i.	daɲk.**ŋ**oj			*!		daɲk
j.	daɲ.koj**ɲ**			*!		daɲkoj
k.	daɲ.k**ŋ**oj		*!	*!		daɲk

Floating nasals precede obstruents

Floating nasals are always linearized preceding an obstruent, which in Ende includes the voiceless and voiced stops, affricates, and fricatives: (/p, b, t, d, k, ɡ, ʈ͡ʂ, ɖ͡ʐ, s, z/). If floating nasals are non-linearized in the input, the phonological grammar must be able to explain why floating nasals only precede obstruents and not any other segment in the word. From a diachronic perspective, a reasonable hypothesis is that Ende at one point in time distinguished prenasalized voiced and voiceless obstruents as phonemes and it is this historical distinction that provides the blueprint for the modern phonological pattern. This analysis takes a synchronic approach and posits a set of constraints that can generate the present pattern without referencing any historical patterns, which themselves require an explanation.

One way in which we can approach this restriction of nasals to pre-obstruent contexts is to consider the principles of the Syllable Contact Law (Vennemann, 1972), which states that optimal coda-onset contacts should fall in sonority, such that codas are maximally sonorous, and onsets are minimally sonorous. This pattern can be derived from the multi-valued sonority scale, repeated in (79), which states that vowels are more sonorous than glides and so on, and the binary moraicity scale in (80), which holds that codas are more sonorous positions than onsets.

(79) Sonority scale (Bell & Hooper [Bybee], 1978; Clements, 1990)
vowels > glides > liquids > nasals > obstruents (abbreviated v > g > l > n > o)

(80) *Moraicity scale* (Gouskova, 2004)
Coda > Onset

Gouskova (2004) derives the syllable contact scale by first applying harmonic alignment to the set of scales in (79) and (80), to return the harmonic scales in (81). (Note that the sonority scale that Gouskova uses further subcategorizes the classes of liquids and obstruents in terms of sonority within each of those classes, but this level of granularity is not necessary for our purposes.)

(81) a. *Onset sonority scale* (Gouskova, 2004)
Ons/o ≻ Ons/n ≻ Ons/l ≻ Ons/g
b. *Coda sonority scale* (Gouskova, 2004)
Coda/g ≻ Coda/l ≻ Coda/n ≻ Coda/o

Essentially, if both of the scales in (79) and (80) are ordered in terms of sonority, then the harmonic scales show that the least sonorous syllable position (onsets) when combined with the least sonorous consonants (obstruents) are more harmonic than that same syllable position when combined with a more sonorous consonant (*e.g.*, nasals). Similarly, for the codas, the most harmonic coda is one that is combined with the most sonorous consonant (glides), which is slightly more harmonic than a coda with a less sonorous consonant (*e.g.*, liquids).

The harmonic scales in (81) can then be translated using relational alignment into a syllable contact scale, (82). The syllable contact scale is split into seven strata that each contain one or multiple combinations of coda onset contacts. Here, the combinations of codas and onsets (separated by syllable boundaries [.]) are assessed based on their relational harmony. The most harmonic coda (*i.e.*, a glide) when combined with the most harmonic onset (*i.e.*, an obstruent, is more harmonic than the second most harmonic coda with the most harmonic onset (liquid-obstruent) or the most harmonic coda with the second most harmonic onset (glide-nasal), and so on.

(82) *Syllable contact scale* (Gouskova, 2004)

1	2	3	4	5	6	7
g.o ≻	g.n ≻	g.l ≻	g.g ≻	l.g ≻	n.g ≻	o.g
	l.o	l.n	l.l	n.l	o.l	
		n.o	n.n	o.n		
			o.o			
-3	-2	-1	0	+1	+2	+3

The harmony of each combination is based on the distance between the two classes of consonants on the sonority scale. In Stratum 1, a glide is three steps more sonorous than an obstruent, so the distance between the two is -3. Finally, we can incorporate this syllable contact scale into our analysis of output candidates by translating the syllable contact hierarchy into constraints (83), in which the highest-ranked constraints ban the least harmonic combinations (*DIST+3) and the lowest-ranked constraints ban the most harmonic combinations (*DIST-3).

(83) *Syllable contact hierarchy* (Gouskova, 2004)
*DIST+3 » *DIST+2 » *DIST+1 » *DIST+0 » *DIST-1 » *DIST-2 » *DIST-3

(84) *DISTX
Assign one violation for every heterosyllabic sequence of consonants that have a sonority distance of X, as defined by the syllable contact scale in (82).

The ranking of the constraints in the syllable contact hierarchy is fixed, so any language that bans syllable contact combinations of any given distance prohibits syllable contact combinations of any less harmonic distance as well.

In general, Ende phonotactics allow for syllable contacts of any type across syllables, as illustrated in (85).

(85) DIST-3 *daebe* /daj.be/ 'only'
DIST-2 *aenin* /aj.nin/ 'who is (COP.who.PRS.SGS)'
DIST-1 *talme* /tal.me/ 'birth, labor'
DIST+0 *imne* /im.ne/ 'behind'
DIST+1 *umɽaŋ* /um.ɽaŋ/ 'knowledge'
DIST+2 *sisri* /sis.ri/ 'now'
DIST+3 *dagwaeya* /dag.waj.ja/ 'two were (COP.PST.DUS)'

However, syllable contacts with floating nasal segments are further restricted. Even though in general Ende phonotactics allow for a variety of syllable contacts, if floating nasals create a new syllable contact, the sonority distance between the two must be falling. That is, floating nasals may in principle only precede obstruents or follow glides or liquids. This behavior can be accounted for if the constraints *DIST+3, *DIST+2, *DIST+1, and *DIST+0 are ranked higher than NO-INTERVENING(n;L), as shown in Tableau 24-Tableau 27. The candidates with falling sonority at the syllable contacts are evaluated as more optimal than those with stable or rising sonority, even if the positions of the nasal in those outputs better satisfy alignment.

Tableau 24 illustrates how *DIST+0 is ranked higher than NO-INTERVENING(N;L). While candidates (a), (b), and (f) violate principles of sonority within a syllable, candidates (c) and (d) display stable sonority across the syllable boundary. Stable sonority is a violation of *DIST+0. Though candidate (e) incurs more violations of NO-INTERVENING(N;L), it does not violate any principles of sonority within or across syllables and is thus the most optimal.

*Tableau 24: *DIST+0 » NO-INTERVENING(N;L)*

//N,bənab//		SSP	MSD	*DIST+0	MAX(MEL)	NO-INTERVENING(N;L)
a.	/**m**bə.nab/	*!				
b.	/b**m**ə.nab/		*!			b
c.	/bə**n.**nab/			*!		bə
d.	/bən.**n**ab/			*!		bən
☞e.	/bə.na**m**b/					bəna
f.	/bə.nab**m**/	*!				bənab

Similarly, Tableau 25 illustrates how *DIST+1 must also be ranked higher than NO-INTERVENING(N;L). As *DIST+1 is stringently ordered higher than *DIST+0, this ranking follows from the ranking in Tableau 24, but it shows how a candidate like (d) /dob.**m**ak/ with a +1 rise in sonority fares in this grammar's evaluation.

*Tableau 25: *DIST+1 » NO-INTERVENING(n;L)*

//N,dobak//		*DIST+1	SSP	MSD	*DIST+0	MAX(MEL)	NO-INTERVENING(n;L)
a.	/**n**do.bak/		*!				
b.	/d**n**o.bak/			*!			d
☞c.	/do**m.**bak/						do
d.	/dob.**m**ak/	*!					dob
e.	/dob.a**ŋ**k/						dob!a
f.	/do.bak**ŋ**/		*!				dobak

Tableau 26 and Tableau 27 differ in that they each have medial sonorants: a liquid and a glide respectively. The candidates in which the floating nasal occurs immediately following the sonorant, Tableau 26, candidate (d) /baɽ.**nɨ**g/ and Tableau 27, candidate (d) /bej.**ɲ**a.bəg/, are evaluated as the most optimal, although neither of these outputs are observed in Ende (represented with 💣). These candidates do not violate any sonority principles within or across the syllables and better satisfy NO-INTERVENING(N;L) than the observed outputs (represented with ☞).

*Tableau 26: *DIST+2 » NO-INTERVENING(n;L)*

//N,baɽɪg//		*DIST+2	*DIST+1	SSP	MSD	*DIST+0	MAX(MEL)	NO-INTERVENING(N;L)
a.	/**m**ba.ɽɪg/			*!				
b.	/b**m**a.ɽɪg/				*!			b
c.	/ba**n**.ɽɪg/	*!						ba
💣d.	/baɽ.**n**ɪg/							baɽ
☞e.	/ba.ɽɪ**ŋ**g/							baɽɨ!
f.	/ba.ɽɪg**ŋ**/			*!				baɽɨg

*Tableau 27: *DIST+3 » NO-INTERVENING(N;L)*

//N,bejabəg//		*DIST+3	*DIST+2	*DIST+1	SSP	MSD	*DIST+0	MAX(MEL)	NO-INTERVENING (N;L)
a.	/**m**be.ja.bəg/				*!				
b.	/b**m**e.ja.bəg/					*!			b
c.	/be**ɲ.**ja.bəg/	*!							be
💣d.	/bej.**ɲ**a.bəg/								bej
☞e.	/be.ja**m.**bəg/								beja!
f.	/be.jab.**m**əg/			*!					bejab
g.	/be.ja.bə**ŋ**g/								bejab!ə
h.	/be.ja.bəg**ŋ**/				*!				bejabəg

The principle that prohibits floating nasals from aligning in post-liquid or post-glide position has to do with the fact that floating nasals are not specified for their place of articulation and are restricted in terms of what types of segments they may agree and correspond with.

Floating nasals match in place with following obstruents.

Although the principles of the Syllable Contact Law predict that floating nasals could be realized in both pre-obstruent and post-liquid/-glide position, in reality, floating nasals may only precede obstruents. Floating nasals are not found following glides or liquids, even if those positions would better satisfy the alignment constraint (see the (d) candidates in Tableau 26 and Tableau 27). The sonority principles described above also do not explain why floating nasals match in place with the obstruents that they follow. In fact, the place of articulation for every floating nasal matches the place of articulation specified for the following obstruent, such that the floating nasal is realized as labial /m/ before labial stops

/p, b/, as coronal /n/ before coronal stops and fricatives /t, d, s, z/ and retroflex affricates /t͡ʂ, d͡ʐ/ and velar /ŋ/ before velar stops /k, ɡ/.

Implementing the Agreement by Correspondence (ABC; Hansson, 2001; Rose & Walker, 2004) theory in our analysis of floating nasal realization explains both why floating nasals must precede obstruents and why floating nasals match in place (see §2.2 for more on ABC). ABC formalizes the observation that the closer in position and similarity two segments are, the more likely the two will assimilate (or dissimilate). Essentially, if two segments are near enough to one another and similar enough, it is best to assimilate the segments so that they are identical or dissimilate the segments so that they can be better differentiated.

The way this plays out in Ende is that adjacent [-approximant] segments correspond and must match in place. Correspondence between adjacent similar consonants is mediated through a constraint called CORR-C-C[-APPROX], which assigns a violation to any pair of [-approximant] consonants that are adjacent in the output and not in correspondence. Agreement between corresponding consonants is regulated by a constraint called IDENTITY-[place]-O, which assigns a violation to any pair of corresponding segments that do not agree in the feature [place].[18]

(86) CORR-C-C[-approx]
Assign one violation to any pair of adjacent [-approximant] segments that do not correspond in the output.

(87) IDENTITY-[place]-O
Assign one violation to any pair of corresponding segments in the output that do not agree in the feature [place].

Once again, the effects of these two constraints only emerge in the unmarked or derived context of the floating nasal alternation. Floating nasals are not specified for place in the underlying form, and therefore specification of a place feature in the output does not violate faithfulness between the input and the output. However, for segments that are specified for place in the input, they will not undergo place assimilation because this

[18] Correspondence between output elements is represented with a subscript numbering system, explained more in depth in §2.2. Correspondence between the input and the output is not represented numerically but assumed as usual.

violates that faithfulness constraint, IDENTITY-[place]-IO, which assigns a violation for any segment with a [place] feature in the input that is not present in the output. The effect of this constraint is visible in candidates (a-b) in Tableau 28. The nasal segment /n/ in *inpiak* /in.pjak/ ‘eagle’ is specified for [+coronal] in the input and cannot assimilate to [+labial] in the output without violating IDENTITY-[place]-IO, candidate (b). Candidates (a) and (c) are equally optimal outputs as the constraints CORR-C-C and IDENT-[place]-O are not ranked with respect to one another. This is a prediction of Partial Order Optimality Theory (Anttila, 1997a, 2007; Anttila & Cho, 1998).

(88) IDENTITY-[place]-IO
Assign one violation to any [place] feature in the input that is not in identical correspondence with a [place] feature in the output.

Tableau 28: IDENT-[place]-IO » CORR-C-C[-approx], IDENT-[place]-O

	//in.pjak// ‘eagle’	IDENT-[place]-IO	CORR-C-C	IDENT-[place]-O
☞a.	/in$_1$.p$_1$jak/			*!
b.	/im$_1$.p$_1$jak/	*!		
☞c.	/in.pjak/		*!	

However, segments that are unspecified for place in the input, like floating nasals, do undergo place assimilation. Sharing of a feature in the input between two features in the output violates INTEGRITY, which requires that the input and output indexation of features to segments be the same. INTEGRITY is violated when an input feature corresponds with multiple elements in the output.

(89) INTEGRITY
Assign one violation to any element in the input that has multiple correspondents in the output.

As floating nasals are unspecified for [place] in the input, the only way that they can be realized in the output with a [place] specification is if they are associated with a [place] specification of another segment (Tableau 29, a), or if a default [place] feature is inserted via epenthesis (b, c), thereby avoiding violation of INTEGRITY. If the floating nasal is not realized in the output, (d), this output will also satisfy INTEGRITY, but it will violate the faithfulness constraint MAX(MEL). Thus, the observed output (a), in which the floating nasal corresponds with and identifies with the adjacent segment, indicates that all three constraints, CORR-C-C, IDENT-[place]-O, and MAX(MEL), are ranked higher than INTEGRITY.

Tableau 29: CORR-C-C[-approx], IDENT-[place]-O, MAX(MEL) » INTEGRITY

//N,dobak// 'eel'		IDENT-[PLACE]-IO	CORR-C-C	IDENT-[PLACE]-O	MAX(MEL)	INTEGRITY
☞a.	/do**m**$_1$b$_1$ak/					*
b.	/do**n**bak/		*!			
c.	/do**n**$_1$b$_1$ak/			*!		
d.	/dobak/				*!	

Now, let us consider a situation in which maximal leftward alignment of a floating nasal does not violate the sonority sequencing or minimal sonority distance principles: vowel-initial words. Even in these contexts, the nasal is not realized word-initially but floats rightward to precede the leftmost obstruent. This floating behavior is because realization of the floating nasal in any other position in which it cannot correspond with and associate a [place] feature results in an epenthetic insertion of a [place] feature, violating the faithfulness constraint DEP(MEL). DEP(MEL) is ranked higher than INTEGRITY, thus forcing the floating nasal to travel further rightward into the word.

Tableau 30: DEP(MEL) » INTEGRITY

//N,ede// 'what'		IDENT-[place]-IO	CORR-C-C	IDENT-[place]-O	MAX(MEL)	DEP(MEL)	INTEGRITY
a.	/**n**ede/					*!	
☞b.	/e**n**$_1$d$_1$e/						*
c.	/ede/				*!		

The faithfulness constraints MAX(MEL) and DEP(MEL) can be ranked with respect to one another if we consider an input in which the only phonotactically permissible position for the floating nasal to be realized in is word-initial. For example, the verb *angnoemenyan* //a-ŋonoj-Nmeɲ-an// → /a-ŋnoj-meɲ-an/ 'REC-think-APPL.PL-REC.1|3SGS' contains one [+nasal] morpheme //-N,meɲ// 'APPL.PL'. However, this form does not contain any obstruents to host the floating nasal. If the floating nasal is realized in word-initial position (candidate (a) in Tableau 31), this will violate DEP(MEL), do not epenthesize a melodic feature [+coronal]. However, if the floating nasal fails to be realized (candidate (b)), this would violate MAX(MEL), do not delete a melodic feature [+nasal]. Candidate (b) is the observed output, indicating that DEP(MEL) is ranked higher than MAX(MEL).

Tableau 31: DEP(MEL) » MAX(MEL)

//aŋnojn,meɲan// 'what'		IDENT-[place]-IO	DEP(MEL)	CORR-C-C	IDENT-[place]-O	MAX(MEL)	INTEGRITY
a.	/naŋnojmeɲan/		*!				
☞b.	/aŋnojmeɲan/					*	

Floating nasals are easier to delete than other segments

Finally, the grammar must be able to explain why in cases where a root does not contain a docking position for the floating nasal, it is the floating nasal that gets deleted and not a different segment. For example, consider the inflected form of the verb *nyongkoe* /ɲo**ŋ**koj/ 'to pull', *danykoe* /da-ɲkoj/ 'pull.REM.1|2SGA>SGP'. Evidence that the root of the verb is [+nasal] comes from the infinitival form of the verb, which is *nyongkoe* /ɲo**ŋ**koj/. Thus, the underlying representation of this infinitival form is //N,ɲokoj//. However, the floating nasal is not realized in the surface representation of the inflected form. For the input //da-N,ɲkoj//, the position preceding the first obstruent in the word, /d/, is unavailable as it is in word-initial position and would form an onset that violates the SSP (Tableau 32, candidate (a)).

Tableau 32: MAX(SEG) » IDENT-[place]-O

[Ndaɲkoj]		IDENT-[place]-IO	DEP(MEL)	SSP	MSD	MAX(SEG)	CORR-C-C	IDENT-[place]-O	MAX(MEL)	INTEGRITY
a.	**n**$_1$d$_1$aɲ$_2$k$_2$oj			*!				*		*
b.	daɲ$_1$**ŋ**$_{12}$.k$_2$oj			*!				*		*
c.	daɲ$_1$.**ŋ**$_{12}$k$_2$oj			*!				*		*
d.	da**ŋ**$_1$.k$_1$oj					*!			*	*
☞e.	daɲ$_1$.k$_1$oj							*	*	
f.	da.ɲəŋ$_1$.k$_1$oj		*!							*

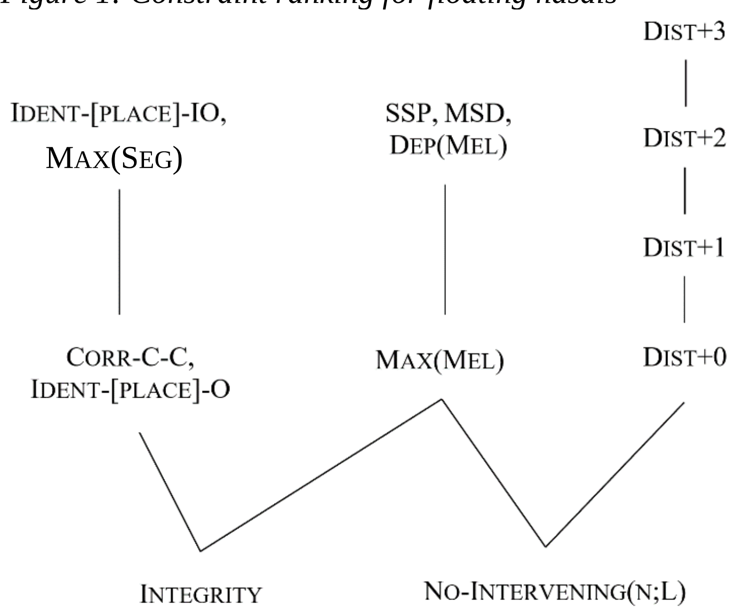
The position preceding the second obstruent in the word, /k/, is also unavailable as the floating nasal would have to form a complex coda with the nasal segment, candidate (b), or a complex onset with the obstruent /k/, candidate (c). There are two available repairs for this situation. Either the full nasal segment /ɲ/ is deleted, as in candidate (d), or the floating nasal is deleted, as in candidate (e). The difference between deletion of a full segment /ɲ/ and a floating nasal /n/ is that the full segment is specified for both a melody and a skeleton in the input while the floating nasal is only specified for melodic features. In this way, deletion of a full segment violates two faithfulness constraints MAX(MEL) and MAX(SEG), while deletion of a floating nasal only violates one faithfulness constraint, MAX(MEL). MAX(SEG) must be ranked higher than IDENT-[place]-O because in this case, deletion of the full segment results in better identity between corresponding segments than deletion of the floating nasal.

Another repair could be epenthesis. An epenthetic vowel could be inserted before the floating nasal (candidate (f)). This repair is not available because the constraint DEP(MEL) is ranked higher than MAX(MEL), candidate (f).

The final ranking for the constraints that explain the floating nasal pattern is in (90), schematized in Figure 1.

(90) a. IDENT-[place]-IO, MAX(SEG) » CORR-C-C, IDENT-[place]-O » INTEGRITY
b. SSP, MSD, DEP(MEL) » MAX(MEL) » INTEGRITY, NO-INTERVENING(N;L)
c. DIST+3 » DIST+2 » DIST+1 » DIST+0 » NO-INTERVENING(N;L)

Figure 1: Constraint ranking for floating nasals



Chapter 4: Hero ghosts

4.1 Description

Hero ghosts display the opposite type of behavior to martyr ghosts. While martyr ghosts are subsegmental elements that are present in the output by default but fail to surface if their presence would incur a markedness violation, hero ghosts do not surface without reason but are realized if their presence would save a word form.

In Chapter 3, I likened the behavior of martyr ghosts to syncope, a phonological process in which elements are deleted in order to optimize the output representation of the input. In contrast, the behavior of hero ghosts is akin to the process of epenthesis. However, unlike canonical epenthetic elements, epenthetic ghosts are subsegmentally specified and cannot be predicted entirely from the phonological grammar.

One type of hero ghost, Ende light vowels, has already been illustrated as an example of hero behavior on p. 17. Ende light vowels are a type of hero ghost because they are only present to break up onset consonant clusters. Otherwise, they are absent.

Another example of a hero ghost is Nguni glide consonants (Sibanda, 2011), shown in (91). Notice how the prefixal subject marker *i-* [class 9] is vowel-initial when surfacing at the left edge of the phonological word (a) but glide-initial when following the negative marker *ka-* (b).

(91) *Nguni ghost glides (Sibanda, 2011)*
a. //i-khul-a// → /ikhula/ ‘it grows’
b. //ka-i-khul-a// → /k<u>ayi</u>khuli/ ‘it does not grow’

The glide *y* seemingly appears in order to prevent vocalic hiatus between the prefix-final /a/ and the prefix initial /i/ in the form. However, this is not the typical way to repair vocalic hiatus in Nguni. Usually, this type of hiatus is repaired via vocalic coalescence, as shown in (92), where the merger of //a-i// becomes /e/.

(92) *Nguni voalic coalescence (Sibanda, 2011)*
//a-ikhaya// → /<u>e</u>khaya/ ‘at home’

Sibanda explains that the deviant behavior of the /i-/ subject marker can be understood if the glide is present at a subsegmental level in the input and only surfaces in the output in times of need. This analysis allows us to correctly predict the absence of the glide in non-hiatus contexts (Tableau 33), its presence in hiatus contexts (Tableau 34), and the more optimal coalescence repair in contexts where no ghost glide is in the input (Tableau 35).

Tableau 33: DEP(SKEL) » MAX(MEL)

//(y)i-khul-a//		*VV	DEP(SEG)	UNIF	DEP(SKEL)	MAX(MEL)
a.	/yikhula/				y!	
☞b.	/ikhula/					y

*Tableau 34: *VV, UNIF » DEP(SKEL)*

//ka-(y)i-khul-a//		*VV	DEP(SEG)	UNIF	DEP(SKEL)	MAX(MEL)
☞a.	/kayikhuli/				y	
b.	/kaikhula/	*!				y!
c.	/kekhula/			*!		y!

*Tableau 35: *VV, DEP(SEG) » UNIF*

//a-ikhaya//		*VV	DEP(SEG)	UNIF	DEP(SKEL)	MAX(MEL)
a.	/aikhaya/	*!				
☞b.	/ekhaya/			*		
c.	/ayikhaya/		*!			

The epenthetic nature of the Nguni glides is regulated by the ranking of two faithfulness constraints, DEP(SKEL) over MAX(MEL). The Nguni ghost glide is a melodic ghost because it is only specified for its melodic features. Thus, when the ghost is realized, this will violate DEP(SKEL) because a skeletal subsegment will be present in the output that was not present in the input. Conversely, if the melodic ghost does not surface in the output, this will violate MAX(MEL) because a melodic subsegment that was present in the input is absent in the output. In equal markedness conditions, that is when a markedness constraint like *VV, which prohibits vocalic hiatus, is not violated whether or not the glide is realized, ranking DEP(SKEL) over MAX(MEL) indicates that it is more optimal for the ghost glide to be deleted than it is to be parsed. This is hero behavior.

(93) *VV
Assign one violation for every pair of two adjacent vowels.

Tableau 34 and Tableau 35 show that the ranking of *VV, DEP(SEG) » UNIF » DEP(SKEL) » MAX(MEL) generate a pattern, in which it is more optimal to insert a subsegmental element than it is to coalesce two vowels (in violation of UNIF). And yet, it is more optimal to coalesce two vowels than it is to insert an entire segment (in violation of DEP(SEG)).

(94) UNIF
Assign one violation for each element in the output that has multiple correspondents in the input.

Besides Ende light vowels and Nguni glides, other hero ghosts include Ende theme vowels (§4.2), Yowlumne suffixal vowels (Newman, 1932; Zoll, 1996/1998), Polish *yer* vowels (Szpyra, 1992; Yearley, 1995), Catalan /u/ (Bonet, Lloret, & Mascaró, 2007), Mohawk vowels (Rowicka, 1998), and French liaison (Tranel, 1996a, 1996b). This next section provides a thorough description and analysis of the Ende theme vowels, which trigger infinitival reduplication.

4.2 Case study: Ende infinitival reduplication

Ende morphophonology exhibits another ghost-like phenomenon in the verbal domain: infinitival reduplication. This pattern is observed when the two basic forms of the lexical verb are compared. As further described in §A.3, lexical verbs have two basic forms: a minimally inflected infinitival form and a maximally inflected inflectional form. Ende verbs in their infinitival forms exhibit reduplication if they are monosyllabic and monomorphemic (95)(a-b), but not if they are multisyllabic (95)(c) or multimorphemic (95)(d-e).

(95) *Ende infinitival verb forms*

	Inflected root	Infinitival form	Infinitival Gloss
a.	√*po*[19] /-po/	*popo* /po-po/	'INF-sharpen.NPLP'
b.	√*ga* /-ga/	*gage* /ga-ge/	'INF-PLant.PLP'
c.	√*imonz* /-imonz/	*imonz* /imonz/	'touch.NPLP'
d.	√*gany* /-ga-ɲ/	*gany* /ga-ɲ/	'plant-NPLP'
e.	√*pongg* /-po-ŋɡ/	*pongg* /po-ŋɡ/	'sharpen-NPLP.APPL (for someone)'

This sensitivity to syllable and morpheme count is not a feature of all reduplicative processes in Ende. For example, some derived adverbs also feature reduplication, but adverbial reduplication is applied categorically whether the stem is monosyllabic or multisyllabic, monomorphemic or multimorphemic (96).

(96) *Ende adverbial reduplication*

a. /kɽo-kɽoe/	'ADV-mix'; 'while mixing'
b. /mer-mer/	'ADV-good'; 'properly'
c. /kili-kili/	'ADV-happy' → ; 'happily'
d. /t͡ʂonen-t͡ʂo-nen/	'ADV-collect-PLP'; 'while collecting'
e. /tomon-tomo-n/	'ADV-wait-NPLP'; 'while waiting'

Like other ghost phenomena, Ende infinitival reduplication has the property that phonotactic well-formedness conditions determine its realization. In this case, reduplication is realized to satisfy minimal syllable count requirements. Infinitival reduplication also features the ghost-like property that its distribution within the lexicon cannot be determined solely by the phonological grammar or by the morphology. It is not the case that all monosyllabic words reduplicate; it is only monosyllabic, monomorphemic verbs. Thus, whatever element that triggers reduplication in these forms must be part of the underlying form or the input to the phonological grammar.

4.2.1 The form of reduplication

Reduplicated forms are typically characterized as being composed of two copies: a base and a reduplicant. If the two copies are identical to one another, this is termed total reduplication, *e.g.* (97)(a).

[19] Inflected roots are written with a root symbol (√) preceding them as they are bound roots and are always preceded by a prefix in this form.

(97)	Inflected root	Infinitival stem	Gloss	Class
a.	√ug	/ug-ug/	'to make earth oven'	I.NPL
b.	√d͡ʐəg	/d͡ʐə-d͡ʐəg/	'to bite'	I.NPL
c.	√dro	/do-dro/	'to clean'	I.NPL
d.	√**n**d͡ʐga	/d͡ʐə**ŋ**ga-d͡ʐə**ŋ**ge/	'to crucify'	I.NPL
e.	√mbɽəd	/bə-**m**bɽəd/	'to grow'	I.NPL
f.	√ɽɪt	/ɽɪt-ɪt/	'to tell'	I.NPL
g.	√**n**təli	/təli/	'to repeat'	I.NPL
h.	√dro-**ŋ**g	/dro-**ŋ**g/	'to clean-APPL.NPL'	I.NPL

If one the copies is not identical, this is typically called partial reduplication. In partial reduplication, the copy that is more reduced or less faithful to what can be analyzed as the underlying form of the root can be considered the reduplicant. Partial reduplication may include various types of emergence of the unmarked (TETU; McCarthy & Prince, 1994) effects like coda reduction (97)(b,e) and complex onset reduction (c,e). Floating nasals (bolded; see §3.2 for a description and analysis) may occur in both copies (d) or in just one copy (e). Very few verb roots exhibit rightward reduplication (f), but those that do categorically begin with a retroflex tap /ɽ/. Verb roots that are multisyllabic (g) or have obligatory suffixes (h) do not reduplicate in their infinitival form.

4.2.2 The source of reduplication

The nature of the source of reduplication is an essential factor for analytical theories of reduplication. In recent decades, it has been shown that the phenomena that have been analyzed collectively under the term reduplication can be distinguished based on the grammatical source of the duplication, namely between phonologically-triggered and morphologically-triggered duplication (Inkelas & Zoll, 2005; Singh, 2005).

The dual theory of reduplication (Inkelas, 2008), which posits two types of word-internal reduplication processes: phonological duplication and morphological doubling, packages this duality into a formal theory. These two sources of reduplication are formally distinct and make different predictions for the output of reduplicative processes. Briefly, phonological duplication is generated by the phonological grammar as a repair for a markedness violation, such as word minimality, vowel hiatus, onset-less syllables, or syllable sonority. In this way, phonological duplication is expected to be a minimal copy of phonological material present in the input to satisfy a markedness constraint. This strategy is like epenthesis, except the melodic features of the inserted segments are copied from the input, not determined by the grammar. Effects of the emergence of the unmarked (TETU; McCarthy & Prince, 1994) are expected in these copies, as markedness and faithfulness principles mediate the shape of the copy. Typically, phonological duplication generates short reduplicant forms, such as a copy of a V-, C-, or CV-. This restriction is because phonological markedness strategies that disprefer elements like codas and consonant clusters constrain the result of the duplication. Therefore, we would not expect reduplication processes that involve reduplicants with the shape of a syllable or larger to be triggered phonologically.

On the other hand, morphological doubling is a morphological process in which two copies of a root are called for in the underlying form. In such cases, no phonological correspondence is expected between the two copies after input into the phonological grammar. Because the segmental and melodic copies are already present in the input, TETU effects are not predicted in either of the copies, and the reduplicant can, in principle, be as large as the root, stem, word, or even phrase. Not all morphological doubling involves total reduplication, however. If one of the copies is reduced, this could be attributed to a truncatum cophonology indexed with one of the copies (Inkelas, 2008, p. 357).

On the surface, Ende infinitival reduplication seems to be a puzzle for the dual theory of reduplication because it exhibits characteristics of both phonological duplication and morphological doubling. Infinitival reduplication is sensitive to phonological structure: monosyllabic verb roots reduplicate, but multisyllabic verb roots do not. Moreover, it is also sensitive to morphological structure: monomorphemic verb roots reduplicate but multimorphemic verb roots do not. Moreover, the shape of the reduplicant may look like a phonological process (small, partial, with TETU effects) or like a morphological process (large, total, unmarkedness effects). I will show that Ende infinitival reduplication can best be analyzed as a mix between the two: morphologically-triggered phonological duplication (cf. Marantz, 1982).

In §4.2.4, I will show how an analysis which treats Ende infinitival reduplication as a morphologically-triggered phonological process accounts for the observed infinitival forms of over 500 Ende verbs, as described in §4.2.3. Finally, I also discuss some other aspects of reduplication in Ende, including fixed segmentism, sesquisyllables, rightward reduplication, and less-than-identical copies (§4.2.5).

4.2.3 Data

The following tables list all observed infinitival verb stems in the Ende corpus, dictionary, and verb database. All infinitival forms appear alongside a reference number (Verb ID), their inflected root form, a gloss, and their conjugation class.

Figure 2: Example of data table headings

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[24]	ug~ug	√ug	'to make mumu'	I.NPL

The infinitival stem that is shown in the tables is the infinitival form at its minimal possible inflection, while the inflected root shown in the tables is the bound root that only surfaces within the inflectional verbal template. Maximally, the infinitival form of the verb is composed of a root and a combination of at least one stem- or word-level[20] affix. This form may then host clitics that have derivational (forming a noun or adverb from a phrase) or case-marking functions. In contrast to the infinitival form, the inflected form of Ende verbs centers the verb root and pluractional suffixes within a set of cooperating prefixes and suffixes that mark tense, aspect, mood, direction, and argument agreement. The anatomy of an infinitival verb form is in Table 4, and the template for an inflected verb form is in Table 5.

[20] Level-ordering is motivated primarily by morpheme combinatorics and is discussed in §A.3.3.

Table 4: Anatomy of an infinitival verb form

word-level (thematic)	root	stem-level (PLU)	word-level (PLU/APPL)	clitics (derivational/case)	
V-	√	-n,-ɲ,-l,-ɽ (NPL;II)	-nen (PL;I|II)	=aŋ,=ag (agentive)	=(d)a (NOM)
		-Ng[21] (NPL;III)	-Ng (NPL.APPL)	=aj (adverbial)	=de (ACC)
		-Nmeɲ (PL;III)	-Nmeɲ (PL.APPL)	=ma (nominalizer)	=(w)e (ALL)
		-ab,-am (NPL;IV)			=aŋ (ATT)
		-ajb,-ajm (PL;IV)			=meɲ (PRIV)
					…

Table 5: Anatomy of an inflected verb form

TAM/argument prefixes			root	pluractional	pluractional/ applicative	TAM/argument suffixes	
d- (REM)	i- (VEN)	ə- (3NDUP)	√	-n,-ɲ,-l,-ɽ (NPL;II)	-neg (SG>PL)	-n (DUR)	-aɽo (REC.3NSGS|A)
n- (REC)	i- (NSGP)	a- (elsewhere)		-Ng (NPL;III)	-ajb (NSG>PL)		-an (REC.1|3SGS|A)
b- (FUT)				-Nmeɲ (PL;III)	-Ng (NPL.APPL)		-aɽe (REC.2SGS|A)
…				-ab,-am (NPL;IV)	-Nmeɲ (PL.APPL)		…
				-ajb,-ajm (PL;IV)			

The tables also list the conjugation class for each verb. There are four conjugation classes in Ende, defined by the types of affixes seen in nonplural and plural pluractional contexts, as shown in Table 6. In this table, the first column lists the conjugation class (I-IV), while the second two columns list the suffix(es) that mark nonplural or plural pluractionality in each of these classes. For example, in conjugation class II, the nonplural is marked with a monoconsonantal suffix such as /-n/ or /-ɲ/, while the plural is marked with an optional suffix //-næn//. The fourth and fifth columns list examples of infinitival forms in each class. Notice how //-næn// is realized as /-nen/: this is a regular phonological

[21] The symbol N represents a floating nasal segment that matches in place and precedes the leftmost non-initial obstruent in the word (§3.2).

change of proto-//æ// to /e/ in non-initial syllables. More importantly, notice how the infinitival form of the Class I nonplural and one of the variants of the Class II plural consist of nearly-identical copies of the verbal root: infinitival reduplication.

Table 6: Conjugation classes of lexical stems by pluractional pattern

Class	Nonplural	Plural	Nonplural	Plural	Gloss
I		//-næn//	/ug-ug/	/ug-nen/	‘to cook in earth oven’
II	//-n, -ɲ, -ɽ, -l//	(//-næn//)	/ga-ɲ/	/ga-ge, ga-nen/	‘to plant’
III	//-ng//	//-nmeɲ//	/tu-ŋg/	/tu-miɲ/	‘to support’
IV	//-ab, -am//	//-ajb, -ajm//	/bl-ab/	/bl-ajb/	‘to mature’

Infinitival reduplication only occurs for nonplural verb stems in Conjugation Class I and plural verb stems in Conjugation Class II, where the pluractional suffix is absent or optional. These are the only cells in the paradigm, in which the root may appear unaffixed, without any stem-/word-level affixes. Classes III and IV are shown for completeness.

First, we will consider reduplicative forms that exhibit total reduplication or two identical copies of the root. The forms in Table 7 are all either nonplural forms of Conjugation Class I or plural forms of Conjugation Class II. The inflected root of each of the forms is monosyllabic. If the form contains a coda, the coda also duplicates. Notice how verb roots with two vowels are treated as monosyllabic if one of the vowels is a light vowel, a vowel that is phonetically realized as /ə/ or /o/, but does does not head a syllable, *e.g.*, verbs [160] *däradära* //dᵊra-dᵊra// /dəradəra/ ‘to decorate’ and [428] *ngättangätta* //ŋᵊʈ͡ʂa-ŋᵊʈ͡ʂa// /ŋəʈ͡ʂaŋəʈ͡ʂa/ ‘to cross’ (see §A.4 for more on light vowels).

Table 7: Total reduplication (identical)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[24]	ug~ug	√ug	‘to make mumu’	I.NPL
[28]	ko~ko	√ko	‘to cut (meat)’	I.NPL
[29]	jag~jag	√jag	‘to look for’	I.NPL
[67]	mə**n**ɖ͡ʐ~mə**n**ɖ͡ʐ	√mə**n**ɖ͡ʐ	‘to drown’	I.NPL
[72]	go~go	√go	‘to build’	I.NPL
[79]	dum~dum	√**n**dum	‘to surround’	I.NPL
[93]	kəl~kəl	√kəl	‘to accuse’	I.NPL
[106]	be~be	√be	‘to leak’	II.PL
[133]	mə**n**d~mə**n**d	√mə**n**d	‘to feed’	I.NPL
[158]	wo~wo	√wo	‘to push through’	I.NPL
[160]	dəra~dəra	√dra	‘to decorate’	I.NPL
[191]	gəɖ͡ʐ~gəɖ͡ʐ	√gəɖ͡ʐ	‘to fight’	I.NPL
[201]	zi~zi	√zi	‘to uncover’	I.NPL
[217]	bəɲ~bəɲ	√bəɲ	‘to cut’	I.NPL
[229]	ŋəɲ~ŋəɲ	√ŋəɲ	‘to swallow’	I.NPL
[291]	i	√i	‘to weave’	I.NPL

[299]	kəd~kəd	√kəd	‘to debark’	I.NPL
[301]	kəɽ~kəɽ	√kəɽ	‘to dig’	I.NPL
[317]	lig~lig	√lig	‘to have sex’	I.NPL
[334]	məl~məl	√məl	‘to squeeze’	I.NPL
[338]	mət͡ʂ~mət͡ʂ	√mət͡ʂ	‘to put on’	I.NPL
[340]	mer~mer	√mer	‘to shrink’	I.NPL
[344]	mok~mok	√mok	‘to wipe’	I.NPL
[355]	ŋɪd~ŋɪd	√ŋɪd	‘to fold’	I.NPL
[385]	kət͡ʂ~kət͡ʂ	√kət͡ʂ	‘to wall’	I.NPL
[390]	ɽəp~ɽəp	√ɽəp	‘to dig’	II.PL
[392]	t͡ʂa~t͡ʂa	√t͡ʂa	‘to chop’	I.NPL
[396]	ŋən~ŋən	√ŋən	‘to swear’	I.NPL
[403]	ok~ok	√ok	‘to erase’	I.NPL
[409]	pət~pət	√pət	‘to dry’	I.NPL
[411]	poɽ~poɽ	√poɽ	‘to bark’	I.NPL
[412]	po~po	√po	‘to sharpen’	I.NPL
[417]	t͡ʂo~t͡ʂo	√t͡ʂo	‘to collect’	I.NPL
[428]	ŋət͡ʂa~ŋət͡ʂa	√ŋt͡ʂa	‘to cross’	I.NPL
[437]	boɽ~boɽ	√boɽ	‘to open sago’	I.NPL
[438]	om~om	√om	‘to sweep’	I.NPL
[446]	po~po	√po	‘to split’	I.NPL
[448]	pit͡ʂ~pit͡ʂ	√pit͡ʂ	‘to sew’	I.NPL
[456]	ŋo~ŋo	√ŋo	‘to smooth’	I.NPL
[458]	mir~mir	√mir	‘to lick’	I.NPL
[461]	tu~tu	√tu	‘to knock fruit continuously’	I.NPL
[481]	do~do	√do	‘to crumble sago’	I.NPL
[487]	wɪ**n**d~wɪ**n**d	√wɪ**n**d	‘to cover pit’	I.NPL
[504]	uɽ~uɽ	√uɽ	‘to cross over’	I.NPL
[505]	kət͡ʂ~kət͡ʂ	√kət͡ʂ	‘to fence’	I.NPL
[512]	zo~zo	√zo	‘to rot’	I.NPL
[514]	pɪd͡ʐ~pɪd͡ʐ	√pɪd͡ʐ	‘to grow’	II.PL
[515]	pɪɲ~pɪɲ	√pɪɲ	‘to plant a lot’	I.NPL
[522]	pi~pi	√pi	‘to shoot’	I.NPL
[547]	ŋəɽ~ŋəɽ	√ŋəɽ	‘to mature’	I.NPL
[548]	pir~pir	√pir	‘to take out’	II.PL
[549]	ɽəb~ɽəb	√ɽəb	‘to hide’	I.NPL
[554]	mal~mal	√mal	‘to mark area’	I.NPL
[556]	ɽo~ɽo	√ɽo	‘to pay respects’	I.NPL

Two other forms of reduplication feature nearly identical copies of verb roots but differ from one another on account of other phonological processes.

The first is ablaut reduplication (Table 8), in which underlying //æ// is realized as /a/ in the first syllable of a word and /e/ in the second syllable of a word interacts with reduplicative forms (see §A.4.5). The surface pattern is reminiscent of ablaut-style reduplication in English (*e.g.*, *flip-flop*, *tick-tock*, *drip-drop*). Notice how the vowel in the first copy of the Ende roots below is always /a/ and the vowel in the second copy of the root is /e/. Further, notice how light vowels in the roots, such as /ə/ and /o/, are ignored for syllable count as they do not head syllables.

Table 8: Total reduplication (ablaut)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[2]	na~ne	√ne	‘to drink’	I.NPL
[18]	gaz~gez	√gez	‘to exit’	II.PL
[22]	wab~eb	√web	‘to smash/belt’	I.NPL
[23]	gona~gone	√gone	‘to cook/burn’	I.NPL
[35]	pa~pe	√pe	‘to crush’	I.NPL
[48]	was~wes	√wes	‘to beg’	I.NPL
[56]	gəda~gəde	√gəde	‘to beat sago’	I.NPL
[73]	bəɽa~bəɽe	√bɽe	‘to find’	I.NPL
[75]	ɖ͡ʐə**ŋ**ga~ɖ͡ʐə**ŋ**ge	√**n**ɖ͡ʐge	‘to crucify’	I.NPL
[86]	pəʈ͡ʂa~pəʈ͡ʂe	√pʈ͡ʂe	‘to shake (dust)’	I.NPL
[88]	wan~wen	√wen	‘to shake (head)’	I.NPL
[89]	paɲ~peɲ	√peɲ	‘to discuss’	I.NPL
[90]	kəɽʈ͡ʂa~kəɽʈ͡ʂe	√kəɽte	‘to cast away’	I.NPL
[91]	ŋas~ŋes	√ŋes	‘to make/do’	I.NPL
[106]	baɽ~beɽ	√baɽ	‘to cook improperly’	I.NPL
[109]	baɖ͡ʐ~beɖ͡ʐ	√beɖ͡ʐ	‘to dry up’	I.NPL
[113]	dəma~dəme	√dəma	‘to sit down’	II.PL
[157]	məka~məke	√məke	‘to use’	I.NPL
[184]	kona~kone	√kone	‘to cover’	I.NPL
[186]	ga~ge	√ge	‘to plant’	II.PL
[208]	təba~təbe	√təba	‘to plan’	I.NPL
[213]	kɪɽa~kɪɽe	√kɪɽe	‘to scrape’	I.NPL
[219]	məla~məle	√mle	‘to patch’	I.NPL
[220]	wan~wen	√wan	‘to shake head’	I.NPL
[264]	ʈ͡ʂəma~ʈ͡ʂəme	√**n**ʈ͡ʂəma	‘to be crowded’	I.NPL
[270]	ʈ͡ʂam~ʈ͡ʂem	√ʈ͡ʂem	‘to be confused’	I.NPL
[289]	gɽa~gɽe	√gɽe	‘to skin’	I.NPL
[302]	kəɽma~kəɽme	√kəɽme	‘to survive’	I.NPL
[311]	kəɽa~kəɽe	√kəɽe	‘to poison’	I.NPL
[332]	məɽa~məɽe	√mɽa	‘to tie’	I.NPL
[335]	ma~me	√ma	‘to rain’	I.NPL
[365]	ɲa~ɲe	√ɲa	‘to take message’	I.NPL
[375]	wuda~ude	√ude	‘to light fire’	I.NPL
[398]	maʈ͡ʂ~meʈ͡ʂ	√maʈ͡ʂ	‘to put in fire’	II.PL
[423]	təga~təge	√tga	‘to hide’	II.PL
[426]	ʈ͡ʂəɲa~ʈ͡ʂəɲe	√**n**ʈ͡ʂɲe	‘to read’	I.NPL
[429]	oda~ode	√ude	‘to light fire’	I.NPL
[459]	təra~təre	√təre	‘to dig out’	I.NPL
[510]	ɽak~ɽek	√ɽek	‘to destroy’	I.NPL
[531]	gaɽ~geɽ	√geɽ	‘to deleaf’	I.NPL
[532]	kaɽ~keɽ	√keɽ	‘to deleaf’	I.NPL
[552]	pam~pem	√pam	‘to fish (a pond)’	I.NPL

Second, some reduplicative forms are exactly alike except that the two copies are separated by a floating nasal (bolded).

Table 9: Total reduplication (floating nasals)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[34]	ɡɽa~**ŋ**ɡɽa	√**ŋ**ɡɽa	‘to swim’	I.NPL
[105]	bəl~**m**bəl	√**m**bəl	‘to miss/remember’	I.NPL
[224]	ɽan go~**ŋ**go	√**ŋ**go	‘to listen intently’	I.NPL
[496]	d͡ʐo~**n**d͡ʐo	√**n**d͡ʐo	‘to boast’	I.NPL

Now we can turn to forms of partial reduplication, in which a segment that is present in the root is not copied in the reduplicative form. Similarly, we can sort partial reduplication between those that exhibit identical vowels in both copies of the root (Table 10) and those that exhibit an ablaut vowel pattern (Table 11). Notice that the first copy of the root is phonologically less marked than the second copy, in that it may be lacking an onset cluster consonant, a coda, or both.

Table 10: Partial reduplication

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[5]	də~**n**dər	√**n**dər	‘to hear’	I.NPL
[14]	moɽe də~**n**dər	√**n**dər	‘to smell’	I.NPL
[20]	d͡ʐə~d͡ʐəg	√d͡ʐəg	‘to bite’	I.NPL
[26]	ɽo~ɽom	√ɽom	‘to break (pot)’	I.NPL
[71]	ŋə~ŋəɽəb	√ŋəɽb	‘to get’	II.PL
[80]	kə~**ŋ**kəl	√**ŋ**kəl	‘to ascend’	I.NPL
[82]	ɡə~**ŋ**ɡəɽəm	√**ŋ**ɡɽəm	‘to wash’	I.NPL
[116]	d͡ʐə~**n**d͡ʐəm	√**n**d͡ʐəm	‘to drown’	I.NPL
[121]	pə~pɽəʈʂ	√pɽəʈʂ	‘to start walking’	II.PL
[125]	ɡə~ɡəb	√ɡəb	‘to jump in place’	II.PL
[151]	bə~bəɽəd	√bɽəd	‘to drop badly’	I.NPL
[170]	d͡ʐə~**n**d͡ʐəm	√**n**d͡ʐəm	‘to worry’	I.NPL
[173]	do~dro	√dro	‘to clean’	I.NPL
[212]	ko~kɽo	√kɽo	‘to scratch’	I.NPL
[214]	ko~kop	√kop	‘to peel’	I.NPL
[253]	ɡə~**ŋ**ɡɽəd	√**ŋ**ɡɽəd	‘to shove’	I.NPL
[260]	bo~**m**bɽo	√**m**bɽo	‘to increase/add’	I.NPL
[282]	bə~**m**bɽəd	√**m**bɽəd	‘to expand’	I.NPL
[303]	kə~**ŋ**kəm	√kəm	‘to squeeze’	I.NPL
[312]	ko~kto	√kto	‘to bail’	I.NPL
[323]	ko~**ŋ**kom	√kom	‘to carry’	II.NPL
[352]	d͡ʐə~**n**d͡ʐəl	√**n**d͡ʐəl	‘to climb’	I.NPL
[360]	ŋo~ŋop	√ŋop	‘to hug’	I.NPL
[372]	ume d͡ʐə~d͡ʐəl	√d͡ʐəl	‘to kiss’	I.NPL
[377]	tɪ~tɪrɪk	√trɪk	‘to untie’	I.NPL
[388]	ko~**ŋ**kot͡ʂom	√**ŋ**kot͡ʂom	‘to gulp’	I.NPL
[394]	d͡ʐə~d͡ʐəɽəb	√d͡ʐəɽb	‘to uproot’	II.PL
[420]	tə~tərəp	√trəp	‘to cut’	II.PL

[425]	tə~tərək	√trək	‘to go underneath’	I.NPL
[440]	kə~kɽət͡ʂ	√kɽət͡ʂ	‘to weed roughly’	I.NPL
[450]	gə~gɽəb	√gɽəb	‘to weed big’	I.NPL
[451]	kə~kɽəp	√kɽəp	‘to weed small’	I.NPL
[452]	də~dərəb	√drəb	‘to cut grass/flowers’	I.NPL
[453]	t͡ʂə~t͡ʂəɽəg	√t͡ʂɽəg	‘to tear’	I.NPL
[457]	to~trop	√trop	‘to descale’	I.NPL
[508]	t͡ʂə~**n**t͡ʂəm	√t͡ʂəm	‘to cook’	I.NPL
[541]	de~dre	√dre	‘to go down the valley’	I.NPL

Table 11: Partial reduplication (ablaut)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[17]	za~zer	√zer	‘to enter’	II.PL
[38]	ŋa~ŋleb	√ŋalb	‘to seek’	I.NPL
[87]	ɲa~ɲem	√ɲem	‘to respect’	I.NPL
[112]	da~deg	√dag	‘to board’	II.PL
[162]	ka~kek	√kak	‘to enter’	II.PL
[434]	pa~pek	√pek	‘to prevent’	I.NPL
[447]	ɽa~ɽem	√ɽem	‘to finish weaving’	I.NPL

Another form of partial reduplication involves verb roots of the form vowel-consonant (VC), in which the vowel is central (Table 12). In these cases, only the consonant appears to be copied into the reduplicative affix.

Table 12: Partial reduplication (VC)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[192]	t~ɪt	√ɪt	‘to dig a canoe’	I.NPL
[216]	ɲ~əɲ	√əɲ	‘to paint’	I.NPL
[310]	k~ɪk	√ɪk	‘to squeeze’	I.NPL
[414]	s~ɪs	√ɪs	‘to extinguish’	I.NPL
[444]	p~əp	√əp	‘to draw’	I.NPL
[491]	g~ɪg	√ɪg	‘to collect ants’	I.NPL
[528]	t͡ʂ~ət͡ʂ	√ət͡ʂ	‘to urinate’	I.NPL

The verbs in Table 13 deviate from other partially reduplicated forms, in that of the two copies of the root, it is the rightmost copy that is more reduced, as opposed to the leftmost copy. Interestingly, these verb roots all share a similar property: they all begin with a retroflex tap /ɽ/ and end with a coronal /t/ or /d/. Not all verb roots that begin with /ɽ/ exhibit partial rightward reduplication. Compare verb forms [390], [510], [549], and [556] that exhibit total reduplication and verb forms [26] and [447] that exhibit partial leftward reduplication. For ease of comparison, these are copied into Table 14. The difference between the two sets is that the verb roots in Table 13 end in a coronal, while those in Table 14 do not.

Table 13: Partial reduplication (rightward)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[142]	ɽɪt~ɪt	√ɽɪt	'to sing/tell'	I.NPL
[237]	ɽa**n**d~ed	√ɽe**n**d	'to make clear'	I.NPL
[327]	ɽəd~əd	√ɽəd	'to grab/marry'	I.NPL
[391]	ɽət~ət	√ɽət	'to remove stone'	I.NPL
[555]	ɽat~at	√ɽat	'to follow the blood'	I.NPL
[557]	ɽat~et	√ɽat	'to twist'	I.NPL

Table 14: Total and partial leftward reduplication (ɽ-initial)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[26]	ɽo~ɽom	√ɽom	'to break (pot)'	I.NPL
[390]	ɽəp~ɽəp	√ɽəp	'to dig'	II.PL
[447]	ɽa~ɽem	√ɽem	'to finish weaving'	I.NPL
[510]	ɽak~ɽek	√ɽek	'to destroy'	I.NPL
[549]	ɽəb~ɽəb	√ɽəb	'to hide'	I.NPL
[556]	ɽo~ɽo	√ɽo	'to pay respects'	I.NPL

Finally, the reduplication patterns exhibited by the verb roots in Table 15 are interesting because they display a fixed segmentism pattern. All other patterns of infinitival reduplication feature an identical copy of the base vowel in the reduplicant copy. However, for these verbs, the vowel in the reduplicant is fixed as low /a/, even though the quality of the vowels in the base is /ə/. In their infinitival and inflected forms, the verb roots in Table 15 consist of three consonants, the medial one being a liquid /r/ or /ɽ/, and the central vowel /ə/. Interestingly, these roots contain a low /a/ in their plural infinitival forms. Another interesting alternation: these verb roots have /a/ in their plural infinitival forms. /da-dərəb/ 'write.NPL', /darb-nen/ 'write.PL'.

Table 15: Partial reduplication (Ca- fixed segmentism)

Verb ID	Infinitival stem	Inflected root	Infinitival stem (plural)	Gloss	Class
[10]	da~dərəb	√darb	darb-nen	'to write'	I.NPL
[164]	da~dərəd	√dard	dard-nen	'to clear'	I.NPL
[215]	pa~pəɽək	√peɽk	paɽk-nen	'to split'	I.NPL
[407]	pa~pɽəg	√pɽəg	pɽag-nen	'to fly'	I.NPL
[421]	ta~tərəp	√terp	tarp-nen	'to cut bush'	I.NPL
[442]	ta~ntrəm	√term	tarm-nen	'to smash'	I.NPL
[484]	ga~gəɽəd	√geɽd	gaɽd-nen	'to cut leaves'	I.NPL

To summarize, infinitival reduplication forms may exhibit total, partial, leftward, rightward, and even fixed patterns of reduplication depending on the phonological make-up of the root.

All the reduplicative infinitival forms listed above are nonplural or plural forms of Conjugation Classes I and II respectively. Not all such verbs in these conjugation classes undergo reduplication. Recall that nonplural forms in Class I may exhibit reduplication (obligatory if monosyllabic) or zero-marking (obligatory if multisyllabic). In contrast, plural forms in Class II either exhibit reduplication (possible only for monosyllabic forms) or the plural suffix *-nen* /-nen/ (possible for monosyllabic forms and obligatory for multisyllabic forms. Thus, the nonplural, multisyllabic verb roots in Conjugation Class I exhibit obligatory zero-marking (Table 16), while the plural, multisyllabic verb roots in Conjugation Class II exhibit obligatory plural marking (Table 17). Another interesting observation about the roots and stems in Table 16 is that they all end in sonorants except for verb [183] *ergod*.

Table 16: Non-reduplication in I.NPL (multisyllabic, monomorphemic roots)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[1]	ŋonoj	√ŋonoj	‘to ask’	I.NPL
[11]	dəmoj	√ndəmoj	‘to push’	I.NPL
[13]	ɲoŋkoj	√ɲkoj	‘to pull’	I.NPL
[95]	t͡ʂamən	√t͡ʂemən	‘to finish’	I.NPL
[183]	ergod	√argod	‘to crawl’	I.NPL
[241]	iŋgol	√iŋgul	‘to go a little bit’	I.NPL
[274]	təli	√**n**tli	‘to repeat’	I.NPL
[286]	d͡ʐəɽgoj		‘to bush hike’	I.NPL
[304]	kamən	√kemən	‘to strike off’	I.NPL
[318]	lugoj	√lugoj	‘to drag’	I.NPL
[354]	do**ŋ**kal	√**n**dokal	‘to stop’	I.NPL
[362]	ɲəgaj	√ɲəgaj	‘to flail’	I.NPL
[369]	ɲəroj	√ɲroj	‘to creep’	I.NPL
[370]	ŋəmen	√ŋmen	‘to reach someone’	I.NPL
[379]	pənaj	√pənaj	‘to translate’	I.NPL
[381]	ibaj	√ibajneg	‘to dig with nose’	I.NPL
[382]	itraj	√itraj	‘to hang’	I.NPL
[387]	ŋanaj	√ŋanaj	‘to coil’	I.NPL
[405]	pəɲaj	√pəɲaj	‘to hop’	I.NPL
[408]	pitkaj	√pitkaj	‘to untie’	I.NPL
[415]	sai	√s	‘to close eye’	I.NPL
[424]	toŋoj	√toŋoj	‘to laugh’	I.NPL
[455]	inuŋoj	√inuŋoj	‘to shake’	I.NPL
[478]	sərə**m**baj	√**n**sərəbaj	‘to fix’	I.NPL
[488]	kəlbaj	√kəlbe	‘to burn feather’	I.NPL
[494]	dəbaj	√dəbaj	‘to drizzle’	I.NPL

[495]	dəbaj	√dəbaj	‘to knock fruit continuously’	I.NPL
[499]	dərmaj		‘to wipe out’	I.NPL
[524]	tulgoj	√itulgoj	‘to gossip’	I.NPL
[525]	wa**n**daj	√we**n**daj	‘to burn’	I.NPL
[530]	beŋaj	√ibiŋe	‘to roof’	I.NPL
[546]	timən	√timən	‘to release’	I.NPL
[550]	pəʈ͡ʂol	√pʈ͡ʂol	‘to start singing’	I.NPL
[551]	zuwoj	√zu	‘to shoot’	I.NPL

Table 17: Non-reduplication in II.PL (multisyllabic, monomorphemic roots)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[60]	otaj-nen	√otaj	‘to perch’	II.PL
[96]	moko-nen	√moko	‘to anoint’	II.PL
[115]	d͡ʐajb-nen	√d͡ʐajb	‘to divorce’	II.PL
[136]	gədaj-nen	√gədaj	‘to land’	II.PL
[146]	iʈ͡ʂaj-nen	√iʈ͡ʂaj	‘to hang from rope’	II.PL
[154]	koɽwa-nen	√kuɽwe	‘to hang (on branch)’	II.PL
[175]	tomo-nen	√ntəmo	‘to wait’	II.PL
[316]	ləpo-nen	√lpo	‘to doubt’	II.PL
[416]	ʈ͡ʂaeŋ-nen	√ʈ͡ʂaeŋ	‘to pull sucker’	II.PL
[540]	koɽdo-nen	√koɽdo	‘to stab/shoot’	II.PL

Four exceptions to this generalization are listed in Table 18. These four verb forms otherwise pattern as if they are in Conjugation Class I, except that they do not exhibit reduplication in their nonplural form, though they are monosyllabic. Interestingly, these four forms all end in a coronal /s/ or /z/. These four roots may constitute an additional conjugation class.

Table 18: Non-reduplication (monosyllabic, monomorphemic)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[138]	ŋəs	√ŋəs	‘to return’	I.NPL (or irregular?)
[322]	gəz	√gəz	‘to kill’	I.NPL (or irregular?)
[327]	kə**n**z	√**ŋ**kəz	‘to go off-road’	I.NPL (or irregular?)
[347]	ple**n**z	√**m**plez	‘to shock’	I.NPL (or irregular?)

It would be incorrect to generalize that infinitival reduplication is a process that applies to all monosyllabic verb stems. Monosyllabic verb stems in other conjugation classes do not reduplicate, as shown in Table 19. The stems in this table may all be analyzed as multi-morphemic, as they all contain a regular pluractional suffix.

Table 19: Non-reduplication (monosyllabic, multimorphemic)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[17]	za-n	√ze-n	‘to enter’	II.NPL
[30]	moɽe du-**ŋ**g	√**n**du-g	‘to sniff’	III.NPL
[49]	ʈ͡ʂo-**ŋ**g	√**n**ʈ͡ʂo-g	‘to give’	III.NPL
[76]	ʈ͡ʂ-am	√**n**ʈ͡ʂ-am	‘to call’	IV.NPL
[76]	ʈ͡ʂ-ajm	√**n**ʈ͡ʂ-ajm	‘to call’	IV.PL
[149]	bl-ab	√bl-ab	‘to mature’	IV.NPL
[149]	bl-ajb	√bl-ajb	‘to mature’	IV.PL
[174]	ʈ͡ʂoj-**ŋ**g	√**n**ʈ͡ʂoj-**ŋ**g	‘to scatter’	III.NPL
[186]	ga-ɲ	√ge-ɲ	‘to plant’	II.NPL
[193]	tu-**ŋ**g	√**n**tu-g	‘to support’	III.NPL
[198]	k-ən	√**ŋ**k-ən	‘to take out’	II.NPL
[211]	paj-**ŋ**g	√**m**paj-g	‘to guess’	III.NPL
[218]	ple-**ŋ**g	√ple	‘to die’	III.NPL
[242]	go-**ŋ**g	√**ŋ**go-g	‘to disturb bees’	III.NPL
[243]	gu-**ŋ**g	√**ŋ**gu-g	‘to marry a widow’	III.NPL
[256]	k-am	√**ŋ**k-am	‘to start’	IV.NPL
[256]	k-ajm	√**ŋ**k-ajm	‘to start’	IV.PL
[258]	k-am	√k-am	‘to cut skin or meat’	IV.NPL
[258]	k-ajm	√k-ajm	‘to cut skin or meat’	IV.PL
[272]	tra-**ŋ**g	√**n**tra-g	‘to quiet’	III.NPL
[353]	da-**ŋ**g	√**n**deg	‘to burn’	III.NPL
[366]	pu-**ŋ**g	√**m**pu-g	‘to get worse’	III.NPL
[492]	gɪ-**ŋ**g	√**ŋ**gɪ-g	‘to gang hit s.o.’	III.NPL
[516]	pu-**ŋ**g	√**m**pu-g	‘to make the first chop’	III.NPL
[517]	ɖ͡ʐu-**ŋ**g	√**n**ɖ͡ʐu-g	‘to decapitate’	III.NPL
[529]	suwe tɪ-**ŋ**g	√**n**tɪ-g	‘to urinate on’	III.NPL

Further evidence that the stems in Table 19 are multimorphemic comes from verb root [174]. As detailed in §3.2, homorganic nasal-obstruent sequences are indicative of a [+nasal] morpheme within the word and are only permitted to occur once per [+nasal] morpheme. The inflected verb stem of [174], √**n**ʈ͡ʂoj-**ŋ**g, contains two homorganic nasal-obstruent sequences /**n**ʈ͡ʂ/ and /**ŋ**g/, indicating that the stem is minimally bimorphemic.

From the data I have shown, one might settle on an analysis in which the reduplicative process is analyzed as a pluractional affix, given the fact that reduplication appears in complementary distribution with other pluractional affixes. Under such an analysis, a reduplication-triggering prefix with the semantics of ‘I.NPL’ and ‘II.PL’ would be available in the set of pluractional stem-level affixes available for forming an infinitival stem. Unfortunately, this analysis is untenable when we consider the ordering effects of other stem-/word-level suffixes.

Applicative suffixes are word-level suffixes that agree in number with an additional argument in the verb phrase, often a benefactor, recipient, or causee (refer to the infinitival verb structure in Table 4). Applicative suffixes are ordered outside of pluractional affixes, as shown in Table 20, where the nonplural applicative suffix *-ngg* /-**ŋ**g/ is affixed after the pluractional suffixes in the stem such as *-ab* /-ab/ ‘IV.NPL’ and *–(ä)n* /-(ə)n/ ‘II.NPL’.

Table 20: Applicative suffixes are ordered outside pluractional suffixes

Verb ID	Infinitival stem root-PLuractional	Infinitival stem root-PLuractional-applicative	Gloss	Class
[149]	bl-ab	bl-ab-ə**ŋ**g	‘to mature’	IV.NPL
[186]	ga-ɲ	ga-ɲ-ə**ŋ**g	‘to plant’	II.NPL
[198]	k-ən	k-ən-ə**ŋ**g	‘to take out’	II.NPL
[256]	k-am	k-am-ə**ŋ**g	‘to start’	IV.NPL

Compare this pattern to the verb stems in Table 21. These verb stems are nonplural, monosyllabic, and in Conjugation Class I, which means that they reduplicate in their infinitival form (Column 2). However, when the infinitival stem is additionally comprised of an applicative affix, the reduplication is seemingly blocked (Column 3). If the reduplication process were triggered by a pluractional affix akin to the pluractional suffixes in Table 20, then we would expect to see both reduplication *and* the applicative suffixes in Column 3 of Table 21.

Table 21: Applicative suffixes block infinitival reduplication

Verb ID	Infinitival stem root-PLuractional	Infinitival stem root-PLuractional-applicative	Gloss	Class
[28]	ko~ko	ko-**ŋ**g	‘to cut for s.o’	I.NPL
[29]	jag~jag	ja**ŋ**g-əg	‘look for s.o.’	I.NPL
[35]	pa~pe	pa-**ŋ**g	‘crush for s.o.’	I.NPL
[72]	go~go	go-**ŋ**g	‘build for s.o.’	I.NPL
[80]	kə~ŋkəl	kəl-ə**ŋ**g	‘climb for s.o.’	I.NPL
[142]	ɽɪt~ɪt	ɽɪ**n**t-əg	‘tell for s.o.’	I.NPL
[173]	do~dro	dro-**ŋ**g	‘clean for s.o.’	I.NPL
[291]	i	i-**ŋ**g	‘weave for s.o’	I.NPL
[446]	po~po	po-**ŋ**g	‘sharpen for s.o.’	I.NPL

To summarize the description of infinitival verb stem processes: monosyllabic verb roots reduplicate to form an infinitival stem if they do not bear any stem-/word-level suffixes. Multisyllabic verb roots do not reduplicate, even if they do not bear any stem-/word-level suffixes. Verb roots with stem-/word-level suffixes, even if still monosyllabic, do not reduplicate. Of those verbs that undergo reduplication, verb roots are lexically specified as to whether they exhibit total or partial reduplication. Most examples of partial reduplication are leftward, meaning that the more reduced copy is to the left of the full copy, but there are some examples of rightward reduplication if the verb root begins with a retroflex tap /ɽ/ and ends in a coronal /t/ or /d/. One reduplication pattern displays fixed segmentism. Other phonological processes such as floating nasals, surface //æ// realization, and light vowels affect the outputs of the reduplication processes.

In summary, monosyllabic verb stems of Conjugation Classes I (nonplural) and II (plural) exhibit total or partial reduplication, while multisyllabic verb stems of those same classes and monosyllabic verb stems of other conjugation classes do not exhibit reduplication. This pattern is unexpected according to the Dual Theory because a phonological analysis where a specific phonological class undergoes reduplication (*e.g.*, monosyllabic words) does not predict any sensitivity to morphological make-up, while a morphological analysis, where a specific conjugation class undergoes reduplication (*e.g.*, Class II plural) would not be predicted to exhibit phonological unmarkedness patterns. An analysis in which the reduplication is morphologically-triggered phonological duplication best captures the data described in this section. This analysis is laid out in the following section.

4.2.4 Analysis

What is the source of Ende infinitival reduplication? In light of the Dual Theory of Reduplication (Inkelas, 2008), we must consider whether the reduplication is serving a morphological function (Inkelas & Zoll, 2005) or whether it is occurring purely for phonological reasons (Alderete et al., 1999; Inkelas, 2008). Ende infinitival reduplication poses a challenge to the dual theory because the reduplicative patterns described in §4.2.3 are sensitive to both morphological and phonological structure. If infinitival reduplication were purely morphological, then the source of the two copies of the verb root in the infinitival stem would be a morphological structure that calls for two instances of the root in adjacent succession, as represented in (98). If infinitival reduplication were purely phonological, then the source of the reduplication would not be in the morphology. The morphological structure would consist of just one instance of the root, as in (99), and the duplication would be triggered by the phonological grammar as an optimal repair for phonological markedness.[22]

(98) Morphologically-triggered UF: √root-√root → √ko-√ko → /koko/
(99) Phonologically-triggered UF: √root → √ko → koko

The underlying structure of Ende infinitival forms cannot be the structure in (98), as this would overgenerate reduplicated forms, including reduplication of multisyllabic verb roots. However, as shown in Table 16 and Table 17, multisyllabic verb roots do not reduplicate. Likewise, the underlying structure can also not be the structure in (99), as this would similarly overgenerate reduplicative forms, including reduplication of multimorphemic, monosyllabic verb roots. As already shown in Table 19, multimorphemic, monosyllabic verb roots do not reduplicate. Thus, we must propose a non-canonical underlying form for Ende infinitival reduplication.

One clue to the underlying morphological structure of these verb stems is the fact that reduplication only occurs when the root occurs without any stem-/word-level affixes. We can understand this as a requirement of Ende verb roots to combine with a stem-/word-level affix in order to form a stem, similar to Latin theme vowels. This means that there are two ways to form infinitival forms from verb roots in Ende. The first way that the stem may be formed is via affixation of a pluractional suffix (100)(a), an applicative suffix (b), or both (c).

(100) a. $[[\text{ɡa}]_{\text{root}}\text{-ɲ}]_{\text{stem}}$ 'plant-II.NPL'
b. $[[\text{ko}]_{\text{root}}\text{-}\mathbf{ŋ}\text{ɡ}]_{\text{stem}}$ 'cut-APPL.NPL'
c. $[[[\text{dəme}]_{\text{root}}\text{-n}]\text{-ə}\mathbf{ŋ}\text{ɡ}]_{\text{stem}}$ 'sit-II.NPL-APPL.NPL'

The second way to form an infinitive is by combining the verb root with an affix that triggers reduplication (represented as RED for the time being, see the structure in (101)). This reduplicative affix is in complementary distribution with the other stem-/word-level affixes and does not have a semantic contribution. Instead, the affix takes a root, such as

[22] In effect, the dual theory replaces the notion of an abstract reduplicative morpheme (RED) that motivates both morphological and phonological reduplication (McCarthy & Prince, 1995).

√ko and forms a word, /koko/. There is no stem level here as this affix cannot cooccur with the stem-level suffixes.

(101) [RED-[√root]$_{\text{root}}$]$_{\text{word}}$ → [RED-[√ko]$_{\text{root}}$]$_{\text{word}}$ → /koko/ (to be amended in (103))

It is not uncommon that a morpheme may have phonological and syntactic content but lack semantic content. This is the analysis for many theme vowels, for example. Latin theme vowels are also semantically-empty but contribute to the word by moving the verbal stem further along the scale to wordhood so that it can take inflection (Aronoff, 1994; Caballero & Inkelas, 2013). In this same way, Ende stem-/word-level affixes and the reduplicative affix contribute to the formation of the word by transforming a verb root into a verb stem that may take further inflectional and derivational affixes.

Now, the question turns to the phonological structure of the reduplicative affix. In the output, we observe that the surface phonological structure of the affix corresponds to some or all the phonological elements of the base. Thus, the phonological elements in the input must already be identical to the root, or the affix must be melodically underspecified.

A prespecified identical input is predicted by morphological theories of reduplication, in which the phonological input is two juxtaposed copies of the root. This avenue is compatible with the total reduplication data but cannot account for the partial reduplication data. Recall how in Table 10-Table 15, the phonological shape of the reduplicative affix was a reduced form of the verbal root, typically of the form consonant-vowel (CV). The CV shape is atypical of most cases of morphological reduplication, in which the size of the reduplicant is bimoraic or larger (Inkelas, 2008, p. 357). Morphologically-triggered reduplicants are typically larger because any reduction in size must be attributed to a natural reduction process in the language, like truncation. It is an important prediction of Morphological Doubling Theory that the ways in which a partial reduplicant can be formed via truncation are the same ways in which a non-reduplicated constituent can be truncated (Inkelas, 2008). CVC is a possible truncation template in Ende (cf. *tongoe eka* 'silly language', see (139)). However, CV-style truncation is unattested in Ende (and elsewhere) possibly because it violates typical minimal word size constraints (Inkelas, 2008, p. 358).

Thus, we turn to the possibility in which the affix is melodically underspecified, and the phonological correspondence between the affix and the root is triggered by constraints in the phonological grammar. Such an input would result in a reduplicative output that matches the characteristics of phonological duplication. These characteristics are listed in Table 22 and compared with those of morphological reduplication, as outlined by Inkelas (2008).

Table 22: Comparison of phonological and morphological reduplication (Inkelas, 2008)

	Phonological duplication	Morphological doubling
Most closely related to	epenthesis and assimilation	compounding and affixation
Motivation	required by phonological output well-formedness (e.g., providing obligatory syllable structure without recourse to epenthesis)	morphological construction
Identity	phonological	morphosemantic
Target	phonological constituent (feature, segment, mora, syllable rime, syllable, foot)	morphological constituent (affix, root, stem, word, phrase)
Size	small; typically, single segment or syllable rime	large; typically, bimoraic or larger
Linear relationship to rest of output	essentially unrestricted	juxtaposition
Locality effects	duplicates closest constituent of same type	no locality restriction
Markedness	copy may show phonological unmarkedness effects	no phonological unmarkedness expected in copy

The phonological shape of the reduplicant varies in size from being minimal (V, CV, or VC shape) to maximal (C^VCV)[23], as shown in (102).

(102)	Shape	Infinitival stem	Gloss	Verb ID
	V	//i~i// → /i/	‘to weave’	[291]
	CV	//ko~ko// → /koko/	‘to cut’	[28]
	VC	//ug~ug// → /ugug/	‘to oven cook’	[24]
	C^VCV	//dᵊra~dᵊra// → /dəradəra/	‘to decorate’	[160]

[23] The superscript ^{V} represents a light vowel (see §A.4 on verbal phonology).

The vowel slot is the only consistent element of the reduplicative phonological structure, and we can represent this element in the phonological input as //V//. In this way, we can reformulate the stem formation structure posited in (101), as minimally containing a vowel slot //V// in the reduplicative affix, as shown in (103).

(103) [V-[√root]$_{\text{root}}$]$_{\text{word}}$ → [V-[√ko]$_{\text{root}}$]$_{\text{word}}$ → /koko/

The realization of this vowel slot is contingent upon the phonological well-formedness of the word. The vowel slot is only realized if deletion of the vowel would result in a monosyllabic root because such would violate a word minimality constraint. In this way, this vowel morpheme exhibits the behavior of a hero ghost element because it is only realized in order to repair a phonotactic violation, namely word minimality.

Word minimality can be defined as a phonotactic constraint that requires phonological words to consist of two syllables, in which the syllable is defined as a phonological element headed by a mora-projecting vowel.[24] As light vowels in Ende do not project moras, they are ignored in the evaluation of satisfaction of this constraint.

(104) WORD MINIMALITY (MINWD)
Assign a violation to every form that does not contain two syllables (=two syllable-projecting vowels).

How this vowel slot is realized with a vocalic melody can be accounted for in the same way that typical phonological duplication has been analyzed (Inkelas 2008) using the principles of Agreement by Correspondence (Hansson, 2001; Rose & Walker, 2004). Vowels that are adjacent to one another on the vocalic tier are in correspondence with one another (enforced by CORR-VV), and if they correspond, an identity constraint mandates full agreement between the two vowels (IDENT-[all]-O).

(105) CORR-VV
Assign a violation to any pair of vowels that are in sequence in the vocalic tier that do not correspond in the output.

[24] Like all optimality-theoretic constraints, the WORD MINIMALITY constraint is violable. There are many words in Ende that violate this constraint. For example, nominals like *lla* /ɽa/ ‘person’ and infinitival verbs like *gany* /ga-ɲ/ ‘plant-II.NPL’ are only composed of a single syllable. Theoretically, these monosyllabic outputs compete with disyllabic candidates, such as **alla* /aɽa/ and **ganya* /gaɲa/, which do not violate WORD MINIMALITY. These candidates do violate faithfulness constraints, which are ranked higher in the grammar.

(106) IDENT-[all]-O: Assign one violation for every pair of corresponding elements in the output that do not agree in all features.

Let us first consider how the grammar generates total reduplication for a form with a monosyllabic root (*e.g.*, //V-ko//; Tableau 36).

Tableau 36: MINWD, CORR-VV, IDENT-[all]-O » INTEGRITY, (total reduplication)

//V-ko//		MINWD	CORR-VV	IDENT-[all]-O	INTEGRITY
☞a.	$/k_1o_2k_1o_2/$				** (ko)
b.	$/k_1\text{ə}_2k_1o_2/$			*! (ə,o)	* (k)
c.	$/k_1\text{ə}k_1o/$		*! (ə,o)		* (k)
d.	/ko/	*!			

Candidate (a) in Tableau 36 represents the observed and optimal candidate. The first CV sequence ($/k_1o_2$…)corresponds with the root CV sequence (…$k_1o_2/$), as shown by the corresponding subscript numerals. The melodic features of the //-ko// sequence in the input correspond with two segments each in the output, incurring two violations of IDENTITY. Candidate (b) shows how the high ranking of IDENT-[all]-O regulates identical identity between corresponding vowels, while candidate (c) shows how the high ranking of CORR-VV ensures that adjacent vowels correspond. Finally, candidate (d), in which the theme vowel is deleted, violates MINWD. Because these three constraints, MINWD, CORR-VV, and IDENT-[all]-O, are ranked higher than INTEGRITY, candidate (a) is the most optimal even though it violates INTEGRITY the most amount of times.

In other words, the process of copying a melody from a nearby element is cheaper than the insertion of an epenthetic vowel quality into the vowel slot, which would violate CORR-VV or IDENTITY (candidates b and c). Non-realization of the vowel violates WORD-MINIMALITY, which requires verb forms to be minimally disyllabic (candidate d). Any form of melodic copying in the output will violate INTEGRITY, which requires elements in the input to have a one-to-one correspondence with elements in the output (candidate a). These CORRESPONDENCE, IDENTITY, and WORD-MINIMALITY constraints are ranked higher than INTEGRITY, and thus the grammar evaluates the output with an identical copy of the nearest root vowel in the reduplicative prefix as the most optimal.

Note that these constraints that regulate correspondence and identity between sequential vowels hold for all sequential vowels, not just sequences in which one vowel is an underspecified thematic vowel. Thus, for a word like *polle* /po.ɽe/ ‘fence’, the two fully specified vowels /o/ and /e/ would be in correspondence. However, a general IDENTITY constraint that regulates identity between the input and the output is ranked higher than CORR-VV and IDENT-[all]-O, thus allowing sequences of non-identical fully specified vowels to surface in the language. This is illustrated in Tableau 37, IDENTITY dominates CORR-VV and IDENT-[all]-O, such that either candidate (a) or (c) are evaluated as the most optimal. (Note that the surface phonetic form of these two outputs is identical. The only difference between the two is whether correspondence has been established which is undetectable in non-derived environments.)

Tableau 37: Non-agreement of fully specified vowels

//poɽe//		IDENTITY-IO	MINWD	CORR-VV	IDENT-[all]-O	INTEGRITY
☞a.	/po$_1$ɽe$_1$/				* (o,e)	
b.	/po$_1$ɽo$_1$/	*! (e,o)				* (o)
☞c.	/poɽe/			*! (o,e)		

The following tableaux will not consider output candidates, which differ in terms of correspondence or identity between fully specified vowels as these candidates are harmonically bounded by candidates, which realize fully-specified vowels faithfully.

Thus, the contribution of the two types of correspondence and identity constraints regulates harmonic realization of underspecified vowels and faithful realization of specified vowels.

Next, let’s consider the active role of the MINWD constraint. If non-realization of the vowel slot does not result in a word-minimality violation, then it will be the non-reduplicated output that will be evaluated as most optimal (Tableau 38). This output is favored because the grammar evaluates violations of INTEGRITY more seriously than violations of MAX(SKEL), which regulates faithfulness of skeletal elements between the input and the output.

Tableau 38: INTEGRITY » MAX(SKEL), (non-reduplication of multisyllabic stems)

//V-ŋəmen//		MINWD	CORR-VV	IDENT-[all]-O	INTEGRITY	MAX(SKEL)
a.	/ŋ$_1$ə$_2$ŋ$_1$ə$_2$men/				*!* (ŋə)	
☞b.	/ŋəmen/					*

Non-reduplication is also the best output for infinitival verb stems that do not contain the thematic vowel slot, even if they are monosyllabic. The observed monosyllabic outputs do violate WORD MINIMALITY, but because DEP(σ) ranks above WORD MINIMALITY, reduplication does not occur as these outputs would contain syllables in the output that are not in the input.

Tableau 39: DEP(σ) » MINWD, (non-reduplication of monosyllabic stems without V-)

//ga-ɲ//		DEP(σ)	MINWD	CORR-VV	IDENT-[all]-O	INTEGRITY	MAX(SKEL)
☞ a.	/gaɲ/		*				
b.	/g$_1$a$_2$ɲ$_3$g$_1$a$_2$ɲ$_3$/	*!				*** (gaɲ)	
c.	/gaɲa/	*!					

In most cases of infinitival reduplication, other elements besides the vowel are copied from the root into the syllable headed by the empty vowel slot (like the /k/ onset in Tableau 36). This process of copying onset and coda material from one syllable into another is mediated by the principle of Surface Correspondence Percolation.

(107) Surface Correspondence Percolation (Inkelas, 2008; Yu, 2005)
If syllable σ_i contains a segment S_i that is in surface correspondence with segment S_j in syllable σ_j, all segments in syllable σ_i must be in correspondence with all segments in syllable σ_j.

Inkelas (2008, p. 377) shows that this principle of syllable correspondence has not only been successful in many analyses of phonological duplication processes, but it is also suitable for correspondence-type analysis of "aggressive reduplication" phenomena (Zuraw, 2002). For example, many assimilatory "errors" in English involve what looks like duplication of a coda from a nearby syllable with the same nucleus, as illustrated in (108). Essentially, if the two nuclei are identical, there is some pressure for the entire rime of the syllable to be identical as well.

(108) Assimilatory "errors" (cited in Inkelas, 2008; Zuraw, 2002)

	Standard	Non-standard
a.	*pompon*	*pompom*
b.	*orangutan*	*orangutang*
c.	*smorgasbord*	*smorgasborg*
d.	*Inuktitut*	*Inuktituk*

Following Inkelas (2008), I will capture Surface Correspondence Percolation in Ende with the use of two constraints: CORR-σσ, which requires syllables containing corresponding elements to correspond, and Ident-σ-O, which requires all elements in corresponding syllables to be identical. What this means is that if two syllables have a pre-established correspondence within them (*e.g.*, correspondence of vowels), then the syllables are more likely to be phonetically alike (due to Identity-O constraints) and closer together (due to the stringent hierarchical principles of Correspondence constraints). One of the tenets of ABC is that phonological elements that are similar and close should also be more likely to be in correspondence, and thus these two constraints, Corr-σσ and Ident-σ-O uphold the basic ABC principles. Syllables that already contain one corresponding element also correspond with one another.

These correspondence and identity constraints are ranked higher than Integrity, which triggers the percolation of correspondence between the reduplicative affix and the root. This ranking accounts for all the patterns of total reduplication, whether that involves additional copying of a simple onset (Tableau 19), a coda (Tableau 20), complex onsets with moraless vowels (Tableau 21), or even floating nasals (Tableau 22).

(109) Corr-σσ
Assign a violation to any pair of syllables with one element in correspondence that do not correspond in the output.

(110) Ident-σ-O
Assign a violation for every element in any pair of corresponding syllables that does not have an identical counterpart in the other syllable.

Tableau 40: Corr-σσ, Ident-σ-O » Integrity

//V-ko//		MinWd	Corr-VV	Ident-[all]-O	Corr-σσ	Ident-σ-O	Integrity	Max(Skel)
☞a.	$[k_1o_2]_3[k_1o_2]_3$						** (ko)	
b.	$[o_1]_2[ko_1]_2$					*! (ø,k)	* (o)	
c.	$[w_1o_2]_3[k_1o_2]_3$			* (w,k)		*! (w,k)	* (o)	
d.	o_2ko_2				*!			

Tableau 41: Total reduplication (onset, coda)

//V-jag//		MinWd	Corr-VV	Ident-[all]-O	Corr-σσ	Ident-σ-O	Integrity	Max (Skel)
☞a.	$[j_1a_2g_3]_4[j_1a_2g_3]_4$						*** (jag)	
b.	$[j_1a_2]_3[j_1a_2g]_3$					*! (ø,g)	** (ja)	
c.	$[a_1]_2[ja_1g]_2$					*!* (ø,j; ø ,g)	* (a)	
d.	[jag]	*!						*

Tableau 42: Total reduplication (complex onsets, moraless vowels)

//V-d^{ə}ra//		MINWD	CORR-VV	IDENT-[all]-O	CORR-σσ	IDENT-σ-O	INTEGRITY	MAX (SKEL)
☞a.	[d$_1{}^ə{}_2$r$_3$a$_4$]$_5$[d$_1{}^ə{}_2$r$_3$a$_4$]$_5$						**** (d^{ə}ra)	
b.	[d$_1{}^ə{}_2$]$_3$[d$_1{}^ə{}_2$ra]$_3$					*!* (ø,r; ø,a)	** (d^ə)	
c.	[d^{ə}ra]	*!						*

Tableau 43: Total reduplication (floating nasals)

//V-**ɴ**,m^{ə}d//[25]		MINWD	CORR-VV	IDENT-[all]-O	CORR-σσ	IDENT-σ-O	INTEGRITY	MAX (SKEL)
☞a.	[m$_1$ə$_2$**n**$_{3,4}$d$_{4,5}$]$_6$ [m$_1$ə$_2$**n**$_{3,7}$d$_{5,7}$]$_6$						**** (m^{ə}nd)	
b.	[m$_1$ə$_2$**n**$_3$d$_{3,4}$]$_5$ [m$_1$ə$_2$d$_4$]$_5$					*! (n,ø)	** (m^{ə}d)	
c.	[m^ə**n**$_1$d$_1$]	*!						*

Let's take a closer look at the indices in Tableau 43. The two syllables /mənd/ and /mənd/ are in correspondence (index 6) because the two vowels /ə/ and /ə/ are in correspondence (regulated by CORR-VV; index 2). CORR-σσ and IDENT-σ-O trigger syllabic percolation and the correspondences between each element in the two syllables reflect this (indices 1, 2, 3, and 5). Also note that the homorganic nasal-obstruent sequences are also in correspondence relations to one another (following the analysis in §3.2). The /n/ and the /d/ correspond and agree in [place] (indices 4 and 7).

This process of affixation and syllable percolation imply a serial derivation and must occur before the process that changes underlying //æ// to /a/ in initial syllables and /e/ in non-initial syllables in order to account for the correspondence between reduplicative affixes and syllables headed by these vowels.

[25] The root vowel /^{ə}/ is represented as a light vowel (in superscript) because there is evidence that it does not project its own syllable. The plural infinitival form of this verb, /m^{ə}nd-nan/, has an underlying form //m^{ə}nd-næn//. Underlying //æ// only surfaces as /a/ in initial syllables, thereby providing evidence that the root vowel is light.

Tableau 44: Total reduplication (ablaut)

//V-pæ//		MINWD	CORR-VV	IDENT-[all]-O	CORR-σσ	IDENT-σ-O	INTEGRITY	MAX (SKEL)
☞a.	[p$_1$æ$_2$]$_3$[p$_1$æ$_2$]$_3$						** (pæ)	
b.	[p$_1$a$_2$]$_3$[p$_1$e$_2$]$_3$			*! (a,e)			** (pæ)	
c.	[pa]	*!						*

The ranking shown in the tableaux above is necessary for generating total reduplication, that is when complex onsets, light vowels, and codas are also copied into the thematic vowel morpheme. However, not all verb roots undergo total reduplication: some verb roots undergo partial reduplication where the reduplicant is less phonologically marked than the root. For present purposes, this means that the reduplicant will not duplicate any codas or complex onsets from the root into the syllable hosted by the theme vowel. If we compare the phonological shape of roots that undergo total reduplication and those that undergo partial reduplication (for example, cf. Table 7 and Table 10), we see that no obvious phonological or morphological factor can account for the distinct behavior. One possibility is that the phonological environment that triggered partial as opposed to total reduplicant was apparent historically but has now been masked by other processes. Another possibility is that the current system is a merger of two phonological systems, perhaps from two related Pahoturi River dialects. Until further investigation reveals the source of this behavioral distinction, I propose to use a cophonology approach (Anttila, 2002) to capture the fact that different lexemes are regulated by distinct grammars. This pattern requires two cophonologies (or distinct rankings): a total reduplication cophonology (above) and a partial reduplication cophonology (below).

Verb roots exhibiting partial reduplication are associated with a cophonology that has the markedness constraints *CODA and *CC ranked higher than CORR-σσ and IDENT-σ-O. This alternative ranking results in an emergence of the unmarked effect: codas and complex onsets are reduced in the reduplicative affix but retained in the root because faithfulness to the input, MAX(MEL), is ranked higher than the markedness constraints.

*Tableau 45: MAX(MEL) » *CODA, *CC » CORR-σσ, IDENT-σ-O (Partial reduplication)*

//V-trop//		MIN WD	CORR-VV	IDENT -[all]-O	MAX (MEL)	*CODA	*CC	CORR -σσ	IDENT-σ-O	INTEGRITY	MAX (SKEL)
☞a.	[t$_1$o$_2$]$_3$ [t$_1$ro$_2$p]$_3$					*	*		** (ø,r;ø,p)	** (to)	
b.	[t$_1$r$_2$o$_3$p$_4$]$_5$ [t$_1$r$_2$o$_3$p$_4$]$_5$					*!*	*!*			**** (trop)	
c.	[t$_1$o$_2$]$_3$ [t$_1$o$_2$]$_3$				*!* (rp)						**(rp)
d.	[trop]	*!				*	*				* (V)

Of course, verb roots exhibiting total reduplication, that is with codas and complex onsets in their reduplicative affixes, are associated with the total reduplication cophonology in which *CODA and *CC are ranked below CORR-σσ and IDENT-σ-O.

*Tableau 46: MAX(MEL), CORR-σσ, IDENT-σ-O » *CODA, *CC (Total reduplication)*

//V-jag//		MIN WD	CORR -VV	IDENT- [all]-O	MAX (MEL)	CORR -σσ	IDENT-σ-O	*CODA	*CC	INTEGRITY	MAX (SKEL)
☞a.	[j$_1$a$_2$g$_3$]$_4$[j$_1$a$_2$g$_3$]$_4$							**		*** (jag)	
b.	[j$_1$a$_2$]$_3$[j$_1$a$_2$g]$_3$						*! (ø,g)	*		** (ja)	
c.	[a$_1$]$_2$[ja$_1$g]$_2$						*!* (ø,j;ø,g)	*		* (a)	
d.	[jag]	*!						*			*

Reduplicative forms with floating nasals complicate the one-to-one and linear correspondence between the two syllables. For example, consider verb [34] *gllangglla* /gɽaŋgɽa/ ‘to swim’. The input to this infinitival form is //V-N,gɽa//, as shown in Tableau 47.

Tableau 47: SSP, DEP(MEL), MAX(MEL), CORR-σσ » IDENT-σ-O

//V-N,gɽa//		SSP	DEP(MEL)	MAX (MEL)	CORR -σσ	IDENT-σ-O	*CODA	*CC	INTEGRITY
a.	[**ŋ**$_{1,2}$g$_{2,3}$ɽ$_4$a$_5$]$_6$[**ŋ**$_{1,7}$g$_{3,7}$ɽ$_4$a$_5$]$_6$	*!*						**	***** (ŋgɽaŋ)
b.	[g$_1$ɽ$_2$a$_3$**ŋ**$_{4,5}$]$_6$[g$_{1,5}$ɽ$_2$a$_3$**ŋ**$_4$]$_6$		*! (ŋ)				**	**	***** (gɽaŋŋ)
c.	[g$_1$ɽ$_2$a$_3$]$_4$[g$_1$ɽ$_2$a$_3$]$_4$			*! (N)				**	*** (gɽa)
d.	[a$_1$**ŋ**$_2$][g$_2$ɽa$_1$]				*!		*	*	**(aŋ)
☞e.	[g$_1$ɽ$_2$a$_3$**ŋ**$_4$]$_5$[g$_{1,4}$ɽ$_2$a$_3$]$_5$					*(ŋ,ø)	*	**	**** (gɽaŋ)

Because the observed output, candidate (e), features a complex onset in the reduplicative affix, we know that this verb root is associated with the total reduplication cophonology, in which IDENT-σ-O is ranked higher than *CODA and *CC. The grammar derived for the alignment of floating nasals (see §3.2) ensures that the floating nasal in the input will be realized preceding the leftmost non-initial obstruent in the word, as shown in candidates (a), (b), (d), and (e). The constraints CORR-σσ and IDENT-σ-O enforce correspondence and agreement between the two syllables. If these two constraints are to be unviolated, the floating nasal must either surface in both syllables (candidates (a) or (b)) or not at all (candidate (c)). The position of the first /ŋ/ in candidate (a) violates the highly ranked sonority sequencing principle (SSP), while the insertion of the melodic features, such as [place], needed to realize the second /ŋ/ in candidate (b) violates DEP(MEL). Non-realization of the floating nasal in candidate (c) violates MAX(MEL). The final way to vacuously satisfy IDENT-σ-O is for the two syllables not to be in correspondence at all, violating CORR-σσ (candidate (d)). Thus, candidate (e) represents the output that best satisfies Syllable Correspondence will retaining the floating nasal and satisfying the sonority sequencing principle.

Now consider two [+nasal] verb roots that are associated with the partial reduplication cophonology: *gängglläd* /gəŋgɽəd/ 'to wash' and *bombllo* /bombɽo/ 'to increase'. The only difference in ranking between Tableau 48-Tableau 49 and Tableau 47 is the partial reduplication cophonology alternation in which *CODA and *CC are now ranked above IDENT-σ-O. Otherwise, the constraint rankings are the same and the correct outputs, in which floating nasals are retained, but complex onsets and codas are reduced in the reduplicative affix are evaluated as optimal by the grammar.

Tableau 48: Partial reduplication with floating nasals

//V-n,gɽəd//		SSP	DEP(MEL)	MAX(MEL)	CORR-σσ	*CODA	*CC	IDENT-σ-O	INTEGRITY
a.	[g$_1$ɽ$_2$ə$_3$**n**$_{4,5}$d$_{5,6}$]$_7$ [g$_1$ɽ$_2$ə$_3$**n**$_{4,8}$d$_{6,8}$]$_7$					**	*!*		****** (gɽəndn)
b.	[g$_1$ə$_2$**ŋ**$_{3,4}$]$_5$ [g$_{1,4}$ɽə$_2$**n**$_3$d]$_5$					**	*	*** (ŋ,n;ø,ɽ;ø,d)	***!* (gəŋn)
☞c.	[g$_1$ə$_2$**ŋ**$_3$]$_4$ [g$_{1,3}$ɽə$_2$d]$_4$					**	*	*** (ŋ,ø;ø,ɽ;ø,d)	*** (gəŋ)
d.	[gə][gɽəd]			*! (N)		*	*	**(ø,ɽ;ø,d)	** (gə)

Tableau 49: Partial reduplication with floating nasals

	//V-n,bɽo//	SSP	DEP(MEL)	MAX(MEL)	CORR-σσ	*CODA	*CC	IDENT-σ-O	INTEGRITY
a.	[b$_1$ɽ$_2$o$_3$**m**$_4$]$_5$ [b$_{1,4}$ɽ$_2$o$_3$]$_5$					*	*!*	* (m,ø)	**** (bɽom)
☞b.	[b$_1$o$_2$**m**$_3$]$_4$[b$_{1,3}$ɽo$_2$]$_4$					*	*	**(m,ø;ø,ɽ)	***(bom)
c.	[b$_1$o$_2$]$_3$[b$_1$ɽo$_2$]$_3$			*! (N)			*	*(ø,ɽ)	**(bo)

Now let us consider the three seemingly irregular partial reduplication patterns: partial-VC reduplication (data in Table 12), fixed segmentism (data in Table 15), and rightward reduplication (data in Table 13).

The pattern of partial-VC reduplication involves verb roots of the phonological shape vowel-consonant (VC) in which the vowel is central (/ə/ or /ɪ/). Typically, verb roots of the shape VC exhibit total reduplication. Four such verbs with non-central vowels are listed in Table 23. However, when verb roots of the shape VC have central vowels, the reduplication pattern appears to copy only the coda, not the nucleus of the syllable, see Table 12, copied below as Table 24.

Table 23: Total reduplication (VC)

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[24]	ug~ug	√ug	'to make mumu'	I.NPL
[403]	ok~ok	√ok	'to erase'	I.NPL
[438]	om~om	√om	'to sweep'	I.NPL
[504]	uɽ~uɽ	√uɽ	'to cross over'	I.NPL

Table 24: Partial reduplication (VC), copy of Table 12

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[192]	t~ɪt	√ɪt	'to dig a canoe'	I.NPL
[216]	ɲ~əɲ	√əɲ	'to paint'	I.NPL
[310]	k~ɪk	√ɪk	'to squeeze'	I.NPL
[414]	s~ɪs	√ɪs	'to extinguish'	I.NPL
[444]	p~əp	√əp	'to draw'	I.NPL
[491]	g~ɪg	√ɪg	'to collect ants'	I.NPL
[528]	ʈ͡ʂ~əʈ͡ʂ	√əʈ͡ʂ	'to urinate'	I.NPL

Following the pattern in Table 23, we might expect the output of //V-ɪt// or //V-əɲ// to be */ɪtɪt/ or */əɲəɲ/. These forms are not observed, and in fact, there are not any words in Ende that begin or end with a central vowel /ɪ/ or /ə/. Thus, I assume that a phonological process reduces the word-initial central vowel in these forms after reduplication takes place. Alternatively, one could imagine a process in which a form with initial /ə/ or /ɪ/ violates a constraint, e.g., *#ɪ, which motivates a repair in the form of a copied consonant from the coda. Unfortunately, if such a repair were possible, the optimal candidate would be one that also did not delete the skeletal vowel slot: the winning candidate (d) 💣/tɪtɪt/ is less marked than the observed candidate (e) ☞/tɪt/ because it satisfies the minimal word requirements and is more faithful to the input. For these reasons, I assume that the form undergoes total reduplication (candidate (a) in Tableau 50) and then is reduced to the surface form at a later stage because of a process that deletes initial, central vowels, like *#ɪ, which assigns a violation for word-initial central ɪ.

Tableau 50: Untenable analysis of VC-partial reduplication

//V-ɪt//		*#ɪ	MINWD	SSP	DEP (MEL)	MAX (MEL)	CORR -σσ	IDENT-σ-O	*CODA	*CC	INTEGRITY	MAX (SKEL)
a.	[ɪt][ɪt]	*!							**		**(ɪt)	
b.	[ɪt]	*!	*						*			*
c.	[wɪt][ɪt]				*! (w)			*(w,ø)	**		**(ɪt)	
💣 d.	[tɪ][tɪt]							*(ø,t)	*		***(tɪt)	
☞ e.	[tɪt]		*!						*		*(t)	*

Next, let us consider the set of verb roots that seem to exhibit fixed segmentism in their partial reduplication pattern. Verb roots that are realized as √drəb, √pɽəg, and √gəɽd in their inflected forms are realized as /da~dərəb/, /pa~pɽəg/, and /ga~gəɽəd/ in their infinitival forms, (see all observed examples of this pattern in Table 15, repeated below as Table 25). Notice how the vowel in the reduplicant, /a/, is not identical to the vowel(s) in the base /ə/, but do match the vowels in the inflected and plural infinitival forms.

Table 25: Partial reduplication (Ca- fixed segmentism)

Verb ID	Infinitival stem	Inflected root	Infinitival stem (plural)	Gloss	Class
[10]	da~dərəb	√darb	darb-nen	'to write'	I.NPL
[164]	da~dərəd	√dard	dard-nen	'to clear'	I.NPL
[215]	pa~pəɽək	√peɽk	paɽk-nen	'to split'	I.NPL
[407]	pa~pɽəg	√pɽəg	pɽag-nen	'to fly'	I.NPL
[421]	ta~tərəp	√terp	tarp-nen	'to cut bush'	I.NPL
[442]	ta~ntrəm	√term	tarm-nen	'to smash'	I.NPL
[484]	ga~gəɽəd	√geɽd	gaɽd-nen	'to cut leaves'	I.NPL
[485]	ka~kəɽət	√keɽt	kaɽtə-nen	'to split leaf'	I.NPL

These forms can be contrasted with minimal pair roots such as √drəb, √pɽəʈ͡ʂ, and √bɽəd, which exhibit faithful vowel copying in their infinitival forms (/də~dərəb/, /pə~pɽəʈ͡ʂ/, and /bə~bəɽəd/) and /ə/ in their plural infinitival forms.

Table 26: Partial reduplication (C(ə)L(ə)C root)

Verb ID	Infinitival stem	Inflected root	Infinitival stem (plural)	Gloss	Class
[425]	tə~tərək	√tərək	tərk-nan	'to go under'	I.NPL
[440]	kə~kɽəʈ͡ʂ	√kɽəʈ͡ʂ	kɽəʈ͡ʂ-nan	'to weed roughly'	I.NPL
[450]	gə~gɽəb	√gɽəb	gɽəb-nan	'to weed big'	I.NPL
[451]	kə~kɽəp	√kɽəp	kəɽp-nan	'to weed small'	I.NPL
[452]	də~dərəb	√drəb	dərəb-nan	'to cut grass/flowers'	I.NPL

Underlyingly, the root of the verb *dadäräb* /dadərəb/ 'to write' contains the low front vowel //æ//, which surfaces as /a/ in initial syllables and /e/ in non-initial syllables. While a reduction process renders the presence of this vowel opaque in the root of the singular infinitive form, its existence is observable in the reduplicant, as well as in the root of the inflected form (//√dærb// → /√darb/ ~ /√derb/) and the plural infinitival form (//dærb-næn// → /darb-nen/). Thus, what appears to be a type of fixed segmentism reduplication is regular duplication combined with a vowel reduction process that masks the underlying quality of the vowel. More data is needed on //æ// reduction processes to offer a comprehensive analysis of this second process.

Finally, we can consider rightward partial reduplication, the data for which is presented in Table 13 and Table 14, repeated below as Table 27 and Table 28. Essentially, we see that monosyllabic verb roots that begin with a retroflex tap /ɽ/ and end with a coronal stop /t/ or /d/ exhibit rightward reduplication, while verb roots that begin with a retroflex tap /ɽ/ and end with nasal or non-coronal stops exhibit regular total or partial reduplication.

Table 27: Partial reduplication (rightward), copy of Table 13

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[142]	ɽɪt~ɪt	√ɽɪt	'to sing/tell'	I.NPL
[237]	ɽa**n**d~ed	√ɽe**n**d	'to make clear'	I.NPL
[327]	ɽəd~əd	√ɽəd	'to grab/marry'	I.NPL
[391]	ɽət~ət	√ɽət	'to remove stone'	I.NPL
[555]	ɽat~at	√ɽat	'to follow the blood'	I.NPL
[557]	ɽat~et	√ɽat	'to twist'	I.NPL

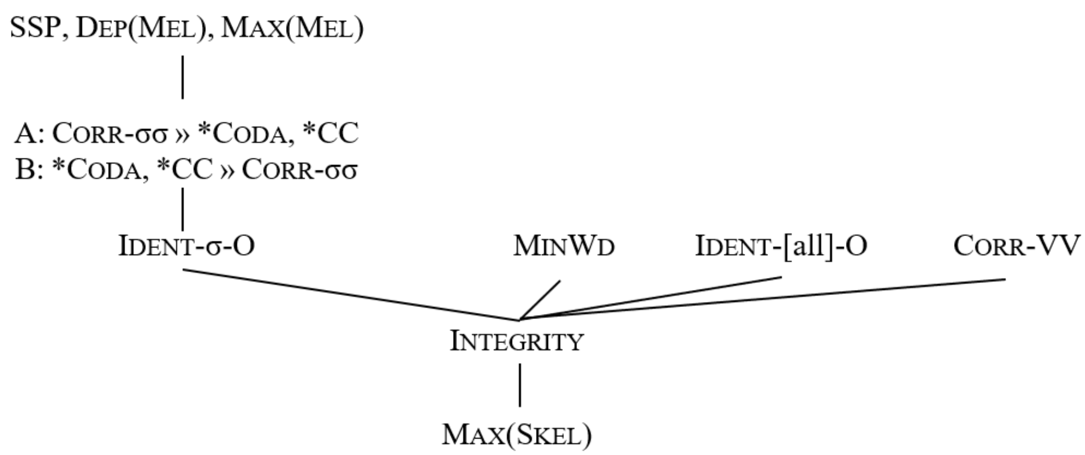
Table 28: Total and partial leftward reduplication (ɽ-initial), copy of Table 14

Verb ID	Infinitival stem	Inflected root	Gloss	Class
[26]	ɽo~ɽom	√ɽom	‘to break (pot)’	I.NPL
[390]	ɽəp~ɽəp	√ɽəp	‘to dig’	II.PL
[447]	ɽa~ɽem	√ɽem	‘to finish weaving’	I.NPL
[510]	ɽak~ɽek	√ɽek	‘to destroy’	I.NPL
[549]	ɽəb~ɽəb	√ɽəb	‘to hide’	I.NPL
[556]	ɽo~ɽo	√ɽo	‘to pay respects’	I.NPL

I can imagine an ad-hoc analysis in which an interaction between some constraints such as MAX(Coronal), which inhibits deletion of coronals, and *ɽ, which inhibits the realization of retroflex taps work together to produce this pattern. Unfortunately, it would grossly overgenerate retention of coronals and deletion of retroflex taps elsewhere in the system. Moreover, according to Kiparsky (1994), there could be no constraint such as MAX(Coronal). I leave this pattern for further study.

To summarize, the ordering of the constraints relevant for patterns of infinitival reduplication can be schematized as in Figure 3.

Figure 3: Constraint ranking for infinitival reduplication



4.2.5 Other aspects of reduplication

In the analysis of floating nasals, we utilized the principles of syllable contact law to account for the alignment of nasals in pre-obstruent position. These principles would seem to be a prominent source for the partial reduplication patterns: perhaps the codas are deleted in order to avoid poor segment sequences over syllable contacts. Unfortunately, there does not appear to be a phonologically determined context that predicts when codas delete or are retained. Therefore, we have resorted to associating a subset of verb roots with a cophonology that generates total reduplication and the remainder of the verb roots with a cophonology that generates partial reduplication. Interestingly, these two cophonologies are independently active in other languages. The total reduplication cophonology, where Surface Correspondence Percolation is ranked higher than markedness constraints like *CODA is active in processes like Cantonese loanword adaptation and others (Yu, 2003, 2004, 2005, 2007). The partial reduplication cophonology, which outputs CV- style partial reduplicants can account for many types of phonological CV- reduplication, in languages like Kuuk Thaayorre (Gaby, 2017), Halq'eméylem (Urbanczyk, 1998) and Cupeño (Haynes, 2007). These languages all support treating CV (or VC) reduplication as phonological duplication, deriving from mora or V affixation (Inkelas, 2008, p. 388), just as we have motivated for the Ende reduplication process.

Chapter 5: Ghost interactions

It is not uncommon for languages with one instance of a ghost element to also exhibit other ghost elements within the phonological system. For instance, Chaha famously has multiple instantiations of melodic, martyr ghosts (*e.g.*, Chaha labialization and palatalization). These ghosts may even have different behavioral patterns. For instance, Chaha labialization is a floating type of ghost, while Chaha palatalization is a latent type (Zoll, 1996/1998). Yowlumne also has multiple types of ghost elements: Yowlumne ghost consonants are a melodic, martyr type of ghost (see (10)), while Yowlumne ghost vowels are a skeletal, hero type of ghost (see (11)). This pattern is also apparent in Ende: Ende floating nasals are a melodic, martyr type of ghost (see §3.2), while Ende theme vowels are a skeletal, hero type of ghost (see §4.2).

When these two types of ghost elements co-occur in the same language, the following rankings must hold: the faithfulness constraint that prohibits deletion of the martyr ghost must be ranked higher than the faithfulness constraint that prohibits realization of the martyr ghost. At the same time, the faithfulness constraint that prohibits realization of the hero ghost must rank higher than the faithfulness constraint that prohibits deletion of the hero ghost.

Because optimality-theoretic faithfulness constraints cannot *see* whether or not the ghost element in question is a martyr type or a hero type, the constraint rankings formulated in (111) and (112) are untenable.

(111) MAX(MARTYR) » DEP(MARTYR)
(112) DEP(HERO) » MAX(HERO)

Instead, Optimality Theory predicts that the grammar should generate these behavioral patterns; they should not be built into the constraints. The analyses of ghost elements in the previous three chapters illustrate how hero and martyr behavior can be generated by ranking faithfulness constraints that are sensitive to the subsegmental composition of the ghost elements, for example, whether the ghost element is specified for melodic features or skeletal features. Thus, a pair of constraint rankings that generate martyr-type behavior of melodic ghost elements and hero-type behavior of skeletal ghost elements could be those in (113) and (114).

(113) MAX(MEL) » DEP(SKEL)
(114) DEP(MEL) » MAX(SKEL)

The ranking in (113) indicates that it is more costly to delete melodic subsegments than it is to add the skeletal subsegments necessary to realize a melodic ghost. The ranking in (114) indicates that it is more costly to add a melodic subsegment necessary for a skeletal ghost to surface than it is to delete the skeletal subsegment. In this way, these rankings generate martyr melodic ghosts and hero skeletal ghosts.

However, there is nothing intrinsic to melodic ghosts that makes them behave like martyrs or to skeletal ghosts that makes them behave like heroes. A rearranging of these four constraints generates four types of phonological systems in which melodic ghosts and skeletal ghosts can be either heroes or martyrs. The fact that constraints can be reranked and that this mechanism predicts a range of possible phonological systems makes Optimality Theory a typologically oriented theory of phonology. The next two sections illustrate this typology of phonological systems in which ghosts interact in these four ways and a case study of the interaction of the two types of ghost elements in Ende.

5.1 Ghost interaction typology

This section summarizes the types of phonological systems predicted to be possible if faithfulness constraints, such as MAX and DEP, are sensitive to subsegmental elements, such as the melody and the skeleton. If we consider a phonological system with two ghost elements, one melodic and one skeletal, there are four clear pattern types. Two of these patterns have consistent behavior by all ghosts elements: in the first, both melodic and skeletal ghosts are martyrs, appearing by default unless they cause a markedness violation, and in the second both types of ghosts are heroes, failing to appear by default but surfacing if their absence would cause a markedness violation. The other two patterns have conflicting behaviors between the ghosts: in the first, melodic ghosts are martyrs, and skeletal ghosts are heroes, and in the second, melodic ghosts are heroes, and skeletal ghosts are martyrs. This typology is organized in (115).

(115)

<table>
<tr><td></td><td></td><td colspan="2">Melodic ghost</td></tr>
<tr><td></td><td></td><td>Realized (martyr)</td><td>Not realized (hero)</td></tr>
<tr><td rowspan="2">Skeletal ghost</td><td>Realized (martyr)</td><td>System1
(both martyrs)</td><td>System 2
(conflicting)</td></tr>
<tr><td>Not realized (hero)</td><td>System 3
(conflicting)</td><td>System 4
(both heroes)</td></tr>
</table>

These four patterns are predicted by ranking the faithfulness constraints, MAX(MEL), MAX(SKEL), DEP(MEL), and DEP(SKEL) in four possible permutations, as shown in the tableaux below.

To illustrate these patterns, I have made up a hypothetical input with two ghost elements: //Vle(t)//. The V represents a skeletal vowel (V), and the (t) represents a melodic consonant (t). To see how these ghost elements behave with respect to various markedness conditions, we will look at contexts in which (a) presence of the ghost elements causes a markedness violation, (b) presence of the ghost elements repairs a markedness violation, and (c) presence of the ghost elements neither causes nor repairs a markedness violation. Though the exact type of markedness is not at issue, we will use two markedness constraints that are active in many languages: the SONORITY SEQUENCING PRINCIPLE (SSP), which prohibits non-rising onsets and non-falling codas and ONSET, which prohibits onsetless syllables.

(116) ONSET
Assign one violation for every syllable in the output the does not have an onset.

For this factorial typology, we will consider the grammar types, in which the markedness constraints are ranked strictly higher than the faithfulness constraints as this captures the four-way distinction in possible realization strategies. To illustrate the realizational behavior of the skeletal ghost, we will position this root into three contexts in which the presence of the skeletal ghost (a) causes markedness, (b) repairs markedness, or (c) neither causes nor repairs markedness. These contexts are listed in (117).

(117)	Input form	Presence of V
	a. Vle(t)	causes markedness (violates ONSET)
	b. r-Vle(t)	repairs markedness (would otherwise violate SSP)
	c. p-Vle(t)	neither causes nor repairs markedness

Similarly, to illustrate the realizational behavior of the melodic ghost, we will position this root into three contexts in which the presence of the melodic ghost (a) causes markedness, (b) repairs markedness, or (c) neither causes nor repairs markedness. These contexts are listed in (118).

(118)	Input form	Presence of (t)
	a. Vle(t)-n	causes markedness (violates SSP)
	b. Vle(t)-a	repairs markedness (would otherwise violate Onset)
	c. Vle(t)	neither causes nor repairs markedness

By pairing each skeletal ghost context with each melodic ghost context, we arrive at nine contexts in which two kinds of ghost vowels, melodic and skeletal, coexist. With an undominated ranking of the markedness constraints SSP and ONSET, we predict that the ghost elements will always surface when necessary to repair markedness and always fail to surface when their presence would cause markedness. It is their behavior in contexts where the ghosts neither cause nor repair markedness that distinguish the four phonological systems. These contexts are bolded in Table 29, which lists the nine inputs (a-i) for each of the pairs of contexts listed in (117) and (118). Alongside each of those inputs are the optimal outputs as evaluated by each of the four distinct grammars. All these grammars rank the markedness constraints, ONSET and SSP, as undominated but differ in the ways that the four faithfulness constraints, MAX(MEL), MAX(SKEL), DEP(MEL), and DEP(SKEL) are ranked beneath them. This typology was generated with the help of OTSoft software (Hayes, Tesar, & Zuraw, 2013).

Table 29: Inputs and winning candidates for factorial typology

Input	Outputs			
	Grammar #1	Grammar #2	Grammar #3	Grammar #4
a. //p-Vle(t)//	**pilet**	**pile**	**plet**	**ple**
b. //p-Vle(t)-a//	**pileta**	**pileta**	**pleta**	**pleta**
c. //p-Vle(t)-n/	**pilen**	**pilen**	**plen**	**plen**
d. //r-Vle(t)//	**rilet**	**rile**	**rilet**	**rile**
e. //r-Vle(t)-a//	rileta	rileta	rileta	rileta
f. //r-V-le(t)-n//	rilen	rilen	rilen	rilen
g. //Vle(t)//	**let**	**le**	**let**	**le**
h. //Vle(t)-a//	leta	leta	leta	leta
i. //Vle(t)-n//	len	len	len	len

Grammar #1 generates the first type of phonological system, in which both skeletal and melodic ghosts are realized by default. Notice how for input (a), //p-Vle(t)//, neither the realization nor the deletion of either of the ghost elements results in any markedness violations of ONSET or SSP (Tableau 51). Each of the four candidates indicates an output, in which one, both, or neither of the ghost elements are present.

Tableau 51: ONSET, SSP » MAX(MEL), MAX(SKEL) » DEP(MEL), DEP(SKEL), (Grammar #1)

a. //p-Vle(t)//		ONSET	SSP	MAX(MEL)	MAX(SKEL)	DEP(MEL)	DEP(SKEL)
☞a.	pilet					i	t
b.	plet				V!		t
c.	pile			t!		i	
d.	ple			t!	V!		

In this grammar, the MAX constraints (MAX(MEL) and MAX(SKEL)) are ranked higher than the DEP constraints (DEP(MEL) and DEP(SKEL)). This ranking indicates that it is more costly to delete any subsegmental elements than it is to add the additional subsegmental material to realize them. Thus, both the melodic ghost and the skeletal ghost surface even though their presence is not required to repair a markedness constraint violation. This behavior is martyr-type behavior and corresponds with System 1 of the typology in (115), where both melodic and skeletal ghosts are martyrs.

It is not the case, however, that melodic ghosts and skeletal ghosts will always surface given this grammar. In cases where the presence of one (or both) of the ghost elements violates a markedness constraint, the ghost element will fail to surface. For example, in input (i), the presence of either of the ghost elements will violate ONSET or

SSP (Tableau 52). Consequently, the optimal output is /len/, which violates neither of the markedness constraints, even though it violates both MAX(MEL) and MAX(SKEL).

Tableau 52: Input (i); (Grammar #1)

i. //Vle(t)-n//		ONSET	SSP	MAX(MEL)	MAX(SKEL)	DEP(MEL)	DEP(SKEL)
☞a.	len			t	V		
b.	letn		tn!		V		t
c.	ilen	i!		t		i	
d.	iletn	i!	tn!			i	t

Grammar #2 generates the second type of phonological system predicted in this typology. In this system, skeletal ghosts always surface unless they would violate a markedness constraint (martyr behavior), while melodic ghosts only surface when necessary (hero behavior). Comparing the optimal outputs of input (a), //p-Vle(t)//, and input (b), //p-Vle(t)-a//, illustrates this pattern. In input (a), the presence of neither the skeletal ghost (V) nor the melodic ghost (t), cause or repair a markedness violation. Yet, the skeletal ghost (V) surfaces as /i/ and the melodic ghost (t) fails to surface. This difference in behavior is generated by the constraint ranking that ranks faithfulness to the skeleton (MAX(SKEL) and DEP(SKEL)) higher than faithfulness to the melody (MAX(MEL) and DEP(MEL)), see Tableau 53.

Tableau 53: ONSET, SSP » DEP(SKEL), MAX(SKEL) » MAX(MEL), DEP(MEL), (Grammar #2)

a. //p-Vle(t)//		ONSET	SSP	DEP(SKEL)	MAX(SKEL)	MAX(MEL)	DEP(MEL)
a.	pilet			t!			i
b.	plet			t!	V!		
☞c.	pile					t	i
d.	ple				V!	t	

The optimal output for input (a) under Grammar #2 is /pile/, in which the skeletal ghost is realized, and the melodic ghost is not realized. However, if the presence of the melodic ghost (t) is required to avoid violation of a markedness constraint, then the melodic ghost will appear, see how input (b) is evaluated in Tableau 54. The two outputs in which the melodic ghost (t) is not realized, (c) and (d), violate ONSET, and therefore output candidate (a) is evaluated to be the optimal candidate.

Tableau 54: Input (b); (Grammar #2)

b. //p-Vle(t)-a//		ONSET	SSP	DEP(SKEL)	MAX(SKEL)	MAX(MEL)	DEP(MEL)
☞a.	pileta			t			i
b.	pleta			t	V!		
c.	pilea	a!				t	i
d.	plea	a!			V	t	

Grammar #3 generates the third type of phonological system, which is diametrically opposite to System #2. In System #3, it is the melodic ghosts that realize by default, while the skeletal ghosts only surface when necessary. This is the same type of system as is observed in Ende and Yowlumne. To generate martyr melodic ghosts and hero skeletal ghosts, constraints that regulate faithfulness to the melody must be ranked higher than constraints that regulate faithfulness to the skeleton. This constraint ranking evaluates yet another output as optimal for input (a). The optimal output is candidate (b), /plet/, in which the melodic ghost is retained but the skeletal ghost is not realized, see Tableau 55.

Tableau 55: ONSET, SSP » DEP(MEL), MAX(MEL) » MAX(SKEL), DEP(SKEL), (Grammar #3)

a. //p-Vle(t)//		ONSET	SSP	DEP(MEL)	MAX(MEL)	MAX(SKEL)	DEP(SKEL)
a.	pilet			i!			t
☞ b.	plet					V	t
c.	pile			i!	(t)!		
d.	ple				(t)!	V	

Though the skeletal ghost (V) does not surface when not necessary with this grammatical ranking, the skeletal ghost will surface in order to repair a markedness violation. The context that best shows this pattern is input (d), //r-Vle(t)//, in which the skeletal ghost (V) is necessary to avoid a violation of the SONORITY SEQUENCING PRINCIPLE in the onset of the resulting form, see Tableau 56.

Tableau 56: Input (d); (Grammar #3)

a. //r-Vle(t)//		ONSET	SSP	DEP(MEL)	MAX(MEL)	MAX(SKEL)	DEP(SKEL)
☞ a.	rilet			i			t
b.	rlet		rl!			V	t
c.	rile			i	(t)!		
d.	rle		rl!		(t)	V	

Finally, Grammar #4 generates the pattern found in the fourth type of phonological system, in which both skeletal ghosts and melodic ghosts display hero-type behavior. In such cases, ghost elements will only appear if necessary to repair a markedness violation but will otherwise be too costly to realize. In this grammar, DEP constraints, such as DEP(MEL) and DEP(SKEL), are ranked higher than MAX constraints, MAX(MEL) and MAX(SKEL). It is more costly to add extra subsegmental material to partially specified elements in the inputs than it is to delete them from the output form. For input (a), this grammar evaluates output candidate (d) as the optimal form.

Tableau 57: ONSET, SSP » DEP(MEL), DEP(SKEL) » MAX(MEL), MAX(SKEL), (Grammar #4)

a. //p-Vle(t)//		ONSET	SSP	DEP(MEL)	DEP(SKEL)	MAX(MEL)	MX(SKEL)
a.	pilet			i!	t!		
b.	plet				t!		V
c.	pile			i!		(t)	
☞ d.	ple					(t)	V

Though in this grammar, these ghost elements do not surface in unmarked contexts, they will surface if their absence incurs a markedness violation. This behavior is illustrated in the evaluation of input (e), in which the presence of both ghost elements is necessary to avoid violations of ONSET or SSP.

Tableau 58: Input (e); (Grammar #4)

e. //r-Vle(t)-a//		ONSET	SSP	DEP(MEL)	DEP(SKEL)	MAX(MEL)	MX(SKEL)
☞ a.	rileta			i	t		
b.	rleta		rl!		t		V
c.	rilea	a!		i		(t)	
d.	rlea	a!	rl!			(t)	V

In this section, I have shown how ranking permutations of the four subsegmental faithfulness constraints predict the existence of four possible patterns in phonological systems that have multiple types of subsegmental elements. Only two languages have been convincingly shown to have the conflicting behavior of system types 2 or 3, or the presence of both melodic and skeletal ghost elements. Though all known phonological systems with a single or multiple instances of ghost elements can be predicted by this typology, a phonological system must show either a distinction in behavior (hero v. martyr) or underlying specification (melodic v. skeletal) to be sure into which system they should be categorized.

For instance, the languages discussed in this dissertation can be categorized as shown in Table 30. Ende and Yowlumne both display melodic martyr ghosts and skeletal hero ghosts. They are thus firmly of system type 3. Finnish exhibits skeletal martyr ghosts, and therefore could be generated by the grammar of system 1 or system 2. Similarly, Chaha phonology displays instances of melodic martyr ghosts and thus could be generated by systems 1 or 3. Polish *yer* ghost elements are of the melodic hero type, and thus can be generated by the grammars of systems 2 or 4.

Table 30: Examples of languages generated by the factorial typology

System	Ranking	Description	Known languages
1	MAX(MEL), MAX(SKEL) » DEP(MEL), DEP(SKEL)	Melodic martyrs, skeletal martyrs	(Finnish), (Chaha), (Welsh)
2	DEP(SKEL), MAX(SKEL) » MAX(MEL), DEP(MEL)	Melodic heroes, skeletal martyrs	(Finnish), (Polish), (Welsh)
3	DEP(MEL), MAX(MEL) » MAX(SKEL), DEP(SKEL)	Melodic martyrs, skeletal heroes	Ende, Yowlumne, (Chaha)
4	DEP(MEL), DEP(SKEL) » MAX(MEL), MAX(SKEL)	Melodic heroes, skeletal heroes	(Polish)

This theory of representation predicts a one-to-one correspondence between underlying specification type (melodic vs. skeletal) and realizational behavior (hero vs. martyr). Thus, a language with a one-to-many correspondence, for example, melodic heroes *and* melodic martyrs, would fall outside of this predicted typology. (Unless they were two distinct cophonologies within the same language, in this case 1+2 or 3+4.)

Zimmermann puts forward just such a claim for melodic ghost elements in Welsh (Zimmermann, 2019). Based on data from Hannahs & Tallermann (2006), her analysis treats one melodic ghost element, final *(g)* in some functional morphemes, as a hero ghost, and two melodic ghost elements, *(y)* and *(r)* in the definite article, as martyr ghosts (appearing ghost and disappearing ghosts in Zimmermann's terminology). She suggests that a subsegmental analysis (Zoll, 1996/1998) would result in a ranking paradox, and thus uses Gradient Symbolic Representations (Rosen, 2016; Smolensky & Goldrick, 2016) to represent the various activity levels of each of the elements. However, my analysis below successfully treats all three of the melodic ghost elements as hero ghosts, indicating that this pattern in Welsh may be generated by the grammars of systems 2 or 4 in the typology above.

Several morphemes in Welsh surface with an unpredictable coda consonant if the following word begins with a vowel, (much like French liaison consonants or English *a(n)*). This can be observed by comparing the pre-consonantal and pre-vocalic forms of each of the functional morphemes in (119), exemplified for *gyda/gydag* in (120).

(119) Functional morpheme alternations in Welsh (Hannahs & Tallerman, 2006, p. 798)
gyda/gydag ‘with’
â/ag ‘with’
tua/tuag ‘towards, about’
na/nag ‘than’
a/ac ‘and’
na/nac ‘neither/nor’

(120) *gyda gwên* ‘with smile’
gydag eraill ‘with others’

The final consonants in these alternations are ghost elements that are underspecified for their unpredictable melodic features but skeletally deficient, distinguishing them from typical consonant codas in Welsh. These melodic ghosts may be treated as hero ghosts (absent by default but appearing in order to provide an onset for a vowel-initial word) or as martyr ghosts (present by default but disappearing in order to avoid a coda violation). Both analyses suggest that the ghost element is reducing markedness, either by appearing or disappearing.

Another function word in Welsh with ghost-like allomorphy is the definite article. The underlying form for the article is *yr* /ər/. Both segments are optionally realized in order to reduce markedness violations such as hiatus (underlined in (121)) and codas (double underlined). Hiatus violations are more severe than coda violations, so a coda may only be tolerated if all alternative options involve vocalic hiatus (121)(c). Forms in which neither the vowel nor the consonant are realized are not considered, as this would fatally violate realization of a minimum part of the morpheme.

(121)

Context	(a) C_V	(b) C_C	(c) V_C	(d) V_V
Example	**yr** afon	**y** llyfr	o’**r** llyfr	o’**r** afon
Gloss	‘the river’	‘the book’	‘from the book’	‘from the river’
Realize /ər/	/ə.ra.vɔn/	*/ər.ɬɪvr/	*/oər.ɬɪvr/	*/oə.ra.vɔn/
Realize /ə/	*/ə.a.vɔn/	/ə.ɬɪvr/	*/oə.ɬɪvr/	*/oə.a.vɔn/
Realize /r/	*/ra.vɔn/	*/r.ɬɪvr/	/or.ɬɪvr/	/o.ra.vɔn/

Now, when a functional morpheme such as *guda(g)* immediately precedes the definite article (*yr*), the question is, which ghost element goes? Curiously, the result is that both the final consonant of the functional morpheme (g) and the initial vowel of the definite article (y) are not realized, leaving the sole (r) to be realized. This is curious given the fact that realization of /r/ results in a coda violation when preceding consonant-initial words (178), and yet the realization of the two other ghost elements /gə/ instead (marked with 💣) would result in neither coda nor hiatus violations.

(122)

Context	(a) gudag yr iaith	(b) gudag yr nod
Example	guda**’r** iaith	guda**’r** nod
Gloss	‘with the language’	‘with the aim’
Realize /gər/	*/gu.da.gər.jaiθ/	*/gu.da.gər.nod/
Realize /gə/	💣*/gu.da.gə.jaiθ/	💣*/gu.da.gə.nod/
Realize /ər/	*/gu.da.ər.jaiθ/	*/gu.da.ər.nod/
Realize /gr/	*/gu.dagr.jaiθ/	*/gu.dagr.nod/
Realize /r/	/gu.dar.jaiθ/	/gu.dar.nod/

Zimmermann accounts for this pattern by claiming that the ghost consonant codas are hero ghosts; they are absent by default and only present to solve a markedness problem. She goes on to claim that the definite article ghost segments are both martyr ghosts; they are present by default and only absent to avoid a markedness problem.

However, the following tableaux show that this pattern can be generated by the following constraint ranking, in which all three ghost elements are hero ghosts, all functional morphemes must be minimally realized (no deletion of all ghost elements possible), and the definite article is treated as an enclitic, not a proclitic (as argued by (Hannahs & Tallerman, 2006)).

Tableau 59: Realization of (r) more optimal than realization of (g)(ə) to avoid DEP(SKEL)

//guda(g)=(y)(r) nod//		MINWD	REALMORPH	HIATUS	DEP(SKEL)	*CODA	MAX(MEL)
a.	gu.da.gər.#nod				**!*	**	
b.	gu.da.gə.#nod				**!	*	*
c.	gu.dagr.#nod				**!	**	*
d.	gu.da.ər.#nod			*!	**	**	*
☞e.	gu.dar.#nod				*	**	**
f.	gu.da.ə.#nod			*!	*	*	**
g.	gu.da#nod		*!			*	***

The input for Tableau 58 contains all three ghost elements. The constraint DEP(SKEL) is ranked above MAX(MEL), generating hero-type behavior for melodic ghosts. This ranking means that it is more costly to realize the skeletal subsegmental material necessary for surfacing a melodic ghost than it is to delete the melodic ghost. Candidates (a), (b), and (c) fatally realize two or more ghost elements, which incur more violations than the optimal candidate (e), which only violates DEP(SKEL) one time. Candidates (d), (f), and (g) violate REALIZE MORPHEME (REALMORPH), which requires morphemes to be minimally phonetically realized, and HIATUS, which prohibits vocalic hiatus.

(123) REALIZE MORPHEME (REALMORPH)
Assign one violation for every morpheme in the input that has no correspondents in the output.

(124) HIATUS
Assign one violation for every pairwise sequence of vowels in the output.

The evaluation of the candidates in Tableau 60, Tableau 61, and Tableau 62 similarly show that once high-ranked constraints such as MINWD, REALMORPH, and HIATUS are avoided, the candidate with the fewest melodic ghost elements realized is evaluated as the most optimal. This is classic hero behavior.

Tableau 60: Realization of (r) more optimal than (y)(r) or (y) to avoid HIATUS violation

//o=(y)(r) llyfr//		MINWD	REALMORPH	HIATUS	DEP(SKEL)	*CODA	MAX(MEL)
a.	o.ər.#ɬɪvr			*!	**	**	
☞b.	or.#ɬɪvr				*	**	*
c.	o.ə.#ɬɪvr			*!	*	*	*
d.	o#ɬɪvr		*!			*	**

Tableau 61: Realization of (ə) more optimal than (ə)(r) or (r) to avoid MINWD violation

//(y)(r) llyfr//		MINWD	REALMORPH	HIATUS	DEP(SKEL)	*CODA	MAX(MEL)
a.	ər.#łɪvr				*!*	**	
b.	r#łɪvr	*!			*	*	*
☞c.	ə.#łɪvr				*	*	*
d.	łɪvr		*!			*	**

Tableau 62: Realization of (y)(r) more optimal than (y) or (r) to avoid MINWD or HIATUS

//(y)(r) afon//		MINWD	REALMORPH	HIATUS	DEP(SKEL)	*CODA	MAX(MEL)
☞a.	ə.r#a.vɔn				**	*	
b.	r#a.vɔn	*!			*	*	*
c.	ə.#a.vɔn			*!	*	*	*
d.	a.vɔn		*!			*	**

While all ghost elements in Welsh can be analyzed as hero-type ghosts, the same cannot be said of Yowlumne or Ende. The next section illustrates how the two Ende ghost elements described and analyzed in the previous two chapters interact in the language.

5.2 Ghost interactions in Ende

In Chapters 3 and 4, I presented two phonological ghost patterns that co-occur in Ende infinitival verbs. *Floating nasals* involve a left-aligned [+nasal] feature that is a phonemic property of morphemes and is realized so long as there is a coda position immediately preceding an obstruent available within the word. Floating nasals can be classified as a melodic martyr ghost, as the element is specified for its melody and is realized unless it causes a phonotactic problem. *Infinitival reduplication* involves a semantically null vowel slot that forms stems from verb roots and is only realized via correspondence with the nearest vowel slot when nonrealization would result in a monosyllabic form. Infinitival reduplication can be classified as a skeletal hero ghost, as the element is specified for its skeletal structure and is only realized to solve a phonotactic problem.

These two patterns interact when a verb root that is specified as [+nasal] occurs in a monomorphemic infinitival form. In such cases, there are two ghost elements in the input, and both have the option to be realized or non-realized. This results in four possible outcomes: one in which both ghost elements are realized, the floating nasal being realized once (125)(a-b), or twice (c), one in which neither ghost element is realized (d), one in which only the floating nasal is realized (e), and finally one in which only the reduplicative morpheme is realized (f-g).

(125) a. //V-N,dər// → /də**n**dər/ ‘to listen’
b. //V-N,bəl// → /bəl**m**bəl/ ‘to miss/remember’
c. //V-N,məd// → /mə**n**dmə**n**d/ ‘to feed’
d. //V-N,təli// → /təli/ ‘to repeat’ (cf. /da**n**tliwən/ ‘S/he repeated it.’)
e. //V-N,imoz//→ /imo**n**z/ ‘to touch’
f. //V-N,dum// → /dumdum/ ‘to surround’ (cf. /da**n**dumeyo/ ‘They surrounded it.’)
g. //V-N,ʈ͡ʂᵊmæ// → /ʈ͡ʂəmaʈ͡ʂəme/ ‘to be crowded’

(126)

		Floating nasal	
		Realized	Not realized
Infinitival reduplication	Realized	(125)(a-c)	(125)(f-g)
	Not realized	(125)(e)	(125)(d)

Considering first the verb roots in (125)(a-c), we observe that the verb roots are monosyllabic, meaning that any output candidates in which reduplication is not realized would result in monosyllabic forms that would violate word minimality. Agreement by correspondence is the most optimal way to satisfy word-minimality for these inputs. In the case of (125)(a), the observed reduction of the coda in the reduplicant indicates that this lexeme is associated with the partial reduplication cophonology. In the resulting reduplicant form without floating nasals *də~dər*, there is only one possible docking site for the nasal in the base and no possible docking site in the reduplicant. Therefore, the floating nasal will only be realized once as the constraints that regulate realization of the nasal (MAX(MEL)) outrank the constraints that regulate identical features between the two corresponding syllables (IDENT-σ-O). The analysis of /V-N,dər/ (125)(a) is identical to that of /V-N,gʈəd/ in Tableau 48.

The analysis of (125)(b) is very similar to that of (125)(a), except that this lexeme is associated with the total reduplication cophonology, as evidenced by the realized coda in the first syllable. The copy of the verb root /bəl/ does not provide a viable docking site for the floating nasal when in word-initial position, and thus the floating nasal only appears once preceding the initial /b/ in the root. The analysis of /V-N,bəl/ (125)(b) is identical to that of /V-N,gɽa/ in Tableau 47.

The analysis of (125)(c) is similar to that of (125)(b), as the input /V-N,məd/ is also associated with the total reduplication cophonology. The input for (c) differs from (b) in that in the faithful copy of the verb root /məd/, there is a viable docking site for the floating nasal in the reduplicant. Because of this, the constraint that regulates identify between the two corresponding syllables (IDENT-σ-O) ensures that the nasal segment is realized twice, in both syllables, as to ensure maximal identity even though there is only one floating nasal in the input. The tableau for /V-N,məd/ (125)(c) is shown in Tableau 43.

Moving on, we will now consider (125)(d), in which neither the infinitival reduplication nor the floating nasal are realized in the infinitival form. The infinitival verb *täli* 'to repeat' is multisyllabic and [+nasal]. We know that the verb root is [+nasal] because the inflected form of this root is /-**nt**əli/. Because the verb root is multisyllabic, the verb does not undergo reduplication because total phonological reduplication violates DEP(σ), which is ranked higher than MAX(SKEL), the constraint that regulates faithfulness to skeletal subsegments, like the thematic vowel, and MAX(MEL), the constraint that regulates faithfulness to melodic subsegments, like the floating nasal.

Tableau 63

/V-N,təli/		SSP	DEP(σ)	MINWD	CORR-VV	IDENT -[all]-O	MAX(MEL)	INTEGRITY	MAX(SKEL)
a.	t$_1$ə$_2$l$_3$i$_4$**nt**$_1$ə$_2$l$_3$i$_4$		*!					**** (təli)	
☞b.	təli						*		*
c.	**n**təli	*!							

The analysis of a verb like (125)(e) *imonz* 'to touch' is very similar to (125)(d), except that there is a viable docking site for the floating nasal in the non-reduplicated form. It is better to realize the floating nasal than to delete it.

Tableau 64

/V-N,imoz/		SSP	DEP(σ)	MINWD	CORR-VV	IDENT-[all]-O	MAX(MEL)	INTEGRITY	MAX(SKEL)
a.	imo**nz**imo**nz**		*!					***** (imonz)	
☞b.	imo**nz**								*
c.	imoz						*!		

The total reduplication case of *dumdum* 'to surround' (125)(f) is a compelling case because here we see how coalescence of the floating nasal and a nasal coda can satisfy Syllable Identity (IDENT-σ-O) without violating MAX(MEL), deletion of the floating feature (Tableau 65).

Tableau 65: Coalesence of floating nasal and nasal segment

/V-N,dum/		SSP	DEP(MEL)	MAX(MEL)	CORR-σσ	IDENT-σ-O	*CODA	*CC	UNIF	INTEGRITY
☞a.	$[d_1u_2\mathbf{m}_3]_4[d_1u_2m_3]_4$						**		*	*** (dum)
b.	$[d_1u_2m_3\mathbf{n}]_4.[d_1u_2m_3]_4$	*!				* (n,ø)	**	*		*** (dum)
c.	$[d_1u_2\mathbf{n}]_3[d_1u_2m]_3$					*! (n,m)	**			** (DU)

However, coalescence is still a last-resort option. It is better for the floating nasal to be realized independently instead of coalesced into a pre-existing nasal feature. This is because the UNIFORMITY (UNIF) constraint is violated when two elements in the input correspond with only one element in the output. UNIFORMITY outranks NO-INTERVENING(N;L), so it is more optimal for the nasal to be realized independently in a non-initial position, then coalesced in an initial position (Tableau 66).

Tableau 66: MAX(MEL), Unif » Integrity

[**N,**ŋonog]		DEP (MEL)	MAX (SEG)	CORR-C-C	IDENT-[place]-O	MAX (MEL)	UNIF	INTEGRITY	NO-INTERVENING (N;L)
a.	**ŋ**onog						*!		
b.	ŋo**n**og						*!		** (ŋo)
☞c.	ŋono**ŋ**$_1$g$_1$							*	**** (ŋono)
d.	ŋonog					*!			

The final example of an infinitival verb form that contains both the floating nasal and the thematic vowel in the input is /V-N,ʈ͡ʂ^{ə}mæ/ 'to be crowded, realized as ʈ͡ʂəmaʈ͡ʂəme. We know that this verb root is morphemically specified for [+nasal] because the floating nasal does appear in the inflected form of this root: -**nʈ͡ʂ**əma-. The analysis of this verb root can be directly contrasted with that of (125)(b), /V-N,bəl/ because both verb roots are associated with a total reduplication cophonology and have only one viable docking site on the root, which is in root-initial position. Thus, if the floating nasal were to be realized, we would expect to see the nasal to appear in between the two copies, */ʈ͡ʂəma**n**ʈ͡ʂəme/, analogous to the observed output of (125)(b), /bəl**m**bəl/ or /V-N,gɽa/, /gɽaŋgɽa/, in Tableau 47 repeated below as Tableau 67.

Tableau 67

/V-N,gɽa/		SSP	DEP(MEL)	MAX (MEL)	CORR -σσ	IDENT-σ-O	*CODA	*CC	INTEGRITY
a.	[**ŋ**$_{1,2}$g$_{2,3}$ɽ$_{4}$a$_{5}$]$_{6}$[**ŋ**$_{1,7}$g$_{3,7}$ɽ$_{4}$a$_{5}$]$_{6}$	*!*						**	***** (ŋgɽaŋ)
b.	[g$_{1}$ɽ$_{2}$a$_{3}$**ŋ**$_{4,5}$]$_{6}$[g$_{1,5}$ɽ$_{2}$a$_{3}$**ŋ**$_{4}$]$_{6}$		*! (ŋ)				**	**	**** (gɽaŋ)
c.	[g$_{1}$ɽ$_{2}$a$_{3}$]$_{4}$[g$_{1}$ɽ$_{2}$a$_{3}$]$_{4}$			*! (N)				**	*** (gɽa)
d.	a$_{1}$**ŋ**$_{2}$g$_{2}$ɽa$_{1}$				*!		*	*	**(aŋ)
☞e.	[g$_{1}$ɽ$_{2}$a$_{3}$**ŋ**$_{4}$]$_{5}$[g$_{1,4}$ɽ$_{2}$a$_{3}$]$_{5}$					*(ŋ,ø)	*	**	**** (gɽaŋ)

As can be seen in Tableau 68, the constraint ranking that generates the correct output for /V-N,gɽa/ in Tableau 67 evaluates candidate (e) */ʈ͡ʂəma**n**ʈ͡ʂəme/ as the optimal output for the input of /V-N,ʈ͡ʂᵊmæ/. The observed candidate, candidate (c), fares better than candidate (e) in terms of coda violations. Forms of this type motivate the possibility of a third cophonology in which *CODA is ranked higher than MAX(MEL) for some lexemes.

Tableau 68

/V-N,ʈ͡ʂᵊmæ/		SSP	DEP (MEL)	MAX (MEL)	CORR -σσ	IDENT -σ-O	*CODA	*CC	INTEGRITY
a.	[**n**$_{12}$ʈ͡ʂ$_{23}$ᵊ$_{4}$m$_{5}$æ$_{6}$]$_{7}$[**n**$_{1}$ʈ͡ʂ$_{3}$ᵊ$_{4}$m$_{5}$æ$_{6}$]$_{7}$	*!*						**	******(nʈ͡ʂəmæn)
b.	[ʈ͡ʂ$_{1}$ᵊ$_{2}$m$_{3}$æ$_{4}$**n**$_{56}$]$_{7}$[ʈ͡ʂ$_{16}$ᵊ$_{2}$m$_{3}$æ$_{4}$**n**$_{5}$]$_{7}$		*! (n)				**		*****(nʈ͡ʂəmæ)
☞c.	[ʈ͡ʂ$_{1}$ᵊ$_{2}$m$_{3}$æ$_{4}$]$_{5}$[ʈ͡ʂ$_{1}$ᵊ$_{2}$m$_{3}$æ$_{4}$]$_{5}$			*! (N)					****(ʈ͡ʂəmæ)
d.	æ$_{1}$**n**$_{2}$ʈ͡ʂ$_{2}$ᵊmæ$_{1}$				*!		*		**(æn)
💣e.	[ʈ͡ʂ$_{1}$ᵊ$_{2}$m$_{3}$æ$_{4}$**n**$_{5}$]$_{6}$[ʈ͡ʂ$_{15}$ᵊ$_{2}$m$_{3}$æ$_{4}$]$_{6}$					*(n,ø)	*		***** (ʈ͡ʂəmæn)

This section has illustrated that the constraint rankings motivated in chapters 3 and 4 for two separate ghost phenomena, floating nasals and infinitival reduplication, are compatible with one another and make the correct predictions for infinitival verb forms which contain both types of ghost elements in the input.

However, these constraint rankings are only compatible with each other because of how we reformulated the subsegmental faithfulness constraints. Recall that in previous works on ghost elements (*e.g.*, Zoll, 1996/1998) faithfulness constraints referred to subsegments (MAX(SUBSEG), DEP(SUBSEG)), without specifying the type of subsegmental elements, such as the skeleton or the melody. If we had adopted such a constraint formulation for regulating faithfulness to subsegmental elements in Ende phonological processes, this would have resulted in a ranking paradox.

This is because the two types of ghost elements under investigation here represent two distinct types of ghost behaviors. Ende floating nasals are a type of martyr ghost. Floating nasals are present by default and are only unrealized if they violate higher-ranked markedness constraints. The constraint that prohibits deletion of the floating nasal, MAX(MEL), must be ranked higher than the constraint that prohibits realization of the floating nasal, INTEGRITY. Indeed, in all the tableaux we have seen, MAX(MEL) is ranked higher than INTEGRITY. Ende infinitival reduplication, on the other hand, is a type of hero ghost. The thematic vowel that triggers phonological reduplication is absent by default and only realized when its absence will violate higher-ranked markedness constraints. Thus, the constraint that prohibits realization of the thematic vowel, INTEGRITY, must be ranked higher than the constraint that prohibits deletion of the thematic vowel, MAX(SKEL). This constraint ranking is compatible with the ranking required for floating nasals, shown in (127).

(127) MAX(MEL) » INTEGRITY » MAX(SKEL)

If we did not differentiate between subsegmental type in our faithfulness constraints and instead used MAX(SUBSEG), do not delete any subsegmental element, this would have resulted in the ranking paradox in (128).

(128) MAX(SUBSEG) » INTEGRITY » MAX(SUBSEG)

It is in this way that languages like Ende with multiple ghost elements with conflicting behavioral patterns motivate greater specification with regards to faithfulness constraint formulation.

Chapter 6: Summary

This dissertation addressed the question of what sort of distinctions are required in underlying representations to account for the realizational behavior patterns of ghost elements in various phonological systems. The observation that ghost elements, such as Yowlumne ghost vowels and Chaha floating labialization, have distinct realizational patterns (Zimmermann, 2019), cannot be accounted for using traditional subsegmental representations of ghost elements, which draw a single binary distinction between segments and subsegments (Zoll, 1996/1998). A theory that represents all ghost elements identically in the underlying form predicts that grammatical constraints, such as faithfulness, will operate uniformly across all such elements. New analyses of data from languages like Yowlumne and Welsh ((Zimmermann, 2019) and new data from Ende contradict these predictions and require an alternate explanation.

By calling upon the autosegmental expansion of the segment into subsegmental components like the skeleton and the melody, this new theory of representation predicts that languages with multiple types of ghost elements may display at least two distinct realizational behaviors and that these behaviors will correlate with the underlying specification of the ghost element. That is, realizational behavior A (*e.g.*, martyr behavior) will correlate with one subsegmental representation (*e.g.*, melodic specification), while the other realizational behavior B (*e.g.*, hero behavior) will correlate with the other subsegmental representation (*e.g.*, skeletal specification).

Realizational behavior—that is whether an element is realized or deleted by default—is regulated by faithfulness constraints that refer to the subsegmental specification of the ghost element. A binary distinction of subsegmental components—the melody and the skeleton—generates four primary faithfulness constraints: MAX(MELODY), MAX(SKELETON), DEP(MELODY), and DEP(SKELETON). Optimality Theory predicts that any permutation of constraints ranked one way to generate one phonological system should generate a typology of phonological systems that contains all and only possible types. This typology predicts four such phonological systems.

To my knowledge, only two languages with multiple ghost elements have been shown convincingly to contain ghost elements with distinct realizational behaviors (hero or martyr) or distinct subsegmental representations (skeletal or melodic): Yowlumne and Ende, which both happen to pattern like the third type of phonological system expounded in §5.2. That said, I do not believe that this patterning is rare. The more we investigate the world's languages and pay attention to these kinds of subsegmental patterns, the more likely we will be able to fill out the rest of this typology with certainty.

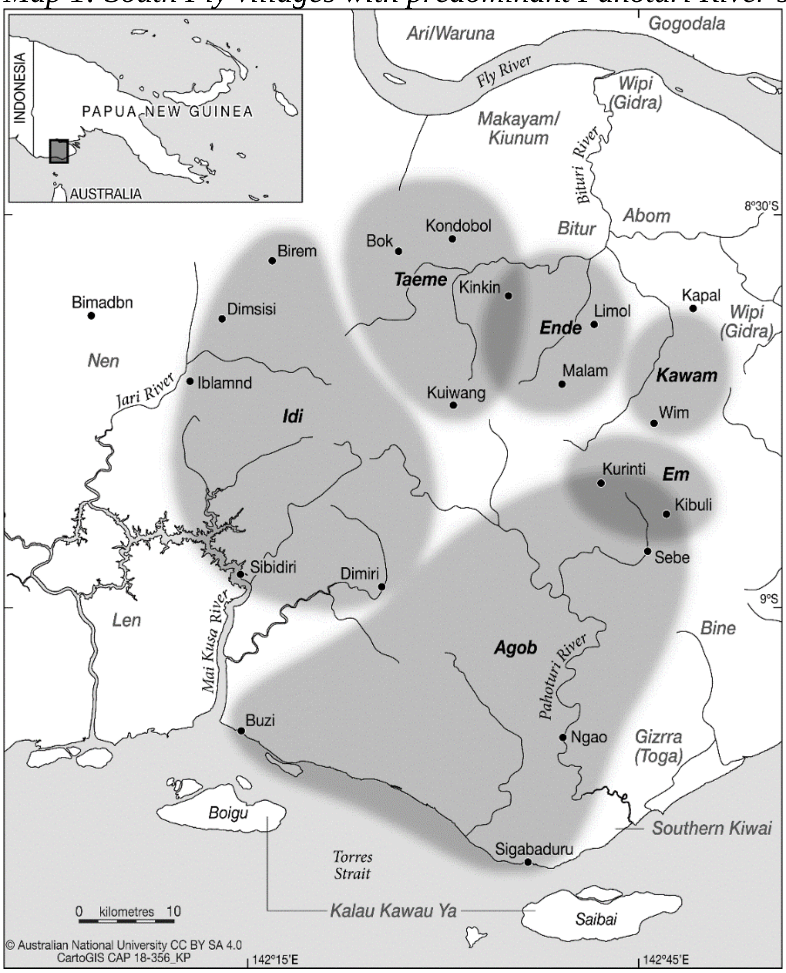
It is not only the realm of subsegmental phonological processes that demands more extensive treatment by phonologists and theoreticians. The new language data from a previously undocumented language and original phonological patterns presented in this dissertation should act as a clear reminder that many of the world's languages replete with phonological puzzles and wonders are unknown to the phonological literature. As linguists, we care about the documentation and preservation of all languages (both presently and once spoken), our field's only data set. As theoreticians, we care about the proper description and analysis of languages. And most importantly as humans, we care about other humans that desire linguistically informed assistance to achieve their own goals. Therefore, it is imperative that we value, support, and engage in work done, with, for, and by speakers of understudied languages. In return for this support and engagement, including the production of materials and linguistic training, speakers of Ende and many other Pahoturi River languages have offered to continue teaching linguists about their languages.

While this dissertation contributes an extension of a theory of subsegmental representation put forth by Cheryl Zoll to account for a greater diversity of subsegmental patterns in the world's languages, it also represents a significant contribution made by the Ende Language Committee. They have helped us to understand the phonological processes of the Ende language, including but not limited to the floating nasal and infinitival reduplication patterns detailed in Chapters 3, 4, and 5. Additional linguistic and cultural knowledge of the Ende tribe is sprinkled throughout the text and forms the bulk of the following four appendices. I have only been able to present a slice of what the Ende community taught me and others on my team, which is, of course, only a fraction of what is known and cherished by the Ende community.

Appendix A: Linguistic profile of Ende

Ende (ISO639-3 code: kit) is a Pahoturi River language spoken by at least 600 (Simons & Fennig, 2018) and as many as 1000 (J. (Jeks) Dareda, 2016a) people in Western Province, Papua New Guinea, primarily in the villages of Limol, Malam, and Kinkin, as shown in Map 1.

Map 1: South Fly villages with predominant Pahoturi River speaker populations[26]



[26] Since the publication of this map from data collected by myself and Dineke Schokkin in 2018, I have become aware of the following corrections from Phillip Rogers, a linguist who conducted fieldwork in the area just north of where the Pahoturi River languages are spoken: (i) Makayam and Kiunum are different languages spoken in different places. Kiunum is spoken further to the west, at the southernmost point in the bend of the Fly River. Makayam should be located further to the east, at or near where the Bituri River meets the Fly River (where Wipi is currently located on the map); (ii) the Wipi (Gidra) label along the Fly River is not in the correct location. There are Wipi speakers along the Fly River, but they are further east, located at the extreme right edge of this map (or slightly past the edge); (iii) the Abom language should be located north and east of where it is located on this map, closer to—but still inland of—the Fly River.

The Pahoturi River family, which also includes the Agob, Em, Idi, Kawam, and Taeme language varieties, has not yet been demonstrated to be related to any other language family and is thus classified as Papuan due to its geographical location. As with many languages in the region, the name of the language, *Ende* /ende/, is also the word meaning ‘what’. It is thought that this ethnonym originates during the meeting of the first Ende man and the first Agob man who, unable to understand one another, repeated ‘what’ back-and-forth, and thus became the first word (Ben Danipa, 2017b; Kollowam, 2015).

Despite this early story of linguistic breakdown, multilingualism is common among Ende speakers, arising from a sister-exchange marriage tradition, which results in many women and men marrying into the community from other linguistic backgrounds. In addition to one or more neighboring local languages, especially Taeme and Kawam, many Ende speakers also speak English, which is the regional *lingua franca* used in education and religion. In Limol village, Ende is the primary language in most domains of interaction except for schooling, which is conducted in both English and Ende at the elementary level and solely in English afterward.

Efforts to develop a writing system for Ende and to begin translating the bible into Ende began as early as 2003. These efforts were led by Warama Kurupel (Suwede) , Wagiba Geser, and Tonny (Tonzah) Warama. With a rotating crew of other Ende-speaking volunteers, this team developed the first practical writing system for Ende under the tutelage of Wycliffe translators at the Lewada Bible Translation Center, ultimately producing a translation of the Book of Mark into Ende (Kurupel (Suwede), Warama, The Ende Language Committee, & Wycliffe Bible Translators, 2009). The current spelling system (orthography) has a nearly one-to-one correspondence between sounds (phonemes) and letters (graphemes or digraphs), as will be illustrated in the sections below.

A.1 Typological summary

Ende’s phonemic inventory is striking for Papuan languages in general, especially the inclusion of three retroflex and three liquid consonants, but is not unusual for the region, that is when compared to existing descriptions of languages in regional families including Pahoturi River, Yam, and Anim families. Ende’s inventory consists of seven vowels and 19 consonants. The vowel system comprises five peripheral vowels: /i, u, e, o, a/ and two central vowels: /ɪ, ə/. The consonant inventory includes five voiced/voiceless obstruent pairs in four places of articulation including /p/, /b/, /t/, /d/, /k/, /ɡ/, /s/, /z/, /ʈ͡ʂ/, /ɖ͡ʐ/, four nasals /m/, /n/, /ɲ/, /ŋ/, three liquids /l/, /r/, /ɽ/, and two glides /w/, /j/. In Ende, homorganic nasal-obstruent sequences (sometimes called prenasalized obstruents in other languages) are common but are featurally specified at the morpheme- not the phoneme-level, as their distribution and behavior are phonologically predictable. These sequences include each of the voiced and voiceless obstruents preceded by a homorganic nasal: /mp/, /mb/, /nt/, /nd/, /ŋk/, /ŋɡ/, /ns/, /nz/, /nʈ͡ʂ/, /nɖ͡ʐ/. (See §A.2 on page 126 for more phonemic and phonotactic information.)

Phonological processes of note include vowel harmony (leftward, [+high] triggered), floating nasal segments, and phonological duplication.

Ende’s verbal morphology system is typical for the region in that it is highly complex and exhibits many types of multiple and distributed exponence. Inflectional categories may be marked in multiple affixal slots, and single morphemes may be underspecified for any one feature. This morphological complexity is typical of languages in the area. See, for example, the grammars of Yam languages Ngkolmpu (Carroll, 2016) and Komnzo (Döhler, 2018). Verbs index nominative arguments (subjects and agents) and accusative arguments (patients), showing agreement in person and number. Additional inflectional categories include tense, aspect, mood, directionality, and pluractionality. Exponents of all categories may be found in the prefixes, verb root, or suffixes.

In contrast, Ende nominal morphology is quite discrete, comprising a couple of derivational suffixes and 14 stacking case clitics (see §A.5). Reduplication is also used in derivational processes. The core cases in Ende exhibit a nominative-accusative alignment in both the pronouns and nominal arguments. Verbs show morphological agreement with both nominative and accusative arguments. Some ditransitive verbs, *e.g.*, *ttongg* /ʈ͡ʂoŋɡ/ ‘to give’, show agreement with dative arguments. The pronominal paradigm distinguishes three persons and two numbers (singular v. nonsingular) and features an inclusive/exclusive distinction in the first-person nonsingular form. Pronoun sets include nominative, accusative, dative, possessive, past possessive (source), restrictive, and emphatic.

Word order in Ende is quite flexible but is typically SOV. Phrasal heads are phrase final with a few exceptions: many nominal modifiers occur after the noun (*e.g.*, *ulle* /uɽe/ 'big') and there is one deictic demonstrative that acts like a preposition (*do* /do/ 'there; until, to').

A.2 Phonemes and phonotactics[27]

This section briefly describes the basic phonology of the Ende language, including an in-depth investigation of the phonemic consonants and vowels in A.2.1, the principles at play in syllabification in A.2.2 and the phonotactics and principles involved in wordhood in A.2.3.

A.2.1 The phoneme

Consonants

There are 19 phonemic consonants in Ende, as illustrated in Table 31 and contrasted in Table 32.

Table 31: Consonant inventory

	Bilabial	Alveolar	Retroflex	Palatal	Velar	(Labialized velar)
Plosive	p b	t d			k g	
Affricate			t͡ʂ d͡ʐ			
Nasal	m	n		ɲ	ŋ	
Fricative		s z				
Tap or flap		r	ɽ			
Approximant				j		w
Lateral approximant		l				

Consonant contrasts

The following table organizes all the consonants that I have identified as phonemic in the Ende inventory in near-minimal pairs. Words with homorganic nasal-obstruent sequences are included to illustrate their distribution, though I have not analyzed them as phonemes in the language. To the greatest extent possible, each consonant in each position is preceded by and/or followed by the low, central vowel /a/.

[27] A version of this section (A.2) has been submitted to a journal for peer review and publication in 2018.

Table 32: Consonant (near-)minimal pairs

Manner of Articulation	Phoneme	Phonetic form			Orthographic forms	Glosses
		Initial	Medial	Final		
Plosive	p	pa	papa	tap	*pa, papa, tap*	bird, hit, yam type
	b	bab	baba	tab	*bab, baba, tab*	yam type, father, promise
	t	tatu	matamata	pat	*tatu, matamata, pat*	wash, tree type, taro type
	d	dada	adawaʈ͡ʂa	omad	*dada, adawatta, omad*	older sibling, because, friend
	k	kab	kakab	kak	*kab, kakab, kak*	rope, leftover, grandmother
	g	gaguma	daga	ag	*gaguma, daga, ag*	yamhouse, tree type, morning
Affricate	ʈ͡ʂ	ʈ͡ʂam	maʈ͡ʂa	ʈ͡ʂaʈ͡ʂ	*ttam, matta, ttatt*	leaf, shoulder, jaw
	ɖ͡ʐ	ɖ͡ʐapaɽ	kijaɖ͡ʐaɖ͡ʐa	ɖ͡ʐaɖ͡ʐ	*ddapall, kiyaddadda, ddadd*	sky, bird type, tree type
Nasal	m	ma	mamamamaŋ	mamam	*ma, mamamamang, mamam*	house, pink, red
	n	nag	sana	tan	*nag, sana, tan*	friend, sago, broom
	ɲ	ɲəŋ	paɲa	aɲ	*nyäng, panya, any*	bag, pineapple, something
	ŋ	ŋam	kilikiliaŋaj	mamaŋ	*ngam, kilikiliangae, mamang*	breast, happily, pink

Manner of Articulation	Phoneme	Phonetic form			Orthographic forms	Glosses
		Initial	Medial	Final		
Fricative	s	sana	masar	as	*sana, masar, as*	sago, grandfather, banana type
	z~d͡ʒ	za	zazaba	ziz	*za, zazaba, ziz*	thing, bag type, insect
Homorganic nasal-obstruent sequences	mp		dompa		*dompa*	spear type
	mb		amba	bənamb	*amba, bänamb*	tree type, open
	nt		tanteɲ		*tanteny*	tree type
	nd		panda	band	*panda, band*	tree type, tree type
	ŋk		daŋkam	nəŋk	*dangkam, nängk*	lean, take off (imperative)
	ŋg		saŋga	penaŋg	*sangga, penangg*	bird type, to burn
	nʈ͡ʂ		wanʈ͡ʂawanʈ͡ʂa		*wanttawantta*	game type
	nɖ͡ʐ		ɖ͡ʐonɖ͡ʐo	mənɖ͡ʐmənɖ͡ʐ	*ddonddo, mänddmändd*	proud, to drown
	ns		nanserbe		*nanserbe*	prepare
	nz		ŋanzig	bənz	*nganzig, bänz*	overtake, mosquito
Approximants	r	rupi[28]	para	masar	*rupi, para, masar*	leaf type, challenge, grandfather
	ɽ	ɽa	maɽa	ʈ͡ʂaɽ	*lla, malla, ttall*	person, not, wallaby
	l	lajm	malam	jal	*laem, malam, yal*	argue, obey, tree type

[28] Very few words begin with /r/ in Ende. Some exceptions include some uncommon nouns (*e.g.*, *rupi* /rupi/ 'leaf type', *ruriruri* /ruriruri/ 'earthquake'), proper nouns (*e.g.*, *Robae* /robaj/ 'female personal name', *Raroge* /raroge/ 'place name') and loanwords (*e.g.*, *rop* /rop/ 'rope', *ripott* /ripoʈ͡ʂ/ 'report').

Manner of Articulation	Phoneme	Phonetic form			Orthographic forms	Glosses
		Initial	Medial	Final		
	j	jaj	aja	naj	*yae, aya, nae*	mother, who, sweet potato
	w	waɽe	bawa	aw	*walle, bawa, ao*	river, rainy season, yes

Plosives

Voiced and voiceless plosives contrast at bilabial, alveolar, and velar places of articulation. Voiceless plosives /p, t, k/ are aspirated word-initially and word-finally. Voiced plosives /b, d, g/ are fully voiced in all positions. All six plosive phonemes are found in word-initial, -medial, and -final positions though the voiceless phonemes are more frequent, especially word-finally. These six phonemes occur in all Pahoturi River varieties and are also found regionally (*e.g.*, in Bitur, Bine, Nen, Ngkolmpu, and Coastal Marind).

Notable absences from the plosive inventory include the labial-velar plosives present in other Pahoturi River languages, such as Idi (k͡w~k͡pʷ, g͡bʷ; Schokkin, p.c.), and Yam languages such as Nmbo (Kashima, p.c.) and Nen (k͡pʷ, g͡bʷ; Evans & Miller, 2016). Ende cognates with Idi words that begin with /k͡w~k͡pʷ, g͡bʷ/ are realized as /k, g/ and are often (but not always) followed by a rounded vowel. The contrast between the Idi words with labial-velar plosives and their cognates in Ende is shown in Table 33.

Table 33: Comparison of Idi /k͡w~k͡pʷ/ and /g͡bʷ/ with Ende /ku/ and /gu/ (Idi data from Schokkin, p.c.)

Idi	Ende	Gloss
g͡bʷəlbi	guɽbe	male animal
g͡bʷɪgəl	gagəɽ	bad
g͡bʷɪl	guɽ	net
g͡bʷəg	gogo	to build
k͡wɪmb	kum	buttocks
k͡wɪdəl	kuɖ͡ʐəɽ	dead
k͡wɪʈ͡ʂ	kuʈ͡ʂ	bone
k͡wɪp	kup	pit, valley
k͡wam	kom	hair, feather
k͡wak	kok	moon
k͡wonk͡won	konkon	deaf, crazy, stupid
k͡wolk͡wol	kɪɽkɪɽ	dig, scrape

There are a limited number of words in the Ende lexicon that include onsets with /kw/ or /gw/. These are listed in Table 34 alongside Idi cognates when available.

Table 34: Ende words with /kw/ and /gw/ (Idi data from Schokkin, p.c.)

Idi	Ende	Gloss
	gwaga	tree type
	gwəɽəd	tree type
	gwara	lightning
	gwazi	taro type
	gweɽ	rule (n.)
	gwem	river part
	kwaj	yam type
	kwakaɽ	tree type
	kwakasru	snake type
	kwaɽaŋ	tree type
g͡bʷaŋg͡bʷa	kwa^{ŋ}ka	crested pitohui (bird)
k͡wænɖæ	kwa^{n}ʈ͡ʂa	tree type
	kwarataŋ	thin
k͡was	kwas	taro type
	kwata	tree type
	kwi	island
k͡wɪbiæg	kwibiag	Papuan black snake

What is striking in this list are the surprising number of species names (12 total). Of the remaining, only *kwi* 'island' and *kwibiag* 'Papuan black snake' are commonly used words in the corpus. It is also striking that none of the Ende examples with /kw/ and /gw/ precede back rounded vowels, in comparison with the examples in Table 33. One could analyze the /kw/ and /gw/ sequences as labial-velar plosives or as sequences of phonemes. Evidence for the latter analysis comes from the fact that /k/ and /g/ are not the only plosives that can precede /w/ in an onset. The bilabial plosives /p/ and /b/ can also precede /w/, as shown in (129). Moreover, plosives can form complex onsets with the other glide /j/, (130).

(129) /pw/: *pwapwa* /pwa.pwa/ 'light', *pwikme* /pwik.me/ 'lizard type'
/bw/: *bwitu* /bwi.tu/ 'stick', *bwata* /bwa.ta/ 'palm type', *bwidde* /bwi.ɖ͡ʐe/ 'tool type', *bwindre* /bwin.dre/ 'bird type', *sambwag* /sam.bwag/ 'prawn'

(130) /kj/: *kyakya* /kja.kja/ 'bird type'
/bj/: *pimbyom* /pim.bjom/ 'bark type'

For now, I will analyze /kw/, /gw/, /pw/, /bw/, /kj/, and /bj/ as complex onsets, not as labial-velar plosives, although they could have a monosegmental origin.

Prenasalized obstruents or nasal-obstruent sequences

Ende’s plosive inventory also differs from related Idi (Schokkin, p.c.) and nearby Yam languages, such as Nmbo (Kashima, p.c.), Nen (Evans & Miller, 2016), Nama (Siegel, p.c.), and Ngkolmpu (Carroll, 2016), in that while linguists report voiced prenasalized plosives (^{m}b, ^{n}d, $^{\text{ŋ}}$g, $^{\text{ŋ}}$g͡b^{w}) for Idi, Nmbo, Nen, and Nama, and voiceless prenasalized obstruents (^{m}p, ^{n}t, $^{\text{ŋ}}$k, ^{n}s) for Ngkolmpu, I do not report any prenasalized phonemes in Ende’s inventory. I hesitate to distinguish Ende in this way because the candidates for prenasalized phonemes in Ende (^{m}p, ^{m}b, ^{n}t, ^{n}d, $^{\text{ŋ}}$k, $^{\text{ŋ}}$g, ^{n}ʈ͡ʂ, ^{n}ɖ͡ʐ, ^{n}s, ^{n}z) appear to be both phonetically and phonotactically similar to the prenasalized consonants reported in Idi, Nmbo, and Nen. However, these ten candidates in Ende do not provide adequate evidence for rejecting the hypothesis that they are sequences of phonemes, as has been done for languages with phonemic prenasalization, such as nearby Komnzo (Döhler, 2018), Ngkolmpu, and Coastal Marind (Olsson, 2017).

In determining whether a homorganic nasal-obstruent sequence should be analyzed monosegmentally, either as a prenasalized obstruent (^{n}d) or a postoralized nasal (n^{d}), or sequentially, as two segments (nd), there are three major objections to what could be assumed to be the default sequential analysis. First is the contrast objection (is there a contrast between sequential and monosegmental forms?). Second is the behavior objection (do homorganic nasal-obstruent sequences behave like segments or sequences?). And third is the distribution objection (is the distribution of homorganic nasal-obstruent sequences like segments or sequences?). The next three sections evaluate each of these objections in turn.

The contrast objection

Homorganic nasal-obstruent sequences (*e.g.*, mb, nd, ŋg) have the potential to be analyzed as monosegmental phonemes, often represented with a tie bar or a nasal onset (*e.g.*, m͡b or ^{m}b), or as a sequence of two phonemes. Feinstein (1979) suggests that languages with phonemic prenasalization typically raise at least one of three objections to the sequential analysis. The first is the contrast objection. Though Ende has many lexical pairs that seem to contrast obstruents and nasal-obstruent sequences (131), Ende does not contrast non-derived homorganic nasal-stop segments and sequences (e.g., /a^{n}da/ and /anda/), as languages like Sinhalese do (Feinstein, 1979).

(131) a. /ede/ *ede* 'so'
/e**nd**e/ *ende* 'what'
b. /agan/ *agan* 'AUX.REC.1|3SGS'
/a**ŋg**an/ *anggan* 'AUX.PRS.3PLS'
c. /nakaman/ *nakaman* 'cut.REC.1|3SGA>3SGP'
/na**ŋk**aman/ *nangkaman* 'start.REC.1|3SGA>3SGP'

The distribution objection

The second common objection used to support a special treatment of prenasalized consonants is the distribution objection. This is when the phonotactic distribution of prenasalized consonants are typical of single segments. For instance, if they can occur in both onset and coda positions, even in languages that do not allow onset and coda clusters.

There are at least three ways in which Ende homorganic nasal-obstruent sequences do not exhibit a phonotactic distribution typical of single segments. First, these sequences never occur word-initially or in onset position. The occurrence of prenasalized consonants in onset position is good evidence for a monosegmental analysis. In languages like Ngkolmpu (Yam; Papuan), derived nasal-stop sequences are repaired via epenthesis (132)(a), unlike prenasalized obstruents, which are phonotactically permissible in onset position (132)(b).

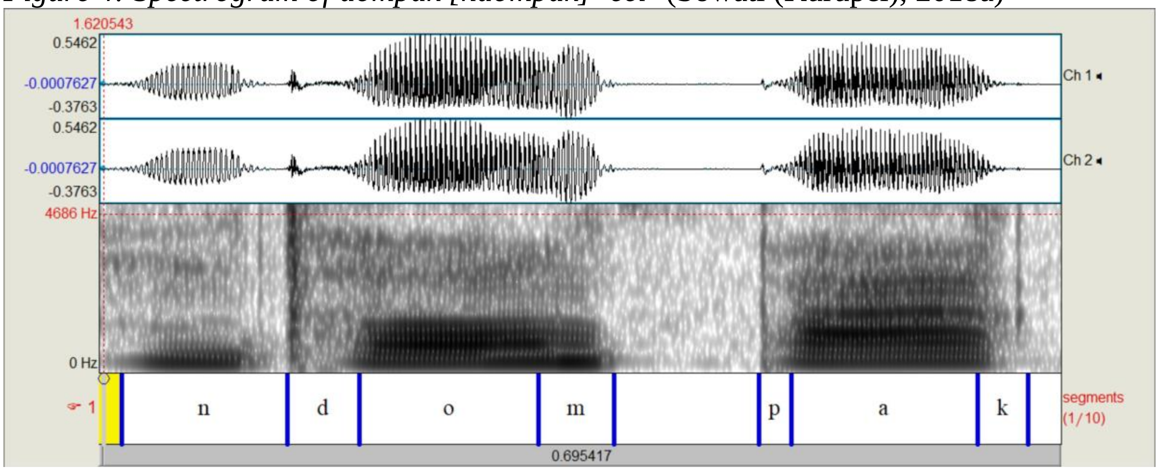
(132) Ngkolmpu onset clusters (Carroll, 2017)
a. /**n-t**inpitr/ → [**nə̆.**ˈ**t**i.nə̆.pi.tə̆r] 'SG>2SG.PRS.DUR.cover'
b. /$^{\mathbf{n}}$**t**ɔp/ → [$^{\mathbf{n}}$**t**ɔp^{h}] 'big'

Of the 11,542 unique word forms (distinct words) identified in the Ende spoken corpus, 1,758 words (15.2%) contain a homorganic nasal-obstruent sequence somewhere in the word form. In none of these forms does the sequence occur in word-initial position. (In contrast, 1,914 unique word forms begin with simple nasals.) Moreover, in all words with homorganic nasal-obstruent sequences, the nasal segment is always in the coda, see (133). In codas, nasals may appear alone (a), followed by a homorganic stop (b, c), or preceded by a glide (c) or liquid (d). (For more on Ende syllable phonotactics, see §A.2.2)

(133) a. /kə**ŋ.k**əl/ *kängkäl* 'to climb'
b. /pə**ŋg**.meɲ/ *pänggmeny* 'to protect'
c. /bə.naj**mb**/ *bänaemb* 'to open'
d. /i.ne kəl**ŋ.k**əl/ *ine kälngkäl* 'high tide'

Initial homorganic nasal-obstruent sequences can be observed in the speech signal for some words and some speakers (see Figure 4), but literate speakers do not write these word-initial sequences and refute their existence in transcription exercises. Contrast this with Nen, where speakers sometimes talk of initial voiced stops as having a “hidden” nasal, which was undoubtedly once there historically and is found in other languages of the family (*e.g.*, Nä), but have been dropped from Nen (Evans, p.c.).

Figure 4: Spectrogram of dompak [ndompak] ‘eel’ (Sowati (Kurupel), 2018a)



The second way in which Ende homorganic nasal-obstruent sequences show a phonotactic distribution atypical of single segments is that they may only occur once per morpheme. There are no examples in the dictionary or corpus of a monomorphemic word with more than one homorganic nasal-obstruent sequence. Words that do contain more than one sequence are always multi-morphemic. Neither a monosegmental input analysis nor a sequential input analysis predicts this pattern. Monomorphemic forms with repeating segmental melodies are found for all segments, including nasals, affricates, and approximants (134).

(134) a. /ŋoŋop/ *ngongop* ‘to hug’
b. /ɲeɲ/ *nyeny* ‘tree type’
c. /ɖ͡ʐaɖ͡ʐ/ *ddadd* ‘tree type’
d. /ʈ͡ʂaʈ͡ʂ/ *ttatt* ‘jaw’
e. /ruriruri/ *ruriruri* ‘earthquake’
f. /wawajm/ *wawaem* ‘current’

This pattern is expected if homorganic nasal-obstruent sequences are not part of the underlying form but rather if the nasal segment is contributed by a morpheme-level feature. Under this analysis, [+nasal] morphemes will be underspecified for a floating [+nasal] feature that is realized as a nasal segment within the word.

The third way in which the phonotactic distribution of homorganic nasal-obstruent sequences is atypical of single segments is that in any given word, the homorganic nasal-obstruent sequence necessarily involves the leftmost obstruent in the word that can permit a nasal to precede it in coda position. This generalization holds for all words in the Ende corpus and lexicon. There are many words with multiple obstruents, (*e.g.*, /ɖ͡ʐəɖ͡ʐəg/ *ddäddäg* ‘animal’), but there are no words in which a non-initial simple obstruent precedes a homorganic nasal-obstruent sequence (*e.g.*, */ɖ͡ʐəɖ͡ʐə**ŋg**/). This generalization is evident, for example, by looking at the 100 most frequent words with homorganic nasal-obstruent sequences in Table 35.

Table 35: 100 most frequent words with homorganic nasal-obstruent sequences

e**nd**e	en**ɖ͡ʐ**əna	di**nd**ug	goŋno**ŋg**ən	sərə**mb**ajnen
a**ŋg**an	mo**nd**rog	a**ŋg**aɽo	di**nd**ugməɽnən	go**ŋk**əbmeɲnən
ka**nd**ərmaŋ	dan**ʈ͡ʂ**ogən	go**nt**emeɲne	a**nd**ərmom	go**nt**emeɲaemne
i**nd**raŋ	a**ŋg**aɽe	də**ŋk**ameja	go**ŋk**aemom	do**ŋk**i
go**ŋk**amən	ʈ͡ʂo**ŋg**	nowa**ns**egan	ni**nd**ug	də**ŋk**ələn
i**ŋg**ojmeɲ	ʈ͡ʂə**nʈ͡ʂ**əm	e**nd**ag	go**nz**er	a**nd**reɖ͡ʐ
di**nd**ugən	baɲerə**ŋg**	sərə**mb**ajnen	peno**ŋg**	a**ŋk**aman
ŋono**ŋg**	ma**ŋg**eja	da**nd**ər	dowa**ns**egeja	e**nd**ru
ko**ŋk**om	di**nd**uag	da**nd**ərən	mə**nd**a	ni**nd**ugan
ba**nd**ra	ba**ŋg**u	go**ŋk**amejo	kə**mb**əmeɲ	deja**nd**mojən
bə**nt**ameɲ	go**ŋg**kam	do**nʈ͡ʂ**ogən	ɲə**ŋk**aɽbiɖ͡ʐ	go**ŋk**amaɽe
də**ŋk**amən	də**ŋk**amejo	ɲo**ŋk**oj	kə**ŋk**əm	ka**ŋg**e
də**nd**ər	ŋə**nʈ͡ʂ**əg	nowa**ns**eg	go**ŋk**əbəgən	so**ŋg**orag
e**nd**a	pə**ŋg**meɲ	kə**mb**əgag	kə**ŋk**əl	no**nʈ͡ʂ**ogan
bu**nd**aj	nə**ŋk**ələn	bo**ns**erbeaebne	ɽa**nd**rəg	pe**nt**aj
dowa**ns**egən	damə**nd**ən	dowa**ns**eg	ʈ͡ʂo**ŋg**ag	no**nʈ͡ʂ**og
ŋəmi**ŋg**	go**nd**ərən	e**nɖ͡ʐ**əna	dowa**ns**egaɽo	go**ŋk**ən
mo**nd**re	dowa**ns**egejo	ʈ͡ʂə**nʈ͡ʂ**əmaŋ	sərə**mb**aj	də**ŋk**amaɽo
e**nd**an	wa**ns**eg	nə**ŋk**aman	e**nz**ul	di**ŋg**i
kə**mb**meɲ	mə**nd**mə**nd**ag	mə**nɖ͡ʐ**mə**nɖ͡ʐ**	sa**nd**e	ba**nʈ͡ʂ**og

This alignment of homorganic nasal-obstruent sequences to the left-edge is persistent, meaning that we can observe a floating pattern of the nasal component of the sequence when we compare morphologically different forms. For example, consider the form /ʈ͡ʂəkoj/ *ttäkoe* ‘to chop’ in (135). The verb root does not contain any homorganic nasal-obstruent sequences in its basic infinitival form (a) but when the infinitival form is affixed with the applicative suffix /-**ŋg**/ in (b), the nasal component of the suffix appears to float leftward to precede the root medial /k/. The nasal component of the suffix appears to float even further leftward to precede root-initial /ʈ͡ʂ/ when the verb root and applicative suffix are further affixed with an inflectional prefix (c).

(135) a. /ʈ͡ʂəkoj/ *ttäkoe* ‘to chop’
b. //ʈ͡ʂəkoj-**ŋg**// → /ʈ͡ʂə**ŋk**oj-g/ *ttängkoeg* ‘to chop for someone’
c. //da-ʈ͡ʂəkoj-**ŋg**// → /da-**nʈ͡ʂ**əkoj-g/ *dantträkoeg* ‘I chopped it for someone.’

Persistent left-alignment of these nasals is also evident when it is the verb root that is specified as [+nasal]. For example, when the verb root /bənaj**mb**/ ‘to open’ is affixed with an inflectional prefix (136), the nasal segment shifts from root-medial to root-initial position.

(136) //bə-bənaj**mb**// → /bə-**mb**najb/ *bämbnaeb* ‘I will open it.’

Because these nasal segments are left-aligned but impermissible word-initially, this means that a [+nasal] morpheme with a single obstruent in morpheme-initial position will have a realized nasal when the morpheme is in non-initial position but no apparent nasal segment when the morpheme is word-initial. For example, consider the two roots /kam/ ‘to start’ and /kam/ ‘to cut’, which are identical in their infinitival forms (137), but differ in their inflected forms (138). The verb root meaning ‘to start’ is specified for the feature [+nasal], which means that a nasal segment will be realized before the first non-initial obstruent in the word. In the infinitival form, no such obstruent is available, but in the inflected form, the root is preceded by an inflectional prefix, allowing the nasal to precede the root-initial /k/ (/na-**ŋk**am-an/ ‘he started it’). In contrast, the verb root meaning ‘to cut’ is not specified for the feature [+nasal], which means that the nasal segment is not predicted in either the infinitival form nor the inflected form (/na-kam-an/ ‘he cut it’).

(137) a.

Obo	ma we	abo	ibi wi	kam	allan.[29]
obo	ma=we	abo	ibi=wi	kam	aɽan
3.SG.POSS	house=ALL	then	go=ALL	start	AUX.PRS.1|3SGS

‘He is starting to go home.’
(E. Baewa, 2018b SE_SI025 #77)

b.

Ita da	ngämo	ttäle de	kam	eran
ita=da	ŋəmo	ʈ͡ʂəle=de	kam	eran
grass.type=NOM	1.SG.POSS	leg=ACC	cut	AUX.PRS.1|3SGA>3SGP

[29] Ende examples may include an orthographic form (italicized), a phonemic form (in /slashes/), an underlying form (in //double slashes//), a gloss using the Leipzig Glossing Rules (Comrie et al., 2015), and/or a free translation (in ‘single quotes’).

‘The *ita* grass is cutting my leg.’
(Kurupel (Suwede), 2018c SE_EE059 #1)

(138) a.

Gänya	*gagäll*	*ttam me*	*giddoll e*	*ngänäm*
gəɲa	gagəɽ	t͡ʂam=me	gid͡ʐoɽ=e	ŋənəm
here	bad	life=LOC	living=ALL	1.SG.ACC

nangkaman.
n-a-ŋkam-an
REC-RT.EXT-start-REC.1|3SGA
‘He started [making] me live in a bad life.’
(E. Baewa, 2018a SE_PN034 #18)

b.

Gilbet bom	*ita da*	*era*	*ttäle me*
gɪlbet=bom	ita=da	era	t͡ʂəle=me
Gilbet=3.SG.ACC	grass.type=NOM	COP.where.PRS.SGS	leg=LOC

nakaman.
n-a-kam-an
REC-RT.EXT-cut-REC.1|3SGS
‘The *ita* grass is cutting Gilbet’s leg.’
(Kurupel (Suwede), 2018c SE_EE059 #1)

The leftward alignment of the nasal segment is compatible with an analysis in which the nasal segment is non-linearized in the input and aligned phonologically, much like how an infix may be aligned to one edge of the word. Except, of course, the floating nasal feature is not independently meaningful like a typical affix. The nasalization feature must precede and match in place with the leftmost obstruent in the word, while not violating any phonotactic constraints of the syllable. If such an obstruent is not available in the word, the nasal segment will fail to be realized.

To summarize, this section has shown three ways in which homorganic nasal-obstruent sequences exhibit a phonotactic distribution that is atypical of a monosegmental analysis or sequential analysis, as they do not occur word-initially, only occur once per morpheme, and are left-aligned within the word, meaning they are phonotactically independent of the stop.

The behavior objection

The third common objection to the sequential analysis of prenasalized consonants is the behavior objection. If prenasalized consonants behave like single segments for the application of phonological rules, this may warrant a monosegmental analysis. In Ende, once again homorganic nasal-obstruent sequences do not behave quite like single segments or like heterorganic sequences; indeed, the floating property of the floating nasals is one indication of this. Another example refuting this hypothesis is *tongoe eka* ‘silly language’, an Ende language game.

In silly language, words are truncated after the first vowel-consonant (VC) sequence and suffixed with a fixed suffix -*sko*. This transforms the utterance in (139) from Ende (a) to silly language (b). Note that glides are skipped due to their semi-vowel properties. This language game is productive and can be applied to new loanwords in the language.

(139) Ende *tongoe eka* ‘silly language’

a.	*Ngämo*	*bin a*	*ainen*	*Wagiba.*
	ŋəmo	bin=a	ajnen	wagiba.
	1.SG.POSS	name=NOM	who.COP.PRS.SGS	Wagiba
	‘My name is Wagiba.’			
b.	*Ngämsko*	*binsko*	*ainsko*	*Wagsko.*
	ŋəm-sko	bin-sko	ajn-sko	Wag-sko

Regardless of whether the first post-vocalic consonant is an oral or nasal consonant, or in an onset or coda position (140)(a-c), the truncatum contains everything up to that first post-vocalic consonant. Both the verb roots in (d) and (e) contain homorganic nasal-obstruent sequences. Under a monosegmental analysis, we would expect both the nasal and the obstruent to be retained before the -*sko* affix (*də^{n}d-sko, *pə$^{\text{ŋ}}$g-sko). Only the nasal is retained in the truncatum, illustrating the nasal’s independent segmentation status.

(140)	Consonant type	Inflected verb	Silly language	Gloss
a.	Non-nasal onset	/go.də.me.nən/	/godsko/	‘he sat’
b.	Nasal onset	/də.naj.mejo/	/dənsko/	‘they drank’
c.	Nasal coda	/goŋ.ʈ͡ʂəg/	/goŋsko/	‘I arrived’
d.	Floating nasal coda	/də**n.d**ə.raj.bejo/	/də**ns**ko/	‘they heard it’
e.	Floating nasal cluster	/pə**ŋg.**meɲ/	/pə**ns**ko/	‘to protect’

One thing to notice, however, is the contrast between the nasal segments in (c) and (e). Though both nasals are velar in the original word, they differ in that the nasal segment in (c) was not originally part of a homorganic sequence and does not match the following obstruent in place. In contrast, the nasal segments in (d) and (e) were originally part of homorganic sequences. In the silly language forms, the nasal segments that were initially part of homorganic sequences re-assimilate in place to the coronal /s/ unlike the nasal segment in (c) which retains its original place specification. This behavior follows from the place-underspecification of the homorganic nasals in the input. The place-underspecification is demonstrated by the variant place values that floating nasals may take depending on the place of the following obstruent.

Another phonological process in which homorganic nasal-obstruent sequences behave differently from other sequences, but not necessarily like single segments is in phonological doubling, a subprocess of Ende infinitival reduplication (see §4.2). Some infinitival stems are formed via affixation of a semantically vacuous vowel slot, which triggers copying of the closest vowel and onset if the root is monosyllabic. This results in total reduplication of CV roots (141)(a) and CV-reduplication of larger monosyllabic roots (b-d). Note that the onset of the reduplicant corresponds with the first consonantal segment in the root.

(141)	Inflected form	Infinitival form	Gloss
a.	-go	go~go	'to build'
b.	-ɖ͡ʐəg	ɖ͡ʐə~ɖ͡ʐəg	'to bite'
c.	-dro	do~dro	'to clean'
d.	-trop	to~trop	'to descale'

However, verb roots that begin with homorganic nasal-obstruent sequences in their inflected forms present a puzzle for this analysis, as the empty consonant copies the melody of the obstruent in the sequence, not the nasal (142).

(142)	Inflected form	Infinitival form	Gloss
a.	-**ŋg**o	go~**ŋg**o	'to listen intently'
b.	-**nɖ͡ʐ**əl	ɖ͡ʐə~**nɖ͡ʐ**əl	'to climb'
c.	-**mb**ɽo	bo~**mb**ɽo	'to increase/add'
d.	-**ŋg**ɽəd	gə~**ŋg**ɽəd	'to shove'

In this case, the homorganic nasal-obstruent sequences are behaving differently than the obstruent-liquid sequences in (141)(c-d). There are three possible analyses to consider: one in which the homorganic nasal-obstruent sequences are monosegmental, one in which they are sequential, and one in which the nasal is non-linearized in the input. Each analysis makes a different prediction for the reduplicative output of verb roots like -ŋgɽəd 'to shove'.

Table 36: Derivational comparison of input analyses

Processes	Monosegmental	Sequential	Non-linearized nasal
Input	V-ᵑgɽəd	V-ŋgɽəd	N, V-gɽəd
Syllable structure copy	CV-ᵑgɽəd	CV-ŋgɽəd	N, CV-gɽəd

Nearest segment copy	${}^{\text{ŋ}}$gə-${}^{\text{ŋ}}$gɽəd	ŋə-ŋgɽəd	N, gə-gɽəd
Floating nasal alignment	gə-${}^{\text{ŋ}}$gɽə${}^{\text{n}}$d	ŋə-ŋgɽəd	gə-ŋgɽəd
Output	*gə-**ŋg**ɽə**nd**	*ŋə-**ŋg**ɽəd	gə-**ŋg**ɽəd

Consider the schema in Table 36 that lists the relevant phonological processes for infinitival reduplication. An empty vowel and accompanying onset slot are inserted into the representation to satisfy minimal word and syllable correspondence requirements (see §4.2) and the melodies of the nearest consonant and vowel segments are copied into these empty slots. Under a monosegmental analysis, this generates an output in which the homorganic nasal-obstruent sequence is copied as a single segment into the onset of the new syllable, resulting in two nasal-obstruent sequences in the output form. Nasal-obstruent sequences are not permissible in the language, and the nasal elements independently align with the leftmost non-initial obstruents in the word (see analysis in §3.2). This alignment process leads to an output /*gə-**ŋg**ɽə**nd**/ with two floating nasals, which is not the observed infinitival form of the verb.

Under the sequential analysis, the homorganic nasal-obstruent sequence is treated as two segments in the input, and the copy process would then erroneously copy the nasal into the onset of the new syllable, generating the output /*ŋə-**ŋg**ɽəd/. While this form does have the correct number of floating nasals (one), the copy process selected the wrong onset.

The final analysis, in which the nasal is non-linearized in the input, predicts both (i) that the obstruent, not the nasal, is selected in the copy process, and that (ii) only one homorganic nasal-sequence appears in the output form. This results in the observed output /gə-**ŋg**ɽəd/.

Given the facts that prenasalization is phonologically predictable and lexically determined at the morpheme level, I maintain that prenasalization is a phonemic feature of the morpheme, not the segment.

Nasals

Nasals are produced in four places of articulation: bilabial, alveolar, palatal, and velar. The palatal and velar nasals are atypical for non-Austronesian languages in New Guinea (Foley, 2000) but common in Austronesian (Blust, 2013). This set of nasals can be found in all Pahoturi River languages and can be reconstructed for Yam languages as well (Evans, Carroll, & Döhler, 2017).

Affricates and fricatives

There are two retroflex affricates, t͡ʂ and d͡ʐ. Retroflex obstruents are atypical of Papuan languages in general (Foley, 2000) and bring more to mind languages further south in Australia (Evans, 2012a). Regionally, retroflex obstruents are more common. They can be found in all Pahoturi River languages, except perhaps Kawam, in which they have been replaced by palatal fricatives (Badu, 2018). Retroflex stops can also be reconstructed for the Yam family (Evans et al., 2017).

There are two fricatives /s/ and /z/. The phoneme represented as /z/ is variably pronounced as a voiced alveolar fricative [z], a voiced alveolar affricate [dz], a voiced postalveolar fricative [ʒ], and a voiced postalveolar affricate [dʒ]. Thus, the word *pazi* /pazi/ 'year' can be pronounced four different ways, (143).

(143) /pazi/

a. [pazi] AKD (Kaoga (Dobola), 2018)
b. [padzi] GWK (Warama (Kurupel), 2018)
c. [paʒi] TTW (T. (Tonzah) Warama, 2018a)
d. [padʒi] KMM (K. Mado, 2018a)

This same variation pattern has also been observed in other Pahoturi River languages, such as Idi (Schokkin, p.c.), Yam languages, such as Nen (Evans & Miller, 2016) and Nmbo (Kashima, p.c.), Anim languages, such as Bitur (Rogers, p.c.), and Eastern Trans Fly languages, such as Bine (Döhler, p.c.).

Liquids

The Ende inventory includes three liquids, /r/, /ɽ/, and /l/. Among the liquids, /ɽ/ is most common word-initially, inter-vocalically, and word-finally, although /r/ approaches the count of /ɽ/ inter-vocalically. The distribution of liquids is more similar in complex onsets and codas, although they are far more in onsets than codas. The counts in Table 37 are based on the 2017 Ende dictionary, which included approximately 5000 words.

Table 37: Distribution of liquids

Liquid	#_	V_V	_#	.C_V	V_C.
/ɽ/	114	348	220	41	2
/r/	17	298	147	48	1
/l/	26	131	145	24	3

Most Papuan languages only have a single liquid phoneme, but many Austronesian languages minimally have a contrast between /r/ and /l/ (Foley, 2000). The retroflex liquid /ɽ/ is rare in the region but found in three Pahoturi River language varieties: Ende, Agob, and Em. Words with /ɽ/ in Ende, Agob, and Em are realized with /r/ in Kawam, /l/ in Idi and /l/ or /ʎ̟/ in Taeme (Lindsey, 2017a), as illustrated in Table 38. Idi data provided by Dineke Schokkin (p.c.).

Table 38: Words with /ɽ/ in Ende in all Pahoturi River languages

Gloss	Ende (ɽ)	Agob (ɽ)	Em (ɽ)	Kawam (r)	Taeme (l, ʎ)	Idi (l)
'fingernail'	ɽɪpɪt	ɽu.put (ɽu.be)	ɽu.put	ruput	lɪpɪt (lɪ.bi)	lɪbæ
'man'	ɽa	ɽa.bo	ɽa.bo	ra	la	la
'small lizard'	pip.ɽo	pip.ɽo	pip.ɽo	pip.ro	pip.ʎ̟u	pip.lu
'woman'	mə.ɽa	mo.ɽa	mə.ɽa	mə.ra	mə.la	mə.la
'fly (noun)'	aɽ.ko	aɽ.ko	aɽ.ko	ar.ko	æl.ko	æl.ko
'male animal'	guɽ.be	guɽ.be	guɽ.be	gur.be	gʷuʎ̟.bi	g͡bəl.bi
'canoe'	gaɽ	geɽ	gaɽ	gar	gæl	gæl
'die'	kuɖ͡ʐəɽ	kuɖ͡ʐuɽ	kuduɽ	kuɖ͡ʐur	kʷɪdɪʎ̟	k͡wɪdəl

Compared to other Pahoturi River languages, there is one notable absence in the Ende liquid inventory. Both Idi and Taeme have an alveolo-palatal lateral approximant /ʎ/, in addition to alveolar /l/. /ʎ/ is more frequent in Taeme than in Idi. When Taeme /ʎ/ is also /ʎ/ in Idi, it is realized as /l/ in Ende, Kawam, Em, and Agob (Table 39a). When Taeme /ʎ/ is realized as /l/ in Idi, it is realized as /ɽ/ in Ende, Em, and Agob, and /r/ in Kawam (Table 39b). Idi data provided by Dineke Schokkin (p.c.).

Table 39: Words with /ʎ/ in Taeme/Idi in all Pahoturi River languages

	Gloss	Ende (l)	Agob (l)	Em (l)	Kawam (l)	Taeme (ʎ)	Idi (ʎ)
a.	ascend	kəᵑkəl	kɵᵑkɵl		konkol	kəʎkəʎ	kakəʎ
	bow	bəgəl	bɵgɵl	bogol	bogol	bəgəʎ	bəgəʎ
	copulate	liglig	liglig	liglig	liglig	ʎeʎeg	ʎeʎeg
	dry	pərəl	porol	porol	porol	pəreʎ	pərəʎ
	yam, purple	galbi	gelbe	galbi	gælbe	gæʎbi	gæʎbæ
		Ende (ɽ)	Agob (ɽ)	Em (ɽ)	Kawam (r)	Taeme (ʎ)	Idi (l)
b.	canoe	gaɽ	geɽ	gaɽ	ger	gæʎ	gæl
	die	kuɖ͡ʐɪɽ	kuɖ͡ʐuɽ	kuduɽ	kuɖ͡ʐur	kʷɪdɪʎ	kʷɪdəl
	fish	koɽba	(pudi)	koɽba	korba	kʷəʎba	(wagbej)
	small lizard	pipɽo	pipɽo	pipɽo	pipro	pipʎu	piplu
	male animal	guɽbe	guɽbe	guɽbe	gurbe	gʷuʎbi	g͡bʷəlbi
	pig	sɪmeɽ	sɪmoɽ	sɪmeɽ	sɪmer	səmiʎ	sɪᵐbɪl
	rain	jogoɽ	iguɽ	juguɽ	jogor	jogəʎ	jɪg͡bʷɪl
	two	komɽa	komɽebi	kumɽe	komre	komʎæ	koᵐblæ
	bush wallaby	kubuɽ	kubuɽ	kubuɽ	kubur	kʷubəʎ	kubɪl

Glides

There are two glides in the Ende consonant inventory, /w/ and /j/, that occur in all positions of the syllable and word. These two phonemes are used contrastively, as shown in Table 40. They are also used epenthetically. Their epenthetic function is to provide onsets to vowel-initial words and to break up vowel sequences.

Table 40: Minimal pairs - glides

Glide	Word-initial	Inter-vocalic	Word-final
/w/	/wap/ ‘stick’	/baba/ ‘father’	/aw/ ‘yes’
	/ap/ ‘savannah’	/bawa/ ‘rainy season’	/a/ ‘and’
/j/	/jure/ ‘sago type’	/bije/ ‘taro’	/ma/ ‘house’
	/uɽe/ ‘big’	/bile/ ‘salt’	/maj/ ‘sago type’

In coda position, these glides are adjacent to vowels and are phonetically very similar to vowel sequences or diphthongs. The three most common sequences are [ai] or [aj], [oi] or [oj], and [ao] or [aw]. One could analyze these sequences either as diphthongs or as vowel-glide sequences.

Three pieces of evidence favor a vowel-glide analysis as opposed to a diphthong analysis. First, evidence for a vowel-glide analysis comes from case allomorphy. The purposive case clitic has two forms: =*e* when following a consonant-final root and =*we* when following a vowel-final root, as shown in (144) and (145). When the purposive follows a root ending in a vowel-glide sequence, such as in (146), it is realized as =*e* and not =*we*. This suggests that the phonology treats these syllables as ending with a consonantal coda, not a diphthong.

(144) *ngämi* ***kämbämeny e*** *gobäll*
ŋəmi kəmbə-meɲ=e ɡo-bəɽ
1.EXCL.PL.NOM dive-III.PL=PURP REM-go.PL
‘We went diving.’
(W. Warama, 2016c SE_SN019 #3)

(145) *llɨg a* ***po we*** *gobällän*
ɽɪɡ=a po=we ɡo-bəɽ-ən
boy=NOM block=PURP REM-go.PL-3SGS
‘The boys went to block (the animals).’
(T. (Tonzah) Warama, 2016d SE_PN002 #10)

(146) ***mamoe e*** *abällan*
mamoj=e a-bəɽ-an
hunt=PURP REC.RT.EXT-go.PL-REC.1|3SGS
‘They went hunting.’
(J. (Jeks) Dareda, 2018d SE_SN045 #57)

Moreover, vowel-glide sequences in closed syllables (CVGC) are marginal, occurring much less frequently than simple vowel nuclei, even of the least common vowels (/i/ and /u/). If we were to consider a diphthong analysis, the counts listed in Table 41 indicate that the diphthongs have a much lower frequency than simple vowel nuclei. Alternatively, a vowel-glide sequence analysis indicates that these syllables have complex codas, and indeed the frequencies of these closed syllables is much more like the frequency of other syllables with complex codas in the language.

Table 41: Distribution of simple and complex vowel nuclei

Vowel	Closed syllable	Word-finally
[ai] or [aj]	58	120
[oi] or [oj]	31	49
[ao] or [aw]	8	7
/a/	989	598
/i/	272	154
/u/	242	112

Finally, Table 41 shows that vowel-glide sequences occur more frequently word-finally than in closed syllables, which is the opposite pattern of simple vowels. This further indicates that the vowel-glide sequences are distributed more like closed syllables than complex nuclei. Complex codas are infrequent in the language (see Syllable Structure below), supporting this pattern. Distribution counts in Table 41 are based on the 2017 version of the Ende dictionary, which included approximately 5000 words.

Vowels

Ende has five full peripheral vowels /i e a o u/ and two central vowels /ɪ ə/. The placement of the vowels in the trapezoid below is approximated from the plot in Figure 5, in which the normalized F1/F2 measurements of 2260 vowel tokens spoken by sixteen speakers are plotted. The plots below were made using the PhonR package (McCloy, 2016).

Figure 5: Vowel trapezoid

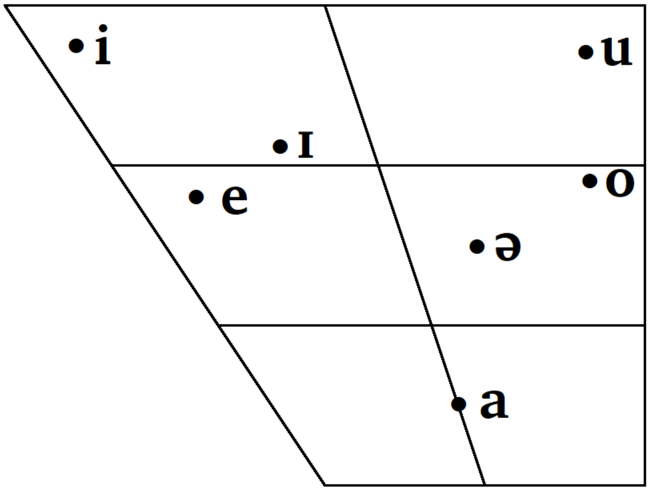
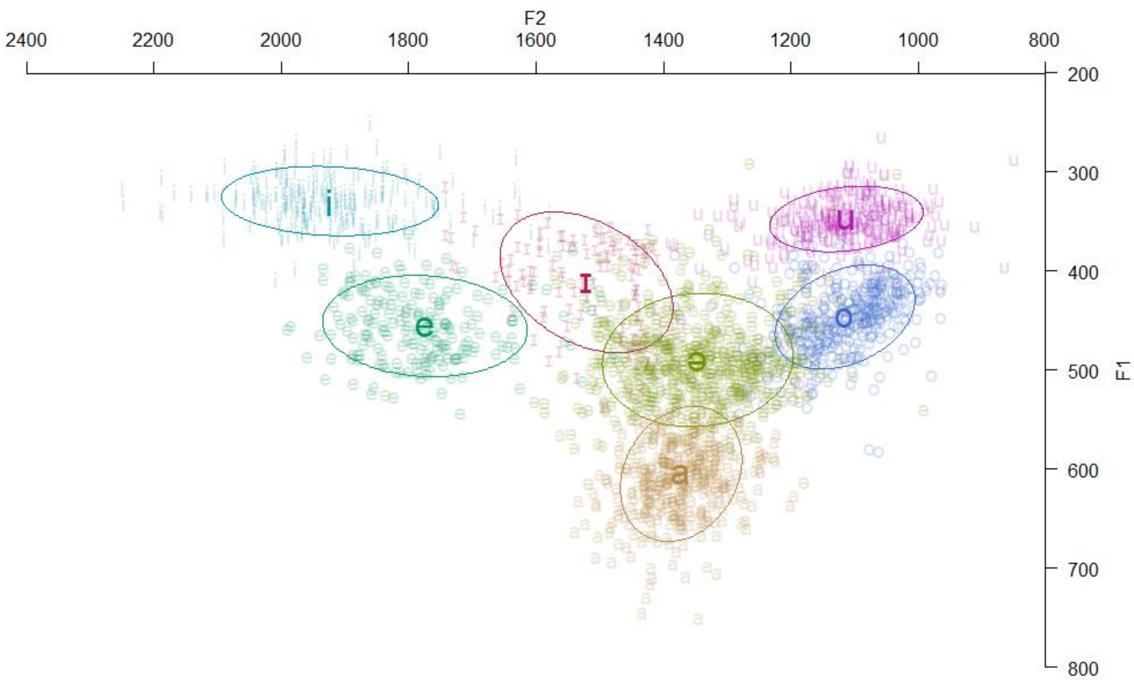


Figure 6: Vowel plot



Vowel quality

To determine the quality and dispersion of each of the vowels, I measured wordlist tokens from each of the sixteen speakers listed in Table 42. Each speaker read at least four monosyllabic words, in which each vowel was encased by voiceless obstruents, and repeated this at least three times. This resulted in an average of twenty tokens per vowel per speaker. I extracted each vowel by visually inspecting the waveform and spectrogram in Praat (Boersma & Weenink, 2018) and then measured F1 and F2 at the midpoints of each vowel by running a Praat script titled *getDurationPitchFormants* (McCloy & Lennes, 2011), in which the linear predictive coding (LPC) analysis was set to identify five formants under 5500 Hz. The same settings were used for both male and female speakers as the results from this automatic extraction were plotted, visually inspected, and performed equally well in both groups. Outlier tokens were remeasured by setting the LPC parameters manually to match the visible formant lines in the spectrogram. These measurements were then normalized using NORM: Vowel Normalization Suite's implementation of Lobanov's formula, which factors out physiologically-caused differences but retains sociolinguistic variation (Lobanov, 1971; Thomas & Kendall, 2007).

Table 42: Speaker information

Name	Gender	Age (2018)	Hometown	Source
Paine Kurupel	M	62+	Limol (Kuddäll)	(P. Kurupel, 2018c)
Donae Kurupel	F	62+	Limol (Kuddäll)	(D. Kurupel, 2018a)
Sarbi Kurupel	F	62+	Limol (Kuddäll)	(Sarbi Kurupel, 2018a)
Karea Mado	M	62+	Limol (Kuddäll)	(K. Mado, 2018a)
Warama Kurupel (Suwede)	M	46-61	Limol (Kibobma)	(Kurupel (Suwede), 2018a, 2018c)
Kaoga Dobola	M	46-61	Limol (Kibobma)	(K. Dobola, 2018a)
Kwale (Tutu) Geser	F	46-61	Limol (Kibobma)	(K. Geser, 2018)
Wagiba Geser	F	46-61	Limol (Kibobma)	(W. Geser, 2018b, 2018d, 2018e)
Tonny (Tonzah) Warama	M	30-45	Limol (Kibobma)	(T. (Tonzah) Warama, 2018a, 2018b)
Jerry (Jeks) Dareda	M	30-45	Limol (Kibobma)	(J. (Jeks) Dareda, 2018b)
Gloria Warama (Kurupel)	F	30-45	Limol (Kibobma)	(Warama (Kurupel), 2018)
Namaya Karea	F	30-45	Limol (Kibobma)	(N. Karea, 2018)
Wendy Frank	F	15-29	Limol (KT)	(Frank, 2018a)
Winson Warama	M	15-29	Limol (KT)	(W. Warama, 2018)
Maryanne Sowati (Kurupel)	F	15-29	Limol (KT)	(Sowati (Kurupel), 2018a)
Andrew Kaoga (Dobola)	M	15-29	Limol (KT)	(Kaoga (Dobola), 2018)

Plots that show the group means by sex (Figure 7) or age (Figure 8) do not indicate any overt sex or age effects on vowel quality in this sample, except that /i/ appears to be more front for the youngest age group.

Figure 7: Vowel means by sex

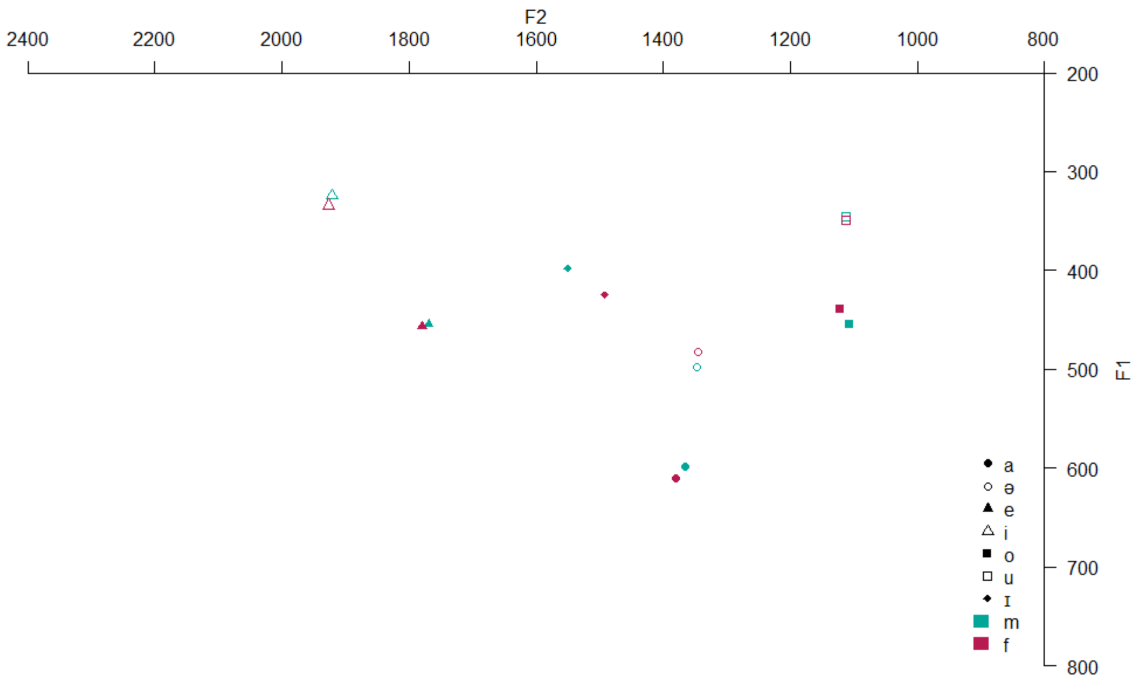


Figure 8: Vowel means by age

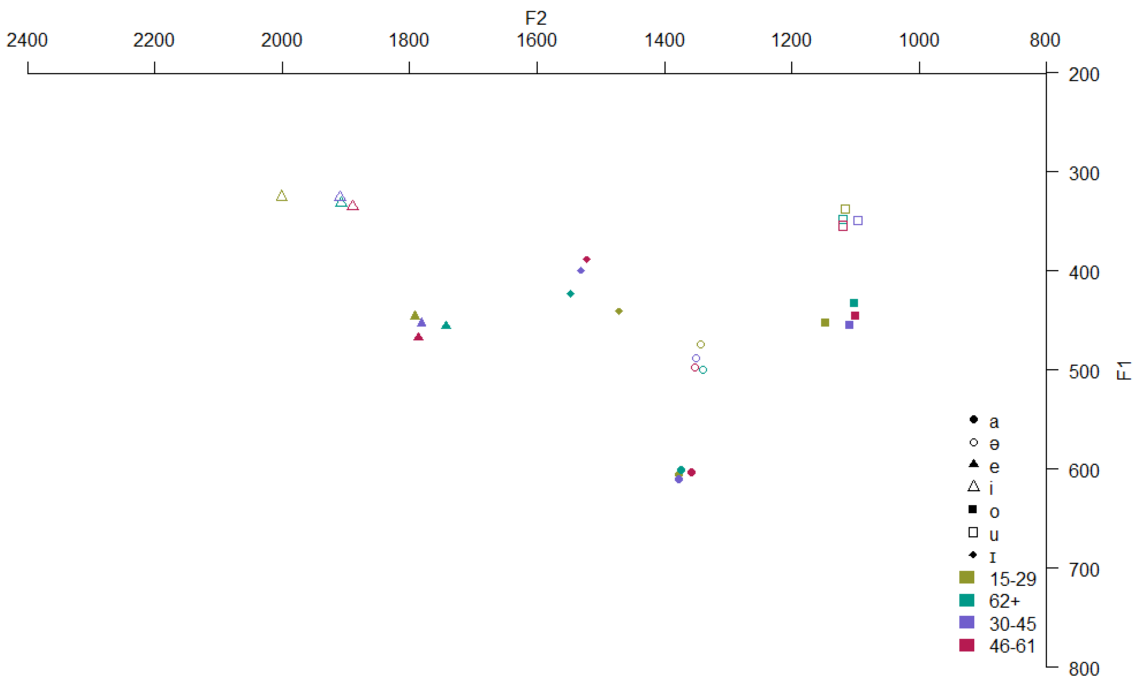


Table 43: Vocalic inventory

	Front	Central	Back
Close	i		u
Close-mid		ɪ	
Mid	e	ə	o
Open		a	

Vowel phonotactics

The five peripheral vowels /i e a o u/ occur word-initially, word-finally, and even as a complete word, as shown in Table 44. The phoneme /e/ is realized as [e] word-finally and [ɛ] elsewhere. Central vowels /ɪ/ and /ə/ are not observed word-initially or -finally.

Table 44: Oral vowel phonotactics

Vowel	Word	Word-initial	Word-final
/i/	/i/ ‘to weave’	/ibi/ ‘to go’	pazi ‘year’
/e/	[e] ‘which’	[ɛka] ‘language’	[ɛ^{n}de] ‘language name’
/a/	/a/ ‘and’	/aɡ/ ‘morning’	/pa/ ‘bird’
/o/	/o/ ‘ripe’	/oməɡ/ ‘magic’	/ɽo/ ‘tree’
/u/		/uɽe/ ‘big’	/ju/ ‘fire’

The close-mid central vowel /ɪ/ is much less common than the other vowels. In the first version of the Ende orthography, words with /ɪ/ and /ə/ were both written with the grapheme <ɨ>. In 2015, the orthography was modified so that /ə/ was represented by <ä>, a grapheme used in neighboring Idi but for the low front vowel /æ/. That same year /ɪ/ was also elevated in orthographic status and given the grapheme <ɨ> based on minimal pairs such as *tän* /tən/ ‘stem’ and *tɨn* /tɪn/ ‘steam’.

In contrast to /ɪ/, the mid-central vowel /ə/ is the third most frequent vowel in the 2017 dictionary (1794 occurrences), only surpassed by /a/ (3362 occurrences) and /e/ (1869 occurrences). The high frequency of /ə/ can be partly attributed to its intrusive behavior between consonant clusters (see §A.2.2). However, its realization is not always predictable. Minimal pairs, such as those listed in Table 45, and its standalone use as a morpheme /ə-/ ‘third non-dual[30] patient’ support its phonemic status.

[30] The category of non-dual indicates singular or plural referents (but not dual). This contrast is similar to the Nen system, where the dual vs non-dual contrast is deeply entrenched (Evans, 2015b, 2019b).

Table 45: Minimal pairs with /ə/

/ə/	/a/	/e/	/u/	/i/	/ɪ/	/o/
/kək/ 'to bubble'	/kak/ 'grandmother'	/kek/ 'bush hen'			/kɪk/ 'to crumple'	/kok/ 'moon'
/pət͡ʂ/ 'body'	/pat͡ʂ/ 'dead log'		/put͡ʂ/ 'six'	/pit͡ʂ/ 'to sew'		
/pəp/ 'to draw'	/pap/ 'yam type'			/pip/ 'red bee'		/pop/ 'hole'
/kəp/ 'egg'		/kep/ 'hip'	/kup/ 'pit'	/kip/ 'top'		
/səs/ 'sago type'				/sis/ 'season type'	/sɪs/ 'to extinguish'	/sos/ 'church'

However, some phonological processes seem to ignore the presence of /ə/, bringing its syllabic or moraic status into question. For example, verb roots in Ende exhibit phonological duplication (see §4.2), in which some infinitival verb stems are formed via affixation of a semantically empty vowel slot that triggers phonological duplication of monosyllabic words. Disyllabic roots with /ə/ are treated as monosyllabic, suggesting these vowels may be epenthetic or intrusive. To illustrate this, consider the verb root patterns offered in Table 46.

Table 46: Phonological duplication in verb roots

Infinitival form	Infinitival plural form	Inflected root	Gloss	Note
d͡ʐo-nd͡ʐo	d͡ʐo-nen	√nd͡ʐo	boast	monosyllabic, monomorphemic roots reduplicate.
bl-ab	bl-ajb	√bl-ab	mature	monosyllabic, multimorphemic roots do not reduplicate
ergod	ergod-nen	√ergod	crawl	multisyllabic, monomorphemic roots do not reduplicate
bə-bəɽəd	bəɽəd-nan	√bɽəd	drop badly	disyllabic, monomorphemic roots with epenthetic /ə/ reduplicate

Though it appears that there may be two phonological types of /ə/, I have not observed a phonetic difference between the two types. Wagiba Geser, a bilingual speaker of Ende and Taeme, both in the Pahoturi River family, observes a length distinction between the central vowels in Ende (long) and Taeme (short), listen to the end of the elicitation in ST_EE006 (W. Geser, 2018i). A similar dual status of /ə/ is observed in other Pahoturi River languages, such as Idi (Schokkin, p.c.), and some Yam languages, such as Nen (Evans & Miller, 2016), Nmbo (Kashima, p.c.), and Komnzo (Döhler, 2018). In these languages, epenthetic /ə/ isn't written, but unpredictable cases of /ə/ are represented in the orthographies.

Ende's vowel inventory stands out in the Pahoturi River family because it has only one open vowel /a/, while all other varieties have two: /æ/ and /a/. To test the neutralization of this vowel, I compared the backness of /a/ in Ende words whose cognates in other Pahoturi River varieties have /æ/ or /a/. Specifically, I had all sixteen speakers read the following list of words three times, in which five words have low front vowels (F) in other Pahoturi River varieties and five words, which have low back vowels (B) in other varieties. [Note: there are a couple of instances where varieties other than Ende have back vowels in expected front vowel contexts or front vowels in expected back vowel contexts. Forms in parentheses are non-cognate but included for completeness.] Idi data provided by Dineke Schokkin (p.c.).

Table 47: Stimuli for testing the neutralization of Ende /a/

	Gloss	Ende	Agob	Em	Kawam	Taeme	Idi
(F)	morning	ag	(wab)	(bodbod)	(boɖ͡ʐboɖ͡ʐ)	æg	æg
	rope	kab	kæb	kæb	kæb	kab	(mænd)
	West wind	kəmag	kəmæg	kəmag	kəmæg	kəbæg	kəbæg
	dead tree	paʈ͡ʂ	pæʈ͡ʂ	paʈ͡ʂ	patʃ	lu pæʈ͡ʂ	pæʈ
	(tree) leaf	ʈ͡ʂam	(pe)	ʈ͡ʂæm	ro tʃæm	ʈ͡ʂæm	ʈæm
(B)	savannah	ap	ap	awe	ap	awaj	æp
	wing	ɖ͡ʐamba	tama	tæma	tama	ɖ͡ʐamba	damba
	sky	ɖ͡ʐapaɽ	ɖ͡ʐapaɽ	ɖ͡ʐapaɽ	dʒapar	ɖ͡ʐapal	ɖapal
	eel	dompak	(sami)	(sami)	dombak	dombak	(gereba)
	bird	pa	pa	pa	pa	pa	pa

In total, the F2 values of 574 vowels were measured and normalized using the method described above for determining the vowel space. The boxplot in Figure 10 illustrates the variance of F2 values between historically front (F) and back (B) vowels. A one-way ANOVA test considers the difference in the variance of the two data sets to be significant ($p = 0.0049$). The variance between the front vowel measurements and the back-vowel measurements is nearly eight times larger than the variance within each of the vowel measurement groups (F = 7.979). However, the actual difference in mean frequencies between the two groups is just 34.89 Hz, almost a complete merger. In this preliminary analysis, I have not investigated whether the factors of age or parental language influence the frontness of historically front vowels. (One might predict that older speakers, or speakers with parents that speak other Pahoturi River language varieties, may have more front open vowels than younger or more monolingual speakers.) Further research in this area is needed.

Figure 10: Variance of F2 values for open vowels in historically front (F) and back (B) vowels

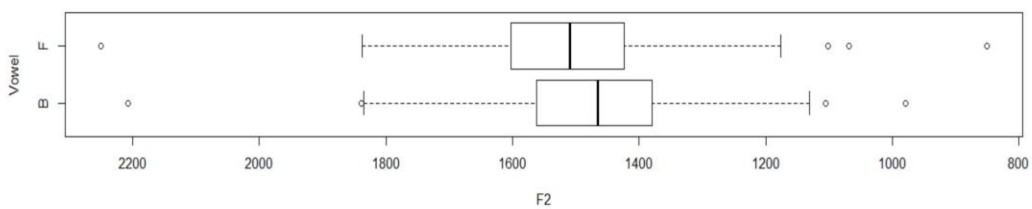


Table 48 lists seven near-minimal pairs that feature all seven vowels following /b/ in the first syllable of the word.

Table 48: Vowel (near-)minimal pairs

Phoneme	Phonemic form	Orthographic form	Gloss
/i/	/bin/	bin	name
/e/	/bem/	bem	sea
/a/	/baba/	baba	father
/o/	/bodo/	bodo	full
/u/	/bun/	bun	head
/ɪ/	/bɪtbɪt/	bɨtbɨt	black
/ə/	/bəgəl/	bägäl	bow

A.2.2 The syllable

The Ende syllable consists of a nucleus, onset, and a coda. Onsets and codas are optional and consist of consonants at the edges of the syllable, while the nucleus is obligatory and occupied by a vowel. In words with more than one nucleus, consonants are parsed as onsets first, then codas. All Ende consonants can be found in both simple onset and coda positions. Onsets and codas may consist of multiple segments if the cluster is legal in Ende. Though they exist, clusters are still sporadic. Legal onset clusters always rise in sonority, according to the Sonority Scale (148), while legal coda clusters always fall in sonority. The two margins are not identical; for instance, onset clusters do not include nasals.

Complex onsets can consist of a plosive (p, b, t, d, k, g) followed by a liquid or glide (r, ɽ, l, w, j), or a fricative (s) followed by a sonorant (n, m, ɽ, l) or an obstruent (p). There are rare examples of a nasal (m, n, ɲ, ŋ) followed by a glide (w, j). Words with a nasal-glide onset are typically adapted loanwords or ideophones. Complex codas can only consist of (i) a glide /w, j/ followed by any consonant, (ii) a liquid /l, r, ɽ/ followed by a nasal or stop, or (iii) a nasal /m, n, ŋ/ followed by an obstruent that matches in place. If an input violates the legal onset or coda specifications, /ə/ is inserted to break up the illegal cluster. Examples of onset and coda clusters are organized in

Table 49 and Table 50.

(147) Ende syllable template
[C_1 C_2 V C_3 C_4]

(148) Sonority Scale (Bell & Hooper [Bybee], 1978; Clements, 1990)
vowels > glides > liquids > nasals > obstruents (abbreviated v > g > l > n > o)

Table 49: Legal onset clusters

		C1								
		p	b	t	d	k	g	s	z	m
C2	r	go.im.pre.gejo ‘they crossed paths’	kojm.bre ‘tree type’	tram ‘to carry’	dra.dre ‘tree type’		gra.wa ‘bird type’		bon.zro ‘to play’	
	l	(aɲke) plenz ‘to shock’	blab ‘to mature’			kla.klaj ‘a little’	gla.gle ‘to dig’	sla.slak ‘bird type’		
	ɽ	pɽa.jaŋ ‘full’	bɽa.bɽa ‘cordyline’	tɽəp.məɽ.tɽəp.məɽ ‘to nibble’		kɽo.kɽoe ‘to mix’	gɽa.gɽe ‘to skin’	sɽo.ɽoŋg ‘to sit close’		
	w	pwa.pwa ‘light’	bwata ‘palm type’		dwelsəra ‘sago bundle’	kwa.ta ‘tree type’	gwa.ra ‘lightning’			mwatu ‘motu’
	j		pim.bjom ‘bark type’			DU kja.kja ‘bird type’				
	m							dən.smo.ɽən ‘to lower’		
	n							(kuʈ͡ʂ) snameɲ ‘funeral term’		
	p							spalek ‘yam basket’		

Table 50: Legal coda clusters

		C3							
		m	n	ŋ	l	r	ɽ	j	w
C4	p	tərəmp,meɲ ‘funeral term’				tarp.nen ‘to cut.PL’		t͡ʂajp.nen ‘to fix’	
	b	bə.namb ‘to open’			dəŋalb.ne ‘I looked for him.’	darb.nen ‘to write’	ŋəɽb.nan ‘to get’	ajb ‘bush hen’	bawb ‘waterlily’
	mp							tajmp.meɲ ‘to show’	
	mb							bə.najmb ‘to open’	
	t		ɽɪnt.meɲ ‘to tell s.o.’					bajt ‘cuscus’	
	d		band ‘tree type’				DU.koɽd.ne.gən ‘he shot them.’		
	t͡ʂ		dant͡ʂ.ka.mə.ɽən ‘he met them’						bawt͡ʂ.bawt͡ʂ ‘to walk aimlessly’
	d͡ʐ		mənd͡ʐ.mənd͡ʐ ‘to drown’						
	k			nəŋk ‘take off!’	kalk.mo ‘joints’	tərk.moɽ ‘biting ant’	paɽk.nen ‘to chop’		
	g			pe.naŋg ‘to burn’				kajg ‘friend’	
	ŋg							pajŋg ‘to guess’	
	s								
	z			bənz ‘mosquito’					
	m				bəlm.bəl ‘to remember’	sərm.baj.nen ‘to prepare’		ba.bajm ‘season type’	
	n				jə.kəln.da ‘their cousin’			kajn ‘to wrap up’	
	ŋ				ine kəlŋ.kəl ‘high tide’		paɽŋ.kəg ‘to divide’		

This brief description of Ende syllable structure raises the question as to how the optimality-theoretic constraints that regulate syllable structure, such as ONSET, *CODA, *CC, MAX, and DEP are ordered in Ende.

(149) ONSET
Assign a violation for every syllable that lacks an onset.

Onset must be ordered higher than Dep to account for the fact that vowel-initial words often host epenthetic glide onsets. Interestingly, this is much more common with mid vowels, where /e/ is preceded by /j/ and /o/ is preceded by /w/.

Tableau 69: ONSET » DEP

/ebdo/		ONSET	DEP
a.	eb.do	*!	
☞b.	yeb.do		*

Similarly, the SONORITY SEQUENCING PRINCIPLE (SSP; Clements, 1990; Hooper, 1976; Kiparsky, 1979; Selkirk, 1984; Steriade, 1982; Zec, 1995, among others), which states that syllables must be composed of a maximally sonorous peak (typically a vowel) with an onset that rises in sonority and a coda that falls in sonority according to the sonority scale in (148), must be ranked higher than DEP, to regulate the observed epenthetic repair to onsets and codas that violate the SSP. MAX must be ranked above DEP, as deletion is never observed as an optimal repair strategy for unsonorous clusters (unless the segment is a ghost element, see §4.2).

Something special must be stated for the observed unsonorous sequences involving /s/, perhaps because some coronal consonants are extrasyllabic, placeless (Yip, 1991), or otherwise evade the sonority sequencing principle as they do in many languages.

(150) SONORITY SEQUENCING PRINCIPLE (SSP)
Assign one violation for every syllable in which the sequence of elements before the most sonorous element in the syllable does not rise in sonority and for every syllable in which the sequence of elements after the most sonorous element in the syllable does not fall in sonority, as defined by the sonority scale in (148).

Tableau 70: MAX, SSP » DEP

/pɽət͡ʂ-n/		MAX	SSP	DEP
a.	pɽət͡ʂn		*!	
☞b.	pɽə.t͡ʂən			*
c.	pɽət͡ʂ	*!		

If only the SSP were active in regulating the permissible complex onset and coda sequences in the language, we would expect to observe all cases of rising onset and all cases of falling codas. However, this is not the case. Permissible onsets and codas in Ende are summarized in (151) and (152), respectively. Each sequence is abbreviated by consonant class (*e.g.*, og = obstruent-glide) and annotated for the distance between the two classes on the sonority scale in (148).

(151) Permitted rising sonority sequences:
og (+3), ol (+2), ng (+2; rare)
Prohibited rising sonority sequences:
on (+1), nl (+1), lg (+1)

(152) Permitted falling sonority sequences:
go (-3), lo (-2), gn (-2), gl (-1), ln (-1), no (-1; must be homorganic)

As can be seen in (151), the only permitted rising sonority sequences are those where the distance in sonority between the first segment and the second segment is at least (+2). This minimal sonority distance (MSD; Greenberg, 1978, p. 249) is language-specific and constrains consonant sequences by stating that adjacent segments must have a certain distance from each other on the sonority scale. Ende phonotactics reveal an MSD of +2 in the onset and no MSD in the coda, except that it must be falling. Another restriction in the coda is that nasal-obstruent sequences in the coda, although falling, must also be homorganic.

(153) MINIMAL SONORITY DISTANCE (MSD(Onset;2))
Assign one violation for every tautosyllabic consonant sequence in the onset, in which the distance in sonority level between the two consonants is not two steps or greater.

(154) AGREE-[place]-NO$_{coda}$
Assign a violation for every tautosyllabic nasal-obstruent sequence in the coda, in which the nasal and the obstruent do not agree in the feature [place].

Tableau 71: MSD, AGREE-[place]-NO$_{coda}$ » DEP

//d-ej-a-ŋʈ͡ʂ-neg//		MSD	AGREE-NO	MAX	SSP	DEP
a.	de.jaŋ.ʈ͡ʂneg	*!				
b.	de.jaŋʈ͡ʂ.neg		*!			
☞c.	de.jaŋ.ʈ͡ʂə.neg					*

Finally, because we do observe variable epenthetic vowels occurring between consonant clusters even in sonorous, minimally distant complex onsets and codas, we can determine that the constraint *CC is unranked with respect to DEP.

*Tableau 72: *CC «» DEP*

/tram/		MSD	AGREE-NO	MAX	SSP	*CC	DEP
☞a.	tram					*	
☞b.	təram						*

Syllable contact patterns

In many languages, there is a restriction on types of heterosyllabic consonant clusters, that is adjacent consonants that belong to different syllables. This is called the Syllable Contact Law (Vennemann, 1972), which states that the greater the sonority slope between the coda and the following onset, such that the coda is maximally sonorous and the onset minimally sonorous, the better. For example, languages like Kazakh require that onsets must be less sonorous than the codas they follow. This leads to processes of desonorization, as shown in (155).

(155) Kazakh onset desonorization in contact (Davis, 1998)
//kol-lar// /kol.dar/ 'hands' cf. al.ma.lar 'apples'
//murin-ma// /mu.rin.ba/ 'nose-int' cf. kol.ma 'hand-int'
//koŋɯz-ma// /ko.ŋɯz.ba/ 'bug-int' cf.ki.jar.ma 'cucumber-int'

In general, Ende phonology is very permissive with respect to the Syllable Contact Law. Examples abound in which coda-onset contacts feature falling sonority (156)(a), stable sonority (b), and even rising sonority (c).

(156) a. aŋ.de 'when'
b. eb.do 'day'
c. ɡud.ne 'old'

The Syllable Contact Law does seem to influence the alignment of morphemic nasal features (floating nasals). Floating nasals are not specified for place in the input, which requires them to precede a place-specified consonant with which they must agree. As codas, the only onsets which the nasals may precede while maintaining a fall in sonority over the syllable boundary are obstruents. In this way, Ende phonology requires a fall in sonority over syllable boundaries, but this effect only emerges in unmarked or derived environments.

A.2.3 The word

In the Ende Language Corpus, which includes 206,401 words, of which 11,803 are unique, most words are disyllabic (31%), followed by words with three syllables (26%), four (20%), five (9%), and monosyllabic (8%). Words with more than five syllables make up approximately 5% of the data. This count does not include additional syllables contributed by case clitics, which are written separately from the word in the general orthography, though they may be considered part of the same phonological word due to common phonological processes, such as vowel harmony and epenthetic glide insertion.

There is no contrastive tone in Ende, and stress does not seem to be a distinctive feature. Speakers find picking out stressed syllables difficult, and judgments often change from one day to the next. There are no words in the current lexicon that minimally contrast by something like stress. According to other researchers who work in the geographical area of South Fly, Papua New Guinea, this property of stresslessness is common and may be an areal feature.

A.3 Verbal morphology

In terms of the morphological structure of the Ende verb, there are three basic verb types: the copulative, the auxiliary, and the lexical verb. The lexical verbs can be further split into two categories: (i) analytic coverbs, which must always be supported by an auxiliary verb in an analytic construction and (ii) synthetic lexical verbs, which are supported by an auxiliary verb in the present tense but host their own inflection in synthetic constructions in non-present tenses.

A.3.1 Copulative verbs

There are at least nine copulative verbs, and they all share a similar morphological structure. Each copula inflects for tense (present and past) and subject number (singular, dual, and plural). The affix template for copulas is shown in Table 51.

Table 51: Copulative tense and subject suffixes

		Subject number	
Tense	Singular	Dual	Plural
Present	*-n*	*-geyo*	*-g*
Past	*-eya*	*-gwaeya*	*-gaeya*

The basic copula, *da-* /da-/, is used to link subjects with descriptive predicates, such as with nominal predicates 'we are six people'(157) or locative predicates 'he is in sorrow'(158). It is also used in modal constructions, such as with *mullae* /muɽaj/ 'able' (159).

(157) *Ngämi* *siks* *lla* ***dag***.
ŋəmi siks ɽa da-ɡ
1.NSG.EXCL.NOM six person COP-PRS.PLS
'We are six people.'
(Soma, 2018 SE_PI046 #66)

(158) *Bogo* *kandärmang me* ***dan***.
bogo kandərmaŋ=me da-n
3.SG.NOM sorrow=LOC COP-PRS.SGS
'He is in sorrow.'
(T. (Kwalde) Jerry & Sowati, 2018 SE_PI035 #11)

(159) *Ede* *ubi* *ddone* *mullae* ***daeya*** *Yina bom*
ede ubi d͡ʐone muɽaj da-jja Yina=bom
so 3.NSG.NOM not able COP-PST.SGS Yina=3.SG.ACC
billɨdallo.
b-i-ɽɪd-aɽo
IRR-COND.3SGP-marry-NSGA
'So it was not possible for them to marry Yina.'
(Sowati Kurupel, 2018e SE_PI070 #203)

Other copulative verbs include the existential copula, *dade-*, which refers to the existence of the subject, often in someone's possession (160), five copular compounds with the pronouns *enda* 'what' (161), *era* 'where' (162), *aeya* 'who' (163), *gänya* 'here' (164), *däbe* 'that' (165), the restrictive case marker =*daebe* 'only' (166), and the prohibitive copula *muda-* 'do not' (167). Some of these compounds, such as *enda* /enda/ 'what', *gänya* /ɡəɲa/ 'here', and dəbe 'that' exist as independent wordforms in the language and could be interpreted as consisting of a pronominal form and reduced copula, but others are only found in this construction. These copular forms function to link subjects to predicates, in possessive constructions (166), as relativizers (168), and even as focus markers (162).

(160)

Obo	*yunipom a*	***dadegaeya***	*bɨtbɨt*	***dagaeya.***
obo	junipom=a	dade-gajja	bɪtbɪt	da-gajja
3.SG.POSS	uniform=NOM	COP.exist-PST.PLS	black	COP-PST.PLS

‘He had uniforms; they were black.’
(K. Kidarga, 2018b SE_PI055 #121)

(161)

Diba	*eka bo*	*bin a*	***endaeya****?*
diba	eka=bo	bin=a	enda-jja
that	language=3.SG.POSS	name=NOM	what-COP.PST.SGS

‘What was that language’s name?’
(W. Geser, 2018g SE_PI050 #202)

(162)

Oba	*tämamae*	*ttoen bällam*	*ngasnen a*	***eragwaeya***
oba	təmamaj	t͡ʂojn=bəɽam	ŋas-nen=a	era-gwajja
3.NSG.POSS	all	thing=every	do-PL=NOM	where-COP.PST.DUS
llame.	***dagwaeya****.*			
ɽame	da-gwaeja			
together	COP-PST.DUS			

‘Everything they did was [done] together.’
(T. (Tonzah) Warama, 2016a RE_EN001 #3)

(163)

Nägäm	***aeneya***	*Mamos a.*
nəgəm	ajn-eja	mamos=a
Nägäm	COP.who-PST.SGS	mamos=NOM

‘The mamos [important position in colonial times] was Nägäm.’
(Sobam, 2018b SE_PI072 #215)

(164)

“Baba,	*ao*	***gänyageyo***	*ddia da.”*
baba	ao	gəɲa-gejo	d͡ʐia=da
father	yes	here-COP.PRS.DUS	deer=NOM

“Yes, dad, there are two deer here.”
(Ben Danipa, 2017a RE_EN034 #15)

(165)

Sowati bane	***däbag***	*ada,*	*Merien…*
Sowati=bəne	dəba-g	ada	Merien
Sowati=3.SG.ABL.ANIM	this-COP.PRS.PLS	like.this	Maryanne

‘Sowati’s [children] are these: Maryanne…’
(D. Kurupel, 2018b SE_PI051 #168)

(166)

Ao	*ngämo*	*ttongdae*	*eka*	***daeben****.*
ao	ŋəmo	t͡ʂoŋ=daj	eka	dajbe-n
yes	1.SG.POSS	one=RES	language	only-COP.PRS.SGS

‘Yes, I only have [speak] one language.’
(D. Kurupel, 2018b SE_PI051 #16)

(167)

Ede	*papa da*	***mudag**,*	*be*	*mer*	*eka de*
ede	papa=da	muda-g	be	mer	eka=de
so	hit=NOM	COP.prohib-PRS.PLS	but	good	word=ACC
sinen.					
si-nen					
give.PL-PL					

‘So do not hit [one another], but give good words.’
(Lindsey, 2018b SE_SF039 #13)

Copular verbs can be further compounded. For example, *gänyaeben* /gəɲajben/ ‘only here’ is a compound of *gänya* /gəɲa/ ‘here’ and *daebe* /dajbe/ ‘only’ with the present singular copula suffix (168) and *ngänawaeben* /ŋənawajben/ ‘only me’ is a compound of *ngäna* /ŋəna/ ‘1.SG.NOM’ and *daebe* /dajbe/ ‘only’ with the present singular copula (169).

(168)

Ngämo	*eka da*	***gänyaeben***	*Ende*	*eka da*
ŋəmo	eka=da	gəɲ-ajbe-n	ende	eka=da
1.SG.POSS	language=NOM	here-only-COP.PRS.SGS	Ende	language=NOM
ge	*ngäna*	*ere*	*eka*	*allan.*
ge	ŋəna	ere	eka	aɽan
this	1.SG.NOM	which	speak	AUX.PRS.1SGS

‘My language is only this one here, Ende language, which I am speaking.’
(Rind, 2018 SE_PI057 #196)

(169)

Ngämo	*pemliangae*	***ngänawaeben***	*ngämo*
ŋəmo	pemli=aŋ=aj	ŋəna-wajbe-n	ŋəmo
1.SG.POSS	family=ATT=ADV	1.SG.NOM-only-COP.PRS.SGS	1.SG.POSS
ma me.			
ma=me			
house=LOC			

‘It’s only my family and me in my house.’
(G. (Garayi) Pewe, 2018b SE_PI054 #87.1)

Full paradigms for these copulative verbs are included in the tables below. Variants are shown in parentheses. Forms that were elicited but not found naturally in the corpus are included in square brackets.

Table 52: Copulative paradigm of da- ‘basic copula’

tense	singular	dual	plural
present	*dan*	*dageyo*	*dag*
past	*daeya (deya)*	*dagwaeya (dagweya, dagwe)*	*dagaeya*

Table 53: Copulative paradigm of dade- ‘existential copula’

tense	singular	dual	plural
present	*daden*	*dadegeyo*	*dadeg*
past	*dadeya*	*dadegwaeya*	*dadegaeya*

Table 54: Copulative paradigm of enda- 'what'

tense	singular	dual	plural
present	*endan*	*[endageyo]*	*endag*
past	*endaeya (endeya)*	*[endagwaeya, endagweya, endagwe]*	*endagaeya*

Table 55: Copulative paradigm of era- 'where'

tense	singular	dual	plural
present	i	[erageyo]	erag
past	eraeya (eraya)	eragwaeya (eragweya, eragwe)	[eragaeya]

Table 56: Copulative paradigm of gänya- 'here'

tense	singular	dual	plural
present	*gänyan*	*gänyageyo*	*gänyag*
past	*gänyaeya*	*[gänyagwaeya]*	*gänyagaya*

Table 57: Copulative paradigm of aeya- 'who'

tense	singular	dual	plural
present	*aenen*	*[amigeyo]*	*amig (ami dag)*
past	*aenaeya*	*[amigwaeya]*	*[amigaeya]*

Table 58: Copulative paradigm of muda- 'don't'

tense	singular	dual	plural
present	mudan	[mudageyo]	mudag
past	[mudaeya]	[mudagwaeya]	[mudagaeya]

Table 59: Copulative paradigm of the singular pronouns

	1st	2nd	3rd
singular	*ngänawaenen*	*bongoaenen*	*beyawaenen*

A.3.2 Auxiliary verbs

There are at least two auxiliary verbs, defined as verbs that support lexical verbs by hosting inflectional categories such as tense, argument agreement, mood, direction, valence, etc. These include the present progressive and the *-g-* perfective. These auxiliaries have both transitive and intransitive templates. An additional verb, *ibi* /ibi/ 'to go' is occasionally used as a transitive perfective auxiliary and may be related to the present progressive. Like lexical verbs (see §A.3.3), auxiliary verbs have prefixes, which typically indicate tense, aspect, and object agreement, and suffixes, which indicate tense, aspect, verbal number, and subject agreement. For simplicity, conditional, irrealis, durative, venitive, and pluractional forms are not included in the paradigms below.

In Table 60, the intransitive auxiliary forms are organized by subject person and number and by tense (present, remote past, recent past, and future). Forms that are separated by a tilde (~) indicate optional variation in form use. The perfective forms are morphologically segmented, and the semantic contribution of each morpheme is listed in Table 63.

Table 60: Intransitive auxiliary paradigm

Subject	PRS	REM	REC	FUT
1SG	allan	go-g	a-g-an	bo-g
1DU	alla	go-g-eya	a-g-alla	bo-g-eya
1PL	amalla	go-g-mam	a-g-malla	bo-g-mam
2SG	alle	go-g	a-g-alle	a-g
2DU	alla	go-g-eya	a-g-alla	a-g-eyo
2PL	amalla	go-g-mam	a-g-malla	a-g-mom
3SG	allan	go-g-on	a-g-an	bo-g-on
3DU	allo	go-g-eyo	a-g-allo	bo-g-eyo
3PL	amallo ~ anggan	go-g-mom ~ go-g-neg-än	a-g-mallo ~ a-g-neg-an	bo-g-mom ~ bo-g-neg-än

The transitive auxiliary forms are organized in two tables: the present forms are listed in Table 61 and the perfective forms are listed in Table 62. The table organizes the forms by number/person of the agent and number/person of the patient. Grey cells indicate reflexive relationships and are listed last in the table. Notice the similarity in form of the present reflexives in Table 61 and the present intransitives in Table 60. The forms are presented orthographically with a preliminary morphological segmentation.

Table 61: Transitive present auxiliary paradigm

<table>
<tr><th></th><th></th><th colspan="9">Patient</th></tr>
<tr><th></th><th></th><th>1SG</th><th>2SG</th><th>3SG</th><th>1DU</th><th>2DU</th><th>3DU</th><th>1PL</th><th>2PL</th><th>3PL</th></tr>
<tr><td rowspan="6">Agent</td><td>1SG</td><td></td><td>n-allan</td><td>e-r-an</td><td></td><td colspan="2">ya-r-an</td><td></td><td colspan="2">angg-an</td></tr>
<tr><td>2SG</td><td>n-alle</td><td></td><td>e-r-alle</td><td>ya-r-alle</td><td></td><td>ya-r-alle</td><td>angg-alle</td><td></td><td>angg-alle</td></tr>
<tr><td>3SG</td><td colspan="2">n-allan</td><td>e-r-an</td><td colspan="3">ya-r-an</td><td colspan="3">angg-an</td></tr>
<tr><td>1NSG</td><td></td><td>n-alla</td><td>e-r-alla</td><td></td><td>ya-r-alla</td><td>ya-r-alla</td><td></td><td colspan="2">am-alla</td></tr>
<tr><td>2NSG</td><td>n-alla</td><td></td><td>e-r-alla</td><td>ya-r-alla</td><td></td><td>ya-r-alla</td><td>am-alla</td><td></td><td>am-alla</td></tr>
<tr><td>3NSG</td><td colspan="2">n-allo</td><td>e-r-allo</td><td colspan="3">ya-r-allo</td><td colspan="3">am-allo</td></tr>
<tr><td colspan="2">Reflexive</td><td>allan</td><td>alle</td><td>allan</td><td colspan="2">alla</td><td>allo</td><td colspan="2">am-alla</td><td>am-allo</td></tr>
</table>

Finally, Table 62 organizes the perfective forms of the transitive auxiliary. These are organized first by Agent and then by Patient (columns 1 and 2) and then shown according to tense (remote past, recent past, and future). These forms are also presented orthographically and morphologically segmented. The semantic contributions of each morpheme are presented in Table 64.

Table 62: Transitive perfective auxiliary paradigm

Agent	Patient	REM	REC	FUT
1SG	2SG	d-a-g	n-a-g-an	b-a-g
	3SG	d-ä-gag	n-ä-gag-an	b-ä-gag
	2DU	d-ey-a-g	y-a-g-an	b-ey-a-g
	3DU	d-ey-a-g	y-a-g-an	b-ey-a-g
	2PL	d-ey-a-g-neg	y-a-g-neg-an	b-ey-a-g-neg
	3PL	d-ä-g-neg	n-ä-g-neg-an	b-ä-g-neg
	REFL	go-g	a-g-an	bo-g
2SG	1SG	d-a-g	n-a-g-alle	n-a-g
	3SG	d-ä-gag	n-ä-gag-alle	n-ä-gag
	1DU	d-ey-a-g	y-a-g-alle	y-a-g
	3DU	d-ey-a-g	y-a-g-alle	y-a-g
	1PL	d-ey-a-g-neg	y-a-g-neg-alle	y-a-g-neg
	3PL	d-ä-g-neg	n-ä-g-neg-alle	n-ä-g-neg
	REFL	go-g	a-g-alle	a-g
3SG	1SG	d-a-g-än	n-a-g-an	b-a-g-än
	2SG	d-a-g-än	n-a-g-an	n-a-g-än
	3SG	d-ä-gag-än	n-ä-gag-an	b-ä-gag-än
	1DU	d-ey-a-g-än	y-a-g-an	b-ey-a-g-än
	2DU	d-ey-a-g-än	y-a-g-an	b-ey-a-g-än
	3DU	d-ey-a-g-än	y-a-g-an	b-ey-a-g-än
	1PL	d-ey-a-g-neg-än	y-a-g-neg-an	b-ey-a-g-neg-än
	2PL	d-a-g-neg-än	y-a-g-neg-an	y-a-g-neg-än
	3PL	d-ä-g-neg-än	n-ä-g-neg-an	b-ä-g-neg-än
	REFL	go-g-on	a-g-an	bo-g-on
1NSG	2SG	d-a-g-eya	n-a-g-alla	b-a-g-eya
	3SG	d-ä-gag-eya	n-ä-gag-alla	b-ä-gag-eya
	2DU	d-ey-a-g-eya	y-a-g-alla	b-ey-a-g-eya
	3DU	d-ey-a-g-eya	y-a-g-alla	b-ey-a-g-eya
	2PL	d-ey-a-g-aeb-eya	y-a-g-aeb-alla	b-ey-a-g-aeb-eya
	3PL	d-ä-g-aeb-eya	n-ä-g-aeb-alla	b-ä-g-aeb-eya
	REFL.DU	go-g-eya	a-g-alla	bo-g-eya
	REFL.PL	go-g-mam	a-g-malla	bo-g-mam
2NSG	1SG	d-a-g-eya	n-a-g-alla	na-g-eyo
	3SG	d-ä-gag-eya	n-ä-gag-alla	nä-gag-eyo
	1DU	d-ey-a-g-eya	y-a-g-alla	ya-g-eyo
	3DU	d-ey-a-g-eya	y-a-g-alla	ya-g-eyo
	1PL	d-ey-a-g-aeb-eya	y-a-g-aeb-alla	ya-g-aeb-eyo
	3PL	d-ä-g-aeb-eya	n-ä-g-aeb-alla	nä-g-aeb-eyo
	REFL.DU	go-g-eya	a-g-alla	a-g-eyo
	REFL.PL	go-g-mam	a-g-malla	a-g-mom
3NSG	1SG	d-a-g-eyo	n-a-g-allo	b-a-g-än
	2SG	d-a-g-eyo	n-a-g-allo	n-a-g-än
	3SG	d-ä-gag-eyo	n-ä-gag-allo	b-ä-gag-än

1DU	d-ey-a-g-eyo	y-a-g-allo	b-ey-a-g-eyo
2DU	d-ey-a-g-eyo	y-a-g-allo	y-a-g-eyo
3DU	d-ey-a-g-eyo	y-a-g-allo	b-ey-a-g-eyo
1PL	d-ey-a-g-aeb-eyo	y-a-g-aeb-allo	b-ey-a-g-aeb-eyo
2PL	d-ey-a-g-aeb-eyo	y-a-g-aeb-allo	y-a-g-aeb-eyo
3PL	d-ä-g-aeb-eyo	n-ä-g-aeb-allo	b-ä-g-aeb-eyo
REFL.DU	go-g-eyo	a-g-allo	bo-g-eyo
REFL.PL	go-g-mom	a-g-mallo	bo-g-mom

The affixes in the paradigms above have the semantic contributions as listed in the descriptive templates below.

Table 63: Intransitive template

<table>
<tr><th>prefix (tense)</th><th>root</th><th>suffix (pluractional)</th><th>suffix (aspect)</th><th colspan="3">suffix (subject/tense)</th></tr>
<tr><th></th><th></th><th></th><th></th><th>REM</th><th>REC</th><th>FUT</th></tr>
<tr><td>go- REM</td><td>g AUX</td><td>-neg 3PLS</td><td>-n(e) DUR</td><td>-ø 1|2SG</td><td>-an 1|3SG</td><td>-ø 1|2SG</td></tr>
<tr><td>a-/o- REC|FUT.2</td><td></td><td>-n,-ny,-l,-ll NPL;II</td><td></td><td>-än 3NDU</td><td>-alle 2SG</td><td>-än 3NDU</td></tr>
<tr><td>bo- FUT</td><td></td><td>-Ng NPL;III</td><td></td><td>-eya 1|2DU[31]</td><td>-alla 1|2DU</td><td>-eya 1DU</td></tr>
<tr><td></td><td></td><td>-Nmeny PL;III</td><td></td><td>-eyo 3DU</td><td>-allo 3DU</td><td>-eyo 2|3DU</td></tr>
<tr><td></td><td></td><td>-ab,-am NPL;IV</td><td></td><td>-mam 1|2PL</td><td>-malla 1|2PL</td><td>-mam 1PL</td></tr>
<tr><td></td><td></td><td>-aeb,-aem PL;IV</td><td></td><td>-mom 3PL</td><td>-mallo 3PL</td><td>-mom 2|3PL</td></tr>
</table>

Table 64: Transitive template

<table>
<tr><th colspan="3">TAM/patient prefixes</th><th>root</th><th>PLUR</th><th>PLUR /APPL</th><th colspan="4">TAM/agent suffixes</th></tr>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>REM</th><th>REC</th><th>FUT</th></tr>
<tr><td>d- REM</td><td>i-[32] VEN</td><td>ä- 3NDUP</td><td>g AUX</td><td>-n,-ny,-l,-ll NPL;II</td><td>-neg SG>PL</td><td>-n DUR</td><td>-ø 1|2SG</td><td>-an 1|3SG</td><td>-ø 1|2SG</td></tr>
<tr><td>n- REC|FUT.2</td><td>i- NSG</td><td>a- RT.EXT</td><td>ga(g) AUX.3SGP</td><td>-Ng NPL;III</td><td>-aeb NSG>PL</td><td></td><td>-än 3SG</td><td>-alle 2SG</td><td>-än 3SG</td></tr>
<tr><td>b- FUT</td><td>i- IRR</td><td></td><td></td><td>-Nmeny PL;III</td><td>-ng NPL.APPL</td><td></td><td>-eya 1|2NSG</td><td>-alla 1|2NSG</td><td>-eya 1NSG</td></tr>
<tr><td></td><td></td><td></td><td></td><td>-ab,-am NPL;IV</td><td>-Nmeny PL.APPL</td><td></td><td>-eyo 3NSG</td><td>-allo 3NSG</td><td>-eyo 2|3NSG</td></tr>
<tr><td></td><td></td><td></td><td></td><td>-aeb,-aem PL;IV</td><td></td><td></td><td colspan="3">-alle IRR.SGS
-allo IRR.NSGS</td></tr>
</table>

The transitive template is used for bivalent verb constructions that take a direct object, or even trivalent verb constructions that take multiple arguments. The intransitive

[31] Note the form syncretisms in these templates: first and second person subjects syncretize in remote past and future singular, first and third syncretize in recent past and present, and second and third syncretize in future non-singular forms.

[32] /i-/ is realized as *y* /-j/ before the root extension /a-/ and *ey*- /-ej/ following tense prefixes /d-/ and /b-/.

template is used for monovalent verb constructions that cannot take a direct object, but it is also used in reflexive and reciprocal contexts.

(170) When K. Dobola was asked how he got married to his wife, he replied,

a.

Ngämi	*moko*	*gogeya.*
ŋəmi	moko	go-g-eja
1.NSG.EXCL.NOM	love	REM-AUX-REM.1|2DUS

‘We fell in love.’ [Literally: ‘We loved each other.’]

b.

Bogo	*ngänam*	*moko*	*dag.*
bogo	ŋənəm	moko	d-a-g
3.SG.NOM	1.SG.NOM	love	REM-RT.EXT-AUX

‘She loved me (first).’
(K. Dobola, 2018b SE_PI110 #135)

The primary function of auxiliary verbs is to support lexical verbs. Some lexical verbs, which we may call coverbs, never host inflectional affixes and must be supported by the present progressive or the perfective auxiliaries in every context. For example, the verb *ikop* /ikop/ ‘to see’ (homophonous with *ikop* ‘eye’, cf. *skop* ‘eye’ in Nen) appears in a coverb + auxiliary construction in both the present (171) and past (172) tenses. In the Papuanist literature, this class of coverbs that appear with auxiliary or light verbs in these types of constructions are called “verb adjuncts” (Pawley, 1993).

(171)

Ngämo	*masar da*	*ikop*	*allan.*
ŋəmo	masar=da	ikop	aɽan
1.SG.POSS	grandfather=NOM	see	AUX.PRS.1|3SGS

‘My grandfather is looking.’
(Kesama, 2018 SE_PI044 #34)

(172)

To	*indrang de*	*ngäna*	*ikop*	*d**i**ge.*
to	indraŋ=de	ŋəna	ikop	d-i-ge
light	bright=ACC	1.SG.NOM	see	REM-VEN.3SGP-AUX.3SGP

‘I saw the bright light coming towards me.’
(Sowati Kurupel, 2017a SE_PN024 #30)

Other lexical verbs host inflectional affixes in non-present tenses and are thus only supported by the present progressive auxiliary in present tense contexts (see §A.3.3).

When auxiliary verbs occur on their own, they may have the meaning of ‘to be’, ‘to become’, ‘to do’, or ‘to put’ (173).

(173)

Pop peyang	*pud de*	*ekaklle we*	*näga.*
pop=pejaŋ	pud=de	ekakɽe=we	n-ə-g-a
hole=COM	end=ACC	earth=ALL	FUT.2A-3NDUP-AUX.3SGP

‘Put the end with the hole towards the ground.’
(Terrance, 2016 RE_EN031 #8)
From an instructional text on how to play the borale /borale/ ‘bamboo flute’

Bare auxiliaries are also used to form so-called experiencer object constructions, such as those in (174)-(177), which feature patient-agent-verb (OSV) order instead of the typical agent-patient-verb (SOV) order. In these constructions, the animate argument is marked with accusative case and indexed in the object prefix, and has less control or volition than a prototypical agent would have. The agent (the argument marked with nominative case) is typically a feeling, like sleep, hunger, pain, or sickness.

(174)

Llɨg de	*yuna da*	*dägnegän*
ɽɪg=de	junu=da	d-ə-g-neg-ən
child=ACC	sleep=NOM	REM-3NDUP-AUX-SG>PL-REM.3SGA
a	gotaramän.	
a	go-otaram-ən	
and	REM-sleep.PL-3SGS	

‘The children felt sleepy and fell asleep.’
(K. Dobola & Kurupel (Suwede), 2007 WE_SN004 #7.1)

(175)

Obom	*eraeya*	*wätät*	*abal da*	*dägnän.*
obom	erajja	wətət	abal=da	d-ə-g-n-ən
3.SG.ACC	COP.where.PST.SGS	hunger	very=NOM	REM-3NDUP-AUX-DUR-3SGA

‘She was very hungry.’
(Sowati (Kurupel), 2016c SE_PN004 #26.1)

(176)

Bam	*tutu*	*kälngkäl me*	*ttäle*	*kakep a*	*nallan.*
bam	tutu	kəlŋkəl=me	t͡ʂəle	kakep=a	naɽan
2.SG.ACC	hill	climb=LOC	foot	pain=NOM	AUX.PRS.3SG>3SG

‘Are you tired from climbing the hill? [Has leg pain gotten you?]’
(T. (Tonzah) Warama, 2017a OE_SI003 #62)

(177)

Oba	*pu mi*	*biye de*	*ddone*	*itrel a*	*anggan.*
oba	pu=mi	bije=de	d͡ʐone	itrel=a	aŋgan
3.NSG.POSS	floating.garden=LOC	taro=ACC	not	sickness=NOM	AUX.PRS.3NSG>3PL

‘Diseases are not striking the taro in their floating garden.’
(T. (Tonzah) Warama, 2017b RE_EE001 #86)

A.3.3 Lexical verbs

There are two ways in which lexical verbal predicates can be constructed in Ende: in an analytic construction or a synthetic construction. All verb roots may occur in the analytic construction, which consists of a coverb or of an inflecting verb in its infinitival form, followed by an auxiliary which inflects by affixation. Only inflecting verbs may occur in the synthetic construction, which consists of the verb root and inflectional affixes. The next three sections detail the infinitival, analytic, and synthetic constructions.

Infinitival construction

The infinitival form of inflecting verb roots consists of the verb root, at least one stem-level or word-level affix, and optionally a set of stackable phrase-level clitics. Coverbs are maximally monomorphemic but may host clitics.

Table 65: Anatomy of an infinitival verb form

word-level (thematic)	root	stem-level (pluractional)	word-level (plu/APPL)	clitics (derivational/case)	
V-[33]	√	-n,-ɲ,-l,-ɽ (NPL;II) -Ng[34] (NPL;III) -Nmeɲ (PL;III) -ab,-am (NPL;IV) -ajb,-ajm (PL;IV)	-næn[35] (PL;I|II) -Ng (NPL.APPL) -Nmeɲ (PL.APPL)	=aŋ,=ag (agentive) =aj (adverbial) =ma (nominalizer) reduplication (adverbial)	=(d)a (NOM) =de (ACC) =(w)e (ALL) =aŋ (ATT) =meɲ (PRIV) …

Stem-level suffixes include a pluractional suffix, which marks nonplural or plural subject, patient, or event number and distinguishes four conjugation classes. More specifically, the plural suffix is used when intransitive subjects or transitive patients are plural (more than two), or if the aspectual event semantics are plural, *e.g.*, iterative or durative. The pluractional marker is obligatory for all classes. The suffix in class II is optional for monosyllabic roots but obligatory for multisyllabic roots. There is no overt

[33] The word-level thematic prefix is semantically empty and triggers reduplication of monosyllabic forms (see §4.2).

[34] The symbol N represents a floating nasal segment that matches in place and precedes the leftmost non-initial obstruent in the word (§3.2).

[35] Underlying //æ// is realized as /a/ in initial syllables and /e/ elsewhere.

pluractional suffix for nonplural forms in class I. This pluractional paradigm is organized by conjugation class in Table 66.

Table 66: Conjugation classes of lexical stems by pluractional pattern

Class	Nonplural pattern	Plural pattern	Nonplural example	Plural example	Gloss
I		//-næn//	/ug-ug/	/ug-nen/	‘to mumu’
II	//-n, -ɲ, -ɽ, -l//	//(-næn)//	/ɡa-ɲ/	/ɡa-ɡe, ɡa-nen/	‘to plant’
III	//-nɡ//	//-nmeɲ//	/tu-ŋɡ/	/tu-miɲ/[36]	‘to support’
IV	//-ab, -am//	//-ajb, -ajm//	/bl-ab/	/bl-ajb/	‘to mature’

In Class I, monosyllabic nonplural stems undergo phonological duplication if otherwise unaffixed (triggered by //V-//, see below), while multisyllabic stems are unchanged. Class I plural stems feature the suffix *-nen*. Class II stems are identified by a monoconsonantal suffix in their nonplural stems that is absent in their plural form. Class II plural stems undergo phonological duplication or take the plural *-nen* suffix if monosyllabic and otherwise unaffixed or obligatorily take the *-nen* suffix if multisyllabic. Class III stems feature a [+nasal] *-g* suffix in their nonplural form and a [+nasal] *-meny* suffix in their plural form. [+nasal] affixes are specified for a floating nasal segment (ɴ) that precedes the leftmost non-initial obstruent in the word (see §3.2). Finally, Class IV stems feature suffixes *-ab* /-ab/ or *-am* /-am/ in their nonplural form and suffixes *-aeb* /-ajb/ or *-aem* /-ajm/ in their plural form.

Besides the pluractional suffixes, additional word-level suffixes include the applicative suffixes. The applicative suffix attaches outside most pluractional suffixes (all except *-nen* /-nen/, which it replaces). The applicative suffix agrees in plurality with an additional argument, typically a dative argument, such as a benefactive or causee argument. Any root that does not take a stem-level or word-level suffix must combine with the word-level thematic prefix //V-// to be realized as a word or to host any clitics. This prefix triggers phonological duplication on monosyllabic roots.

Finally, an infinitival form with at least one stem-level or word-level affix may host clitics, as shown in Table 65. Some examples of infinitival verbs with both stem-level, word-level, and phrase-level affixation are in (178)-(180). The verb root in (178) *ngonoe*

[36] The /e/ in the pluractional suffix surfaces as /i/ due to a process of regular height vowel harmony.

/ŋonoj/ ‘to think’ is affixed with the plural applicative marker *-meny* /-meɲ/, which adds a causative argument to the intransitive verb, forming the verb stem ‘to ask’. This stem is then affixed with an agentive clitic *=ang* /=aŋ/, a locative clitic *=me* ‘while’, and an adverbial clitic *=ae* /=aj/. Similarly, the verb root *gälläm* /gəɽəm/ ‘to wash’ in (179) is affixed with the pluractional marker *-nan* /-nan/ as the root is in conjugation class I. This stem is then affixed with the privative clitic *=meny* /=meɲ/ and the adverbial clitic *=ae* /-aj/. Finally, the monosyllabic verb root *ngas* /ŋas/ ‘to make’ in (180) does not feature any stem- or word-level suffixes and therefore takes the word-level prefix V-, triggering reduplication, before combining with the phrase-level clitics. This stem is also affixed with the privative clitic *=meny* and the adverbial clitic *=ae.*

(178)

Ubi,	***ngonomenyangmeae***	*gognegnän*
ubi	ŋono-meɲ=aŋ=me=aj	go-g-neg-n-ən
3.NSG.NOM	think-PL.APPL=AGT=LOC=ADV	REM-AUX-PL-DUR-3NDUS

‘They went while asking them [think+applicative=ask].’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #484)

(179)

Be,	*ubi*	*ttang*	***gällämnanmenyae***	*otät de*
be	ubi	ʈ͡ʂaŋ	gəɽəm-nan=meɲ=aj	otət=de
but	3.NSG.NOM	hand	wash-PL.I=PRV=ADV	food=ACC
duwem	*anggan.*			
duwem	aŋgan			
eat.meal	AUX.PRS.3PL>3SG			

‘But do they eat without washing their hands?’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #369)

(180)

Be,	*bogo*	*ade*	*llɨg*	***ngasngesmenyae***	*kuddäll*
be	bogo	ade	ɽɪg	ŋas-ŋes=meɲ=aj	kuɖ͡ʐəɽ
but	3.SG.NOM	also	child	INF-make=PRV=ADV	death
gogon.					
go-g-on					
AUX.REM.3SGS					

‘But he died without having had children.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #693)

In this section, I have ascribed various levels to the types of affixes that may combine with a verb root. These levels are motivated by the combinatorics of these affixes with the verb root. The closest affix type to the verb root (√) is the stem-level pluractional (PLU) suffix. This is a suffix that subcategorizes for a root and produces a stem (181).

(181) $[[\surd\ ]_{\text{root}}\text{-PLU}]_{\text{stem}}$

The next closest affix types to the verb root are the word-level thematic prefix (V-) and the word-level applicative (APPL) suffix. The thematic prefix subcategorizes for a root and produces a word (182). The applicative suffix subcategorizes for a root or a stem and produces a word (183).

(182) $[\text{V-}[\surd\ ]_{\text{root}}]_{\text{word}}$
(183) $[[\surd\ ]_{\text{root}}\text{-APPL}]_{\text{word}}$ or $[[[\surd\ ]_{\text{root}}\text{-PLU}]_{\text{stem}}\text{-APPL}]_{\text{word}}$

Finally, phrase-level clitics (=X) subcategorize for words or phrases and produce phrases (184).

(184) $[[]_{\text{stem}}\text{=X}]_{\text{phrase}}$ or $[[]_{\text{word}}\text{=X}]_{\text{phrase}}$ or $[[]_{\text{phrase}}\text{=X}]_{\text{phrase}}$

By organizing these affixes in this way, we make the following correct predictions. The thematic prefix should never co-occur with either pluractional or applicative suffixes (see §4.1). However, the pluractional and applicative suffixes may co-occur, as the pluractional suffix forms a stem and the applicative suffix subcategorizes for a stem. As the output of the thematic prefixes, and the pluractional and applicative suffixes are words, we do not expect them to stack recursively, and indeed they do not. On the contrary, we do expect phrase-level clitics to stack recursively, as they subcategorize for stems, words, or phrases and form phrases. We predict that phrase-level clitics should never be hosted directly by a bare root. Further evidence for the phrase-level nature of the clitics comes from the fact that in the nominal domain, these clitics attach to the rightmost edge of the noun phrase regardless of the part of speech of the rightmost element. Notice how the accusative case marker (=i) attaches to the noun (*sɨmell* 'pig') when it is rightmost in the noun phrase in but attaches to the adjective (*ulle* 'big') when it is rightmost in the noun phrase in (185).[37]

(185)	*Sɨmell* ***de***	*daugnalla.*	*Sɨmell*	*ulle* ***de***.
	sɪmeɽ=de	d-a-ug-n-aɽa	sɪmeɽ	uɽe=de
	pig=ACC	REM-RT.EXT-oven.cook-DUR-1NSGA	pig	big=ACC

'We cooked a pig. A big pig.'
(Minong, 2018 SE_PI084 #229)

[37] Ideally, I would present more phonological or morphological evidence to corroborate the three levels of affixes that I have presented here—stem-, word-, and phrase-level—along with the combinatoric patterns. Unfortunately, I do not have such data, and this is the best analysis that I can offer with the data I do have. More investigation is certainly warranted in this area.

Analytic construction

The analytic construction is composed of a lexical verb stem and an auxiliary verb. It is used for all verbs in the present tense as the category of present progressive can only be expressed with the present progressive auxiliary. In non-present tenses, the analytic construction is used for lexical coverbs, such as *ikop* ‘to see’ and *eka* ‘to speak’, which mean ‘eye’ and ‘language’ respectively in nominal contexts (*ikop näga* /ikop nəga/ ‘look!’, *ikop nagän* /ikop nagən/ ‘he will see you’). Other lexical verbs, such as *ddäddäg* /ɖ͡ʐəɖ͡ʐəg/ ‘to bite’ and *ttänttäm* /ʈ͡ʂənʈ͡ʂəm/ ‘to heat’, also have nominal uses (‘bite’ and ‘heat’, respectively) but require a synthetic construction in non-present tenses (*näddäg* /nə-ɖ͡ʐəg/ ‘bite it!’ *dättämän* /d-ə-ʈ͡ʂəm-ən/ ‘he heated it.’).

The analytic construction is composed of an infinitival verb stem and an inflected auxiliary verb. These two forms must be adjacent to one another. If there is vocalic hiatus at the merger of the stem and the auxiliary, the two vowels may coalesce as shown in (186).

(186) *Ende* *eka walle* ***ekallan***.
ende eka=waɽe eka=aɽan
Ende language=INS speak=AUX.PRS.1SGS
‘I speak Ende language.’
(Kurupel (Suwede), 2018d SE_PI052 #213)

In analytic constructions, all inflectional categories including tense, aspect, valence, directionality, argument agreement, and pluractionality are hosted on the auxiliary verb.

Synthetic construction

In contrast to the analytic construction, the synthetic construction is composed of an inflected lexical verb stem and no auxiliary verb. The synthetic construction of lexical verbs uses the same basic paradigmatic templates that have already been illustrated for the -*g*- perfective auxiliary, see Table 60 and Table 62. There are three lexical templates: the intransitive, the transitive, and the middle. The irregular present auxiliary template, Table 60 and Table 61, is the fourth paradigmatic template in the language. Lexical verb roots are not restricted to one template and are lexically specified for how many templates they can enter. Some roots, such as *ngäs* ‘return’, are rather promiscuous appearing in all three lexical templates with various meanings. When *ngäs* ‘return’ appears in the middle template, it has the intransitive meaning of the motion verb. In the transitive template, *ngäs* 'return' has the meaning of the transfer verb 'to return an object', and in the intransitive template, *ngäs* 'return' can be used to indicate the passive of the transitive 'was/is/will be returned'. Other verb roots have only one available template.

(187)

Middle template	Transitive template	Intransitive template
*dä**ngäs**mällän*	*deya**ngäs**än*	*go**ngos**än*[38]
/də-ŋəs-məɽən/	/deja-ŋəs-ən/	/ɡo-ŋos-ən/
'they returned [home]'	'he returned it [home]'	'it was returned'
'to return (intransitive)'	'to return (transitive)'	'to return (passive)'

Some intransitive roots are split, taking one template (usually the intransitive) for nonplural subjects and another template (usually the middle) for plural subjects. The intransitive template is thus named because it allows for agreement marking of only one argument, typically the nominative argument, in the suffix. The transitive template allows for agreement marking of the nominative argument in the suffix, and of an accusative or dative argument in the prefix. The middle template resembles the transitive template in form but is used in clauses with only one argument. The patient prefix in the middle template, which typically encodes 'third non-dual patient' in the transitive template, agrees with a dummy argument. This is different from the superficially similar situation in Nen, Nama and related Yam languages, in which the prefix in the middle template is filled but not with a dummy argument, since the form of the prefix is not used for any person/number value in other templates (Evans, p.c.).

The intransitive template is repeated below in Table 67. The root of the verb surfaces in the root position of the template. Inflectional prefixes precede the root, and inflectional suffixes follow the root. Affixes are selected based on the TAM and argument properties of the event.

[38] The root vowel is harmonizing with the /o/ in the prefix of this verb.

Table 67: Intransitive template

prefix (tense)	root	suffix (pluractional)	suffix (aspect)	suffix (subject/tense) REM	REC	FUT
go- REM	√	-neg 3PLS	-n(e) DUR	-ø 1|2SG[39]	-an 1|3SG	-ø 1|2SG
a-/o- REC|FUT.2		-n,-ny,-l,-ll NPL;II		-än 3NDU	-alle 2SG	-än 3NDU
bo- FUT		-Ng NPL;III		-eya 1|2DU	-alla 1|2DU	-eya 1DU
		-Nmeny PL;III		-eyo 3DU	-allo 3DU	-eyo 2|3DU
		-ab,-am NPL;IV		-mam 1|2PL	-malla 1|2PL	-mam 1PL
		-aeb,-aem PL;IV		-mom 3PL	-mallo 3PL	-mom 2|3PL

An example of the verb root *gllae* 'to paddle' is shown in Table 68. The analytic construction used in the present tense for this verb is included in column 3 for completeness. Durative forms are not shown.

Table 68: Intransitive paradigm of gllae 'to paddle'

Subject	Remote past	Recent past	Present	Future
1SG	*go-gllae*	*a-gllae-yan*	*gllae allan*	*bo-gllae*
2SG	*go-gllae*	*a-gllae-yalle*	*gllae alle*	*a-gllae*
3SG	*go-gllae-yän*	*a-gllae-yan*	*gllae allan*	*bo-gllae-yän*
1DU	*go-gllae-ya*	*a-gllae-yalla*	*gllae alla*	*bo-gllae-ya*
2DU	*go-gllae-ya*	*a-gllae-yalla*	*gllae alla*	*a-gllae-yo*
3DU	*go-gllae-yo*	*a-gllae-yallo*	*gllae allo*	*bo-gllae-yo*
1PL	*go-gllae-mam*	*a-gllae-malla*	*gllaenen amalla*	*bo-gllae-mam*
2PL	*go-gllae-mam*	*a-gllae-malla*	*gllaenen amalla*	*a-gllae-mom*
3PL	*go-glla-emom* ~ *go-gllae-negän*	*a-gllae-mallo*	*gllaenen anggan*	*bo-gllae-mom* ~ *bo-gllae-negän*

The pluractional suffixes and the subject/tense suffixes interact: if the root features pluractional suppletion or is in conjugation classes II, III, or IV in which the root is overtly marked with a pluractional suffix, the verb will feature singular subject suffixes in plural forms, see Table 69.

[39] Note the form syncretisms in these templates: first and second person subjects syncretize in remote past and future singular, first and third syncretize in recent past and present, and second and third syncretize in future non-singular forms.

Table 69: Intransitive paradigm of gäbän 'to jump in place'

Subject	Remote past	Recent past	Present	Future
1SG	*go-gbän*	*a-gbän-an*	*gäbän allan*	*bo-gbän*
2SG	*go-gbän*	*a-gbän-alle*	*gäbän alle*	*a-gbän*
3SG	*go-gbän-än*	*a-gbän-an*	*gäbän allan*	*bo-gbän-än*
1DU	*go-gbän-eya*	*a-gbän-alla*	*gäbän alla*	*bo-gbän-eya*
2DU	*go-gbän-eya*	*a-gbän-alla*	*gäbän alla*	*a-gbän-eyo*
3DU	*go-gbän-eyo*	*a-gbän-allo*	*gäbän allo*	*bo-gbän-eyo*
1PL	*go-gäb*	*a-gäb-an*	*gägäb allan*	*bo-gäb*
2PL	*go-gäb*	*a-gäb-alle*	*gägäb alle*	*a-gäb*
3PL	*go-gäb-än*	*a-gäb-an*	*gägäb allan*	*bo-gäb-än*

The transitive template is organized in Table 70, and an example of the verb root *ddäddäg* /ɖ͡ʐəɖ͡ʐəg/ 'to bite' in the transitive template is shown in Table 71. The analytic construction used in the present tense is included for completeness. Durative, venitive, applicative, and irrealis forms are not shown.

Table 70: Transitive template

<table>
<tr><th colspan="3">TAM/patient prefixes</th><th>root</th><th>pluractional</th><th>pluractional/ applicative</th><th colspan="4">TAM/agent suffixes</th></tr>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>REM</th><th>REC</th><th>FUT</th></tr>
<tr><td>d-</td><td>i-[40]</td><td>ä-</td><td>√</td><td>-n,-ny,-l,-ll</td><td>-neg</td><td>-n</td><td>-ø 1|2SG</td><td>-an</td><td>-ø 1|2SG</td></tr>
<tr><td>REM</td><td>VEN</td><td>3NDUP</td><td></td><td>NPL;II</td><td>SG>PL</td><td>DUR</td><td>-än</td><td>1|3SG</td><td>-än</td></tr>
<tr><td>n-</td><td>i-</td><td>a-</td><td></td><td>-ng</td><td>-aeb</td><td></td><td>3SG</td><td>-alle</td><td>3SG</td></tr>
<tr><td>REC|FUT.2</td><td>NSG</td><td>RT.EXT</td><td></td><td>NPL;III</td><td>NSG>PL</td><td></td><td>-eya</td><td>2SG</td><td>-eya</td></tr>
<tr><td>b-</td><td>i-</td><td></td><td></td><td>-nmeny</td><td>-ng</td><td></td><td>1|2NSG</td><td>-alla</td><td>1NSG</td></tr>
<tr><td>FUT</td><td>IRR</td><td></td><td></td><td>PL;III</td><td>NPL.APPL</td><td></td><td>-eyo</td><td>1|2NSG</td><td>-eyo</td></tr>
<tr><td></td><td></td><td></td><td></td><td>-ab,-am</td><td>-nmeny</td><td></td><td>3NSG</td><td>-allo</td><td>2|3NSG</td></tr>
<tr><td></td><td></td><td></td><td></td><td>NPL;IV</td><td>pl.APPL</td><td></td><td></td><td>3NSG</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>-aeb,-aem</td><td></td><td></td><td colspan="3">-alle IRR.SGS</td></tr>
<tr><td></td><td></td><td></td><td></td><td>PL;IV</td><td></td><td></td><td colspan="3">-allo IRR.NSGS</td></tr>
</table>

Table 71: Transitive paradigm of ddäddäg /ɖ͡ʐəɖ͡ʐəg/ 'to bite'

Agent	*Patient*	*REM*	*REC*	*PRS*	*FUT*
1SG	2SG	*d-a-ddäg*	*n-a-ddäg-an*	*ddäddäg n-allan*	*b-a-ddäg*
	3SG	*d-ä-ddägag*	*n-ä-ddäg-an*	*ddäddäg e-r-an*	*b-ä-ddägag*
	2DU	*d-ey-a-ddäg*	*y-a-ddäg-an*	*ddäddäg ya-r-an*	*b-ey-a-ddäg*
	3DU	*d-ey-a-ddäg*	*y-a-ddäg-an*	*ddäddäg ya-r-an*	*b-ey-a-ddäg*
	2PL	*d-ey-a-ddäg-neg*	*y-a-ddäg-neg-an*	*ddägnan angg-an*	*b-ey-a-ddäg-neg*
	3PL	*d-ä-ddäg-neg*	*n-ä-ddäg-neg-an*	*ddägnan angg-an*	*b-ä-ddäg-neg*
	REFL	*go-ddäg*	*a-ddäg-an*	*ddäddäg allan*	*bo-ddäg*
2SG	1SG	*d-a-ddäg*	*n-a-ddäg-alle*	*ddäddäg n-alle*	*n-a-ddäg*
	3SG	*d-ä-ddägag*	*n-ä-ddäg-alle*	*ddäddäg e-r-alle*	*n-ä-ddägag*

[40] /i-/ is realized as *y* /-j/ before the root extension /a-/ and *ey-* /-ej/ following tense prefixes /d-/ and /b-/.

	1DU	*d-ey-a-ddäg*	*y-a-ddäg-alle*	*ddäddäg ya-r-alle*	*y-a-ddäg*
	3DU	*d-ey-a-ddäg*	*y-a-ddäg-alle*	*ddäddäg ya-r-alle*	*y-a-ddäg*
	1PL	*d-ey-a-ddäg-neg*	*y-a-ddäg-neg-alle*	*ddägnan angg-alle*	*y-a-ddäg-neg*
	3PL	*d-ä-ddäg-neg*	*n-ä-ddäg-neg-alle*	*ddägnan angg-alle*	*n-ä-ddäg-neg*
	REFL	*go-ddäg*	*a-ddäg-alle*	*ddäddäg alle*	*a-ddäg*
3SG	1SG	*d-a-ddäg-än*	*n-a-ddäg-an*	*ddäddäg n-allan*	*b-a-ddäg-än*
	2SG	*d-a-ddäg-än*	*n-a-ddäg-an*	*ddäddäg n-allan*	*n-a-ddäg-än*
	3SG	*d-ä-ddäg-än*	*n-ä-ddäg-an*	*ddäddäg e-r-an*	*b-ä-ddäg-än*
	1DU	*d-ey-a-ddäg-än*	*y-a-ddäg-an*	*ddäddäg ya-r-an*	*b-ey-a-ddäg-än*
	2DU	*d-ey-a-ddäg-än*	*y-a-ddäg-an*	*ddäddäg ya-r-an*	*b-ey-a-ddäg-än*
	3DU	*d-ey-a-ddäg-än*	*y-a-ddäg-an*	*ddäddäg ya-r-an*	*b-ey-a-ddäg-än*
	1PL	*d-ey-a-ddäg-neg-än*	*y-a-ddäg-neg-an*	*ddägnan angg-an*	*b-ey-a-ddäg-neg-än*
	2PL	*d-a-ddäg-neg-än*	*y-a-ddäg-neg-an*	*ddägnan angg-an*	*y-a-ddäg-neg-än*
	3PL	*d-ä-ddäg-neg-än*	*n-ä-ddäg-neg-an*	*ddägnan angg-an*	*b-ä-ddäg-neg-än*
	REFL	*go-ddäg-on*	*a-ddäg-an*	*ddäddäg allan*	*bo-ddäg-on*
1NSG	2SG	*d-a-ddäg-eya*	*n-a-ddäg-alla*	*ddäddäg n-alla*	*b-a-ddäg-eya*
	3SG	*d-ä-ddäg-eya*	*n-ä-ddäg-alla*	*ddäddäg e-r-alla*	*b-ä-ddäg-eya*
	2DU	*d-ey-a-ddäg-eya*	*y-a-ddäg-alla*	*ddäddäg ya-r-alla*	*b-ey-a-ddäg-eya*
	3DU	*d-ey-a-ddäg-eya*	*y-a-ddäg-alla*	*ddäddäg ya-r-alla*	*b-ey-a-ddäg-eya*
	2PL	*d-ey-a-ddäg-aeb-eya*	*y-a-ddäg-aeb-alla*	*ddägnan a-m-alla*	*b-ey-a-ddäg-aeb-eya*
	3PL	*d-ä-ddäg-aeb-eya*	*n-ä-ddäg-aeb-alla*	*ddägnan a-m-alla*	*b-ä-ddäg-aeb-eya*
	REFL.DU	*go-ddäg-eya*	*a-ddäg-alla*	*ddäddäg alla*	*bo-ddäg-eya*
	REFL.PL	*go-ddäg-mam*	*a-ddäg-malla*	*ddägnan m-alla*	*bo-ddäg-mam*
2NSG	1SG	*d-a-ddäg-eya*	*n-a-ddäg-alla*	*ddäddäg n-alla*	*n-a-ddäg-eyo*
	3SG	*d-ä-ddäg-eya*	*n-ä-ddäg-alla*	*ddäddäg e-r-alla*	*n-ä-ddäg-eyo*
	1DU	*d-ey-a-ddäg-eya*	*y-a-ddäg-alla*	*ddäddäg ya-r-alla*	*y-a-ddäg-eyo*
	3DU	*d-ey-a-ddäg-eya*	*y-a-ddäg-alla*	*ddäddäg ya-r-alla*	*y-a-ddäg-eyo*
	1PL	*d-ey-a-ddäg-aeb-eya*	*y-a-ddäg-aeb-alla*	*ddägnan a-m-alla*	*y-a-ddäg-aeb-eyo*
	3PL	*d-ä-ddäg-aeb-eya*	*n-ä-ddäg-aeb-alla*	*ddägnan a-m-alla*	*n-ä-ddäg-aeb-eyo*
	REFL.DU	*go-ddäg-eya*	*a-ddäg-alla*	*ddäddäg alla*	*a-ddäg-eyo*
	REFL.PL	*go-ddäg-mam*	*a-ddäg-malla*	*ddägnan m-alla*	*a-ddäg-mom*
3NSG	1SG	*d-a-ddäg-eyo*	*n-a-ddäg-allo*	*ddäddäg n-allo*	*b-a-ddäg-än*
	2SG	*d-a-ddäg-eyo*	*n-a-ddäg-allo*	*ddäddäg n-allo*	*n-a-ddäg-än*
	3SG	*d-ä-ddäg-eyo*	*n-ä-ddäg-allo*	*ddäddäg e-r-allo*	*b-ä-ddäg-än*
	1DU	*d-ey-a-ddäg-eyo*	*y-a-ddäg-allo*	*ddäddäg ya-r-allo*	*b-ey-a-ddäg-eyo*
	2DU	*d-ey-a-ddäg-eyo*	*y-a-ddäg-allo*	*ddäddäg ya-r-allo*	*y-a-ddäg-eyo*
	3DU	*d-ey-a-ddäg-eyo*	*y-a-ddäg-allo*	*ddäddäg ya-r-allo*	*b-ey-a-ddäg-eyo*
	1PL	*d-ey-a-ddäg-aeb-eyo*	*y-a-ddäg-aeb-allo*	*ddägnan a-m-allo*	*b-ey-a-ddäg-aeb-eyo*
	2PL	*d-ey-a-ddäg-aeb-eyo*	*y-a-ddäg-aeb-allo*	*ddägnan a-m-allo*	*y-a-ddäg-aeb-eyo*
	3PL	*d-ä-ddäg-aeb-eyo*	*n-ä-ddäg-aeb-allo*	*ddägnan a-m-allo*	*b-ä-ddäg-aeb-eyo*
	REFL.DU	*go-ddäg-eyo*	*a-ddäg-allo*	*ddäddäg allo*	*bo-ddäg-eyo*
	REFL.PL	*go-ddäg-mom*	*a-ddäg-mallo*	*ddägnan m-allo*	*bo-ddäg-mom*

The middle template is a cross between the intransitive and transitive templates in that its form resembles the transitive prefixes, but in function, it only agrees with a single argument. The prefixal slots, which index patient agreement in the transitive template, are fixed in the middle template on third non-dual patient, except for one verb *ibi* /ibi/ ‘to go’, in which the nonsingular patient prefix is used to index dual subjects (see Table 75). Like the intransitive template though, intransitive verbs in the middle template will also take singular subject suffixes if their root is marked for plural either via suppletion or with a stem-level suffix (see Table 74).

Table 72: Middle template

<table>
<tr><th colspan="3">TAM/patient prefixes</th><th>root</th><th>stem-level (A)</th><th>stem-level (B)</th><th colspan="4">TAM/agent suffixes</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>REM</td><td>REC</td><td>FUT</td></tr>
<tr><td>d-</td><td>i-</td><td>ä-</td><td>√</td><td>-n,-ny,-l,-ll</td><td>-neg</td><td>-n</td><td>-än</td><td>-an</td><td>-än</td></tr>
<tr><td>REM</td><td>VEN</td><td>RT.EXT</td><td></td><td>NPL;II</td><td>SG>PL</td><td>DUR</td><td>3SG</td><td>1|3SG</td><td>3SG</td></tr>
<tr><td>n-</td><td>i-</td><td>a-</td><td></td><td>-ng</td><td>-aeb</td><td></td><td>-eya</td><td>-alle</td><td>-eya</td></tr>
<tr><td>REC|FUT.2</td><td>NSG</td><td>RT.EXT</td><td></td><td>NPL;III</td><td>NSG>PL</td><td></td><td>1|2NSG</td><td>2SG</td><td>1NSG</td></tr>
<tr><td>b-</td><td>i-</td><td></td><td></td><td>-nmeny</td><td>-ng</td><td></td><td>-eyo</td><td>-alla</td><td>-eyo</td></tr>
<tr><td>FUT</td><td>IRR</td><td></td><td></td><td>PL;III</td><td>NPL.APPL</td><td></td><td>3NSG</td><td>1|2NSG</td><td>2|3NSG</td></tr>
<tr><td></td><td></td><td></td><td></td><td>-ab,-am</td><td>-nmeny</td><td></td><td></td><td>-allo</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>NPL;IV</td><td>pl.APPL</td><td></td><td></td><td>3NSG</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>-aeb,-aem</td><td></td><td></td><td colspan="3">-alle IRR.SGS</td></tr>
<tr><td></td><td></td><td></td><td></td><td>PL;IV</td><td></td><td></td><td colspan="3">-allo IRR.NSGS</td></tr>
</table>

Table 73: Middle paradigm of gllanggla ‘to swim’

Subject	Remote past	Recent past	Present	Future
1SG	*d-ä-ngglla*	*n-ä-ngglla-wan*	*gllanggla e-r-an*	*b-ä-ngglla*
2SG	*d-ä-ngglla*	*n-ä-ngglla-walle*	*gllanggla e-r-alle*	*n-ä-ngglla*
3SG	*d-ä-ngglla-wän*	*n-ä-ngglla-wan*	*gllanggla e-r-an*	*b-ä-ngglla-wän*
1DU	*d-ä-ngglla-eya*	*n-ä-ngglla-walla*	*gllanggla e-r-alla*	*b-ä-ngglla-eya*
2DU	*d-ä-ngglla-eya*	*n-ä-ngglla-walla*	*gllanggla e-r-alla*	*n-ä-ngglla-eyo*
3DU	*d-ä-ngglla-eyo*	*n-ä-ngglla-wallo*	*gllanggla e-r-allo*	*b-ä-ngglla-eyo*
1PL	*d-ä-ngglla-eb-eya*	*n-ä-ngglla-eb-alla*	*glla-nen angg-an*	*b-ä-ngglla-eb-eya*
2PL	*d-ä-ngglla-eb-eya*	*n-ä-ngglla-eb-alla*	*glla-nen angg-alle*	*n-ä-ngglla-eb-eyo*
3PL	*d-ä-ngglla-eb-eyo*	*n-ä-ngglla-eb-allo*	*glla-nen angg-an*	*b-ä-ngglla-eb-eyo*

Some verbs have split templates in which their nonplural forms take one template (typically the intransitive), and their plural forms take another template (typically the middle), as shown in Table 74. Notice how the nonplural forms feature intransitive-type prefixes (*e.g., go-*), while plural forms feature middle-type prefixes (*e.g., dä-*). The irregular verb *ibi* ‘to go’ features the opposite pattern, see Table 75, where the nonplural forms take middle-type prefixes, and the plural forms take intransitive-type prefixes.

Table 74: Split paradigm of pllättän 'to start walking'

Subject	Remote past	Recent past	Present	Future
1SG	*go-pllättän*	*a-pllättän-an*	*pllättän allan*	*bo-pllättän*
2SG	*go-pllättän*	*a-pllättän-alle*	*pllättän alle*	*a-pllättän*
3SG	*go-pllättän-än*	*a-pllättän-an*	*pllättän allan*	*bo-pllättän-än*
1DU	*go-pllättän-eya*	*a-pllättän-alla*	*pllättän alla*	*bo-pllättän-eya*
2DU	*go-pllättän-eya*	*a-pllättän-alla*	*pllättän alla*	*a-pllättän-eyo*
3DU	*go-pllättän-eyo*	*a-pllättän-allo*	*pllättän allo*	*bo-pllättän-eyo*
1PL	*d-ä-pllätt*	*n-ä-pllätt-an*	*päpllätt allan*	*b-ä-pllätt*
2PL	*d-ä-pllätt*	*n-ä-pllätt-alle*	*päpllätt alle*	*n-ä-pllätt*
3PL	*d-ä-pllätt-än*	*n-ä-pllätt-an*	*päpllätt allan*	*b-ä-pllätt-än*

Table 75: Split paradigm of ibi /ibi/ 'to go'

Subject	Remote past	Recent past	Present	Future
1SG	*d-a-lle*	*n-a-ll-an*	*ibi allan*	*b-a-lle*
2SG	*d-a-lle*	*n-a-ll-alle*	*ibi alle*	*n-a-lle*
3SG	*d-all-än*	*n-a-ll-an*	*ibi allan*	*b-a-ll-än*
1DU	*d-ey-a-r-eya*	*y-a-r-alla*	*ibi alla*	*b-ey-a-r-eya*
2DU	*d-ey-a-r-eya*	*y-a-r-alla*	*ibi alla*	*y-a-r-eyo*
3DU	*d-ey-a-r-eyo*	*y-a-r-allo*	*ibi allo*	*b-ey-a-r-eyo*
1PL	*go-bäll*	*a-bäll-an*	*ibi e-r-an*	*bo-bäll*
2PL	*go-bäll*	*a-bäll-alle*	*ibi e-r-alle*	*a-bäll*
3PL	*go-bäll-än*	*a-bäll-an*	*ibi e-r-an*	*bo-bäll-än*

In this section, I have illustrated three types of verbs (the copula, the auxiliary, and the lexical verb), two construction types (the analytic construction and the synthetic construction), and three synthetic templates (the intransitive template, the transitive template, and the middle template). In the next section, I will discuss some of the phonological processes that affect the forms of lexical verbs.

A.4 Verbal phonology

There are many regular phonological processes that affect the realization of verbs in the synthetic construction. The patterns of vowel harmony, vowel assimilation, epenthesis, and syncope are briefly described here. The patterns of floating nasals and phonological duplication are discussed more in-depth in chapters 3 and 4. The alternations covered in this chapter focus on those observed in inflected forms of synthetic lexical verbs. Synthetic lexical verbs differ from analytical, auxiliary, or copulative verbs (see §A.3) in that they consist of a lexical root, which appears in two forms: infinitival and inflected. In its infinitival form, the root is minimally inflected, and in its inflected form, the root is obligatorily affixed with a (C)V- prefix and an optional medley of suffixes. These affixes covary with tense, aspect, mood, direction, plurality, and clausal arguments. This chapter will focus on the phonological realization of these segments.

Before discussing the alternations, I will define the terminology that I use to describe the phonology and morphology of these verbs. The *infinitival* form of the verb is minimally inflected and is observed in three construction types: infinitival constructions as the argument of the main clause (188), present tense constructions with an auxiliary verb (189), and in derived constructions, such as nominalizations (190) and adverbials (191).

(188)

Baet	*käsre*	*nagda*	*däräng bom*	*yagyag*
bajt	kəsre	nag=da	dərəŋ=bom	jagjag
cuscus	then	friend=3SG.POSS	dog=3.SG.ACC	look.NPL

dängkamän.
d-ə-ŋkam-ən
REM-3NDUP-start-REM.3SGA
'Then Cuscus started **to look** for his friend Dog.'
(T. (Tonzah) Warama, 2016a RE_EN001 #36.1)

(189)

Bogo	*sɨmell de*	*yagyag*	*eran.*
bogo	sɪmeɽ=de	jagjag	eran
3.SG.NOM	pig=ACC	look.NPL	AUX.PRS.1|3SGA>3SGP

'He is **looking** for the pig.'

(190)

Yagyagang a	*dallän.*
jagjag=aŋ=a	d-a-ɽ-ən
look.NPL=AGT=NOM	REM-RT.EXT-go.SG-3SGS

'The **searcher** went.'
(M. Kidarga, 2016b WE_PN001 #5.2)

(191)

Ngäna	*sɨmell de*	*yagyag me*	*ibi*	*allan.*
ŋəna	sɪmeɽ=de	jagjag=me	ibi	aɽan
1.SG.NOM	pig=ACC	look.NPL=LOC	go	AUX.PRS.1|3SGS

'I am walking while **looking** for the pig.'

Most lexical verbs have two infinitival forms denoting a pluractional distinction between nonplural and plural intransitive subjects, transitive patients, or event number. The nonplural infinitival form is used as the citation form. These form pairs may be predictable or suppletive. Consider the plural infinitival counterparts of the nonplural infinitives in (188)-(191), listed in (192)-(195). In (192), (193), and (195), the plural is used to mark the durative action of the seeker. In (194), the plural marks the plurality of the agent.

(192)	*Ngänawa*	*mɨzi*	*wätät*	*yagnen e*	*ibnin*	*allan.*
	ŋəna=wa	mɪzi	wətət	jagnen=e	ibnin	aɽan
	1.SG.NOM=EMPH	will	food	look.PL=ALL	go.PL	AUX.PRS.1|3SGS

‘I am going **to look** for food.’
(Y. Bewag, 2018 SE_PI076 #119.1)

(193)	*Ngäna*	*ngämo*	*sɨmell de*	*yagnen*	*eran.*
	ŋəna	ŋəmo	sɪmeɽ=de	jagnen	eran
	1.SG.NOM	1.SG.POSS	pig=ACC	look.PL	AUX.PRS.1|3SG>3SG

‘I am looking for my pig.’
(J. (Jeks) Dareda, 2018a RE_EE020 #20.1)

(194)	*Gobällän*	*oblle*	***yagnen**ang a.*
	go-bəɽ-ən	obɽe	jagnen=aŋ=a
	REM-go.PL-REM.3SGS	3.SG.POSS	**look.PL**=AGT=NOM

‘The **searchers** went for him.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #85.3)

(195)	*Ngäna*	*skul*	***yagnen** me*	*do*	*giddoll*	*allan.*
	ŋəna	skul	jagnen=me	do	gid͡ʐoɽ	aɽan
	1.SG.NOM	school	look.PL=LOC	there	live.NPL	AUX.PRS.1|3SGS

‘I am living there while **looking** for school.’
(Sowati (Kurupel), 2018b SE_PI107 #79.1)

In contrast to the infinitival form, each verb root also has an *inflected form*. This is the form of the root when it carries inflectional affixes, which occurs in all non-present tenses. The inflected form may differ from the infinitival form. For example, compare the infinitival form of the verb *jagjag* ‘to look.NPL’ (188) and the inflected form -*jag*- ‘look’ (198).

(196)	*Bogo*	*ako*	*gongkäbägän.*
	bogo	ako	go-ŋkəb-əg-ən
	3.SG.NOM	also	REM-dive-III.NPL-REM.3SGS

‘He also dived.’
(W. Warama, 2016c SE_SN019 #26.1)

(197)	*Amo*	*mängall alle de*	*Zon*	*lla de*	*ine*
	amo	məŋaɽ=aɽe=de	Zon	ɽa=de	ine
	whose	strength=INS=FOC	John	person=ACC	water

dä**ngkäbmeny**negnän?
d-ə̠-**ŋkəb-meɲ**-neg-n-ən
REM-3NDUP-**dive-III.PL**-SG>PL-DUR-REM.3SGA
‘With whose strength was John baptizing those people?’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #660.7)

(198)

Erodias	*nyongo de*	*de**yag**negnän.*
erodias	ɲoŋo=de	de̠**jag**/negnən
Herodias	way=ACC	**look**/REM.DUR.3SGA>3PLP

‘Herodias was looking for ways.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #317.1)

(199)

Nyäng	*ik i*	*dä**zan**än.*
ɲəŋ	ik=i	d-ə-**zan**-ən
bag	inside=ALL	REM-3NDUP-**insert.NPL**-REM.3SGA

‘He put it inside the bag.’
(Dieb, 2017 SE_SN032 #7.1)

(200)

Bogo	*obo*	*ttang*	*lläpät de*	*komlla*
bogo	obo	ʈ͡ʂaŋ	ɽəpət=de	komɽa
3.SG.NOM	3.SG.POSS	hand	finger=ACC	two

deya**zen**än.
d-ej-a-**zen**-ən
REM-NSGP-RT.EXT-**insert.NPL**-REM.3SGA
‘He put his two fingers in.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #403.1)

Like in infinitival forms, many verbs have two inflected forms which denote a difference in pluractional number, which typically agrees with absolutive argument or event number. For example, the root *kəmbəg* ‘to dive.NPL’ is realized as *-ŋkəbəg-* ‘dive.NPL’ with a singular intransitive subject (196) but as *-ŋkəbmeɲ-* ‘dive.PL’ with a plural transitive patient (197).

The affixes may change based on the phonological features of the root. Compare the quality of the prefixal vowel, /ə/ in (197) and /e/ in (198), where the only difference between these two forms is the form of the root. The prefixal vowel is typically realized as /ə/, but realized as /e/ when the root is /j/-initial. Finally, the root may change based on the affixes. The vowel quality of the root *zan* ‘to insert.NPL’ in (199) and (200) differs according to the quality of the prefixal vowel.

The sections below detail the following types of phonological processes: epenthesis, elision, assimilation, harmony, floating segments, and various types of reduplication, including phonotactic and partial reduplication.

A.4.1 Hiatus and assimilation

Ende phonotactics do not permit vocalic hiatus. On the surface, phonemic vowels in Ende include /i, ɪ, u, e, ə, o, a/. Phonemic glides include /w, j/. Underlyingly, there are three abstract representations of vowels, varying in degrees of specification. Full vowels are specified for their quality and project syllables. Light vowels are specified for their quality but do not project a mora. They are represented in the underlying form in superscript //$^{\text{ə}}$//. Skeletal vowels are specified for their skeletal structure, that is they project a syllable but are unspecified for their quality. Skeletal vowels are represented as //V//. When these vowels are adjacent to one another in the phonological input, hiatus between full and light vowels is repaired via epenthesis, while hiatus between any vowel and a skeletal vowel is repaired via deletion, as shown in the examples below.

Vocalic hiatus contexts occur when a vowel-initial or -final root is immediately adjacent to a vowel-initial or -final affix. Whenever a skeletal vowel is adjacent to another vowel, the skeletal vowel deletes and the melodic vowel is realized. This occurs when the third nondual patient prefix (V-) or the middle root-extension (V-) co-occur with a vowel-initial root, or the venitive prefix (i-), see examples in (201).

(201) *Examples of V-deletion*
- a. //d-V-oɲ// → /doɲ/
  REM-3NDUP-carry.NPL 'I/you carried it.'
- b. //d-V-i-ejo// → /diju/
  REM-3NDUP-weave-3NSGA 'They wove it.'
- c. //d-V-ugi-ejo//→ /dugiju/
  REM-RT.EXT-stand-3NSGS 'They stood.'
- d. //d-i-V-kom-eja// → /dikomeja/
  REM-VEN-3NDUP-carry.PL-1|2NSGA 'We/you carried them here.'

When skeletal vowels are retained, they harmonize fully with the nearest vowel (see examples in (202)).

(202) *Examples of V-harmony*
- a. //d-V-kom-ən// → /dokomən/
  REM-3NDUP-carry.PL-3SGA 'S/he carried them.'
- b. //d-V-nt͡ʂog-ən// → /dont͡ʂogən/
  REM-3NDUP-give.NPL-3SGA 'S/he gave it.'
- c. //d-V-dru-ajb-aɽo// → /dudruajbaɽo/
  REM-3NDUP-clean-NSG>PL-HAB.PLA
- d. //d-V-kuɽwæ-ɲ-aɽo// → /dukuɽweɲaɽo/
  REM-3NDUP-hang-II.NPL-HAB.PLA
- e. //d-V-DU-n-ən// → /dudunən/
  REM-3NDUP-knock-DUR-REM.3SGA
- f. //d-V-zi-ajm-aɽo// → /diziajmaɽo/
  REM-3NDUP-uncover-NSG>PL-HAB-PLA

g. //d-V-ɽɪt-ən// → /dɪɽɪtən/
REM-3NDUP-tell-REM.3SGA
h. //d-V-d͡ʐˀg-ən// → /dəd͡ʐəgən/
REM-3NDUP-bite-REM.3SGA ‘S/he bit it.’

These vowels may also assimilate or harmonize to a nearby consonant (see examples in (203)-(206)).

(203) *Example of V-fronting to /e/ in pre-/j/ position*
a. //d-V-jag-ən// → /dejagən/
REM-3NDUP-search-REM.3SGA ‘S/he searched for it.’

(204) *Examples of V-backing to /o/ in pre-/w/ position*
a. //d-V-wænseg-ən// → /dowansegən/
REM-3NDUP-put.NPL-REM.3SGA ‘S/he put it down.’
b. //d-V-wat͡ʂəɽ-eja// → /dowat͡ʂəɽeja/
REM-3NDUP-put.PL-REM.1|2NSGA ‘We/you all put them down.’
c. //d-V-wan-ən// → /dowanən/
REM-3NDUP-strike-REM.3SGA ‘S/he struck it.’
d. //d-V-wənd-eja// → /dowəndeja/
REM-3NDUP-cover-REM.1|2NSGA ‘We/you all covered it up.’
e. //d-V-wamən-ən// → /dowamənən/
REM-3NDUP-extinguish-REM.3SGA ‘S/he extinguished it.’
f. //d-V-wət͡ʂ-ejo// → /dowət͡ʂejo/
REM-3NDUP-dig.up-REM.3NSGA ‘They dug it up.’

(205) *Examples of V-rounding to /u/ in pre-[+labial][-high] position*
a. //d-V-poɽ-n-ejo// → /dupoɽnejo/
REM-3NDUP-bark-DUR-REM.3NSGA ‘They were barking at it.’
b. //d-V-web-neg-ən// → /duwebnegən/
REM-3NDUP-beat-SG>PL-REM.3SGA ‘S/he beat them.’
c. //d-V-po-ajm-ejo// → /dupoajmejo/
REM-3NDUP-sharpen-NSG>PL-REM.3NSGA ‘They sharpened them.’
d. //d-V-pot-ən// → /dupotən/
REM-3NDUP-slice-REM.3SGA ‘S/he sliced it.’
e. //d-V-mɽa-ajm-ejo// → /dumɽaemiju/
REM-3NDUP-tie-NSG>PL-REM.3NSGA ‘They tied them.’

(206) *Examples of V-rounding to /u/ in pre-C[+mid][+labial] position*

a. //d-V-kop-ən// → /dukopən/
REM-3NDUP-peel-REM.3SGA 'S/he peeled it.'

b. //d-V-ɡeɽbd-ajb-eja// → /duɡeɽbdajbeja/
REM-3NDUP-cut-NSG>PL-REM.1|2NSGA 'We/you all cut them.'

c. //d-V-koɽdə-neg-ən// → /dukoɽdənegən/
REM-3NDUP-shoot-SG>PL-REM.3SGA 'S/he shot them.'

d. //d-V-ɽom-ən// → /duɽomən/
REM-3NDUP-break-REM.3SGA 'S/he broke it.'

Exceptionally, skeletal vowels are realized as /ə/, when preceding roots with underlying //æ// (see (207)).

(207) *Examples of V-non-agreement*

a. //d-V-ʈ͡ʂæm-ən// → /d-ə-ʈ͡ʂem-ən/
REM-3NDUP-stop-REM.3SGA 'S/he stopped it.'

When a hiatus context involves two melodic vowels, the hiatus is repaired via epenthesis, transformation, or elision. Epenthetic repairs involve the glides /w/ and /j/. When a root ending in a melodic vowel is followed by an /a/- or /ə/-initial suffix, the hiatus is repaired with epenthetic /w/, see examples in (208). This type of epenthesis is observed frequently between root-final vowels and the tense/subject agreement suffixes -/an/, and -/ən/.

(208) *Examples of /w/-epenthesis between melodic vowels and /a/, /ə/*

a. //n-V-ɡæ-an// → /nəɡawan/
REC-3NDUP-AUX.3SGP-REC.1|3SGA 'I did it.'

b. //d-V-dmæ-ən// → /dədmawən/
REM-RT.EXT-sit.PL-REM.3SGS 'S/he sat down.'

c. //n-a-udæ-an// → /naudewan/
REC-RT.EXT-light-REC.1|3SGA 'I lit it.'

d. //d-V-bɽæ-ən// → /dəbɽewən/
REM-3NDUP-find-REM.3SGA 'S/he found it.'

e. //inu=aŋ// → /inuwaŋ/
sleep=ATT 'sleepy'

f. //d-a-zu-ən// → /dazuwən/
REM-RT.EXT-shoot-REM.3SGA 'S/he shot it.'

g. //kwi=aŋ// → /kwiwaŋ/
island=ATT 'of the island'

h. //d-V-ugi-ən// → /dugiwən/
REM-3NDUP-stand-REM.3SGS ‘S/he stood up.’
i. //a-go-an// → /agowan/
REC-build-REC.1|3SGS ‘I built it.’
j. //d-V-ko-ən// → /dokowən/
REM-3NDUP-cut-REM.3SGA ‘S/he cut it.’

When a root ending in /aj/ or /oj/ is followed by an /a/- or /ə/-initial suffix, an additional /j/ is epenthesized, see examples in (209).

(209) *Examples of /j/-epenthesis between /aj/, /oj/ and /a/, /ə/*
a. //d-a-ŋnoj-ən// → /daŋnojjən/
REM-RT.EXT-ask-REM.3SGA ‘S/he asked him.’
b. //n-a-ʈ͡ʂkoj-an// → /naʈ͡ʂkojjan/
REC-RT.EXT-chop-REC.1|3SGA ‘I chopped it.’

Typically, /e/ transforms to /j/ when following a melodic vowel (see (211)), but an epenthetic /w/ is inserted when /e/ is word-final, see (210).

(210) *Examples of /w/-epenthesis between melodic vowels and word-final /e/*
a. //gogo=e// → /gogowe/
build=ALL ‘to build’
b. //papa=e// → /papawe/
hit=ALL ‘to hit’
c. //ibi=e// → /ibiwi/[41]
go=ALL ‘to walk’

Transformational repairs occur when roots beginning with /i/, /e/, /o/, or /u/ are preceded by a prefix ending with /a/ or /o/. The vowels transform into glides /j/ or /w/, according to frontness. This occurs in prefixes (211)(a-e) as well as suffixes (211)(f-g). Similarly, the venitive prefix /i-/ transforms to /j/ when preceding melodic vowels, (212).

(211) *Examples of pre-consonantal vowel-gliding following /a/, /o/.*
a. //d-a-iʈ͡ʂ-ajm-eja// → /dajʈ͡ʂajmeja/
REM-RT.EXT-catch-NSG>PL-REM.1|2NSGA ‘We caught them.’
b. //d-a-er-ən// → /dajrən/
REM-RT.EXT-name-REM.3SGA ‘S/he named him.’
c. //g-o-er// → /gojr/
REM-RT.EXT-name ‘I named myself.’

[41] Note the harmonic change of //e// to /i/ to harmonize with the high vowels in the root. See section on vowel harmony in §A.4.4.

d. //d-a-udæ-ejo// → /dawdejo/
REM-RT.EXT-light-REM.3NSGA ‘They lit it.’
e. //d-a-ug-eja// → /dawgeja/
REM-RT.EXT-make.oven-REM.1|2NSGA ‘We made the oven.’
f. //d-V-gæ-ejo// → /dəgajjo/
REM-3NDUP-AUX.3SGP-REM.3NSGA ‘They did it.’
g. //d-a-po-ejo// → /dapojjo/
REM-RT.EXT-block-REM.3NSGA ‘They blocked it.’

(212) *Examples of vowel-gliding preceding melodic vowels*
a. d-i-a-ɲkoj-ne → dejaɲkojne
pull/REM.VEN.DUR.1|2sgA>3SGP
b. i-V-indug/ → j\indug/
run/imp.VEN.2SGS

There is another productive transformational alternation for words that end in /e/ or /a/, when affixed with some derivational affixes that begin with /a/. The resulting vocalic hiatus is optionally pronounced /o/ (J. (Jeks) Dareda, p.c., 2018). For example, when the verb *mondre* /mondre/ ‘to garden’ is affixed with the attributive clitic *=ag* /=ag/, the resulting form is an agent nominal *mondrog* /mondrog/ ‘gardener’. This pattern is also seen with the ablative clitic, when used derivationally. For example, when the ablative clitic *=att* /=aʈ͡ʂ/ is affixed to a verb such as *gädagäde* /gədagəde/ ‘to beat’, it forms a past participle *gädagädott* /gədagədoʈ͡ʂ/ ‘beaten’, as in *gädegädott sana* ‘beaten sago’. Some more examples are included in Table 76.

Table 76: Vowel transformations preceding derivational suffixes

Base	Clitic	Derived form
mondre 'to garden'	=*ag* (attributive)	*mondrog* 'gardener'
mondre 'to garden'	=*att* (ablative)	*mondrott* 'already worked (of a garden)'
nane 'to drink'	=*ang* (attributive)	*nanong* 'drunkard' or 'one who is drinking'
nane 'to drink'	=*att* (ablative)	*nanott* 'drunk (of a liquid or person)'
nanenane 'while drinking (adverb)'	=*ang* (attributive)	*nanenanong* 'while drinking (adjective)'
eka 'language, to speak'	=*ang* (attributive)	*ekong* 'speaker'
bun ulle 'big head'	=*ang* (attributive)	*bun ullong* 'big headed'
bandrabandra 'while singing'	=*ag* (attributive)	*bandrabandrog* 'while singing (adjective)'
källakällä 'while defecating'	=*ang* (attributive)	*källakällong* 'while defecating (adjective)'

Interestingly, this pattern does not extend to other functions of the ablative clitic, such as when it used to mark a source. The nominal *walle* /waɽe/ 'water' and the ablative clitic =*att* /=aʈ͡ʂ/ cannot be */waɽoʈ͡ʂ/ 'from the water', but only *walleatt* /waɽe=aʈ͡ʂ/. Similarly, this pattern does not extend to other /a/-initial clitics with relational functions such as =*alle* /=aɽe/ 'instrumental' or =*aebe* /=ajbe/ 'restrictive'.

This pattern also does not extend to bases ending in other vowels, e.g. */gogoʈ͡ʂ/ but *gogoatt* /gogo=aʈ͡ʂ/ 'build=ABL, built', */ibog/ but *ibiag* /ibi=ag/ 'go=AGT, traveller'.

Elision repairs occur when roots ending in /e/, /j/, /u/, or /i/ are followed by a suffix beginning with /e/. In these cases, the /e/ is elided. Examples are shown in (213).

(213) a. //d-a-ud<u>æ-ej</u>o// → /dawd<u>ej</u>o/
REM-RT.EXT-light-REM.3NSGA 'They lit it.'
b. //go-pna<u>j-ej</u>o// → /gopna<u>jj</u>o/
REM-turn-REM.3NSGS
c. //d-a-z<u>u-ej</u>o// → /daz<u>uj</u>u/
REM-RT.EXT-shoot-REM.3NSGA
d. //d-V-ug<u>i-ej</u>o// → /dug<u>ij</u>u/
REM-3NDUP-stand-REM.3NSGS

Finally, if a root ending in /a/ is followed by a suffix beginning with /a/, one of the vowels may be elided or an epenthetic /w/ may be inserted.

(214) a. //d-a-mɽæ-ajm-ejo// → /damɽajmejo/
REM-RT.EXT-hold-NSG>PL-REM.3NSGA ‘They held them.’
b. //eka=aɽe// → /ekawaɽe/
language=INS ‘with language’

A final type of assimilation to note is that of harmonic palatalization of /d/. In the corpus and the dictionary, there are no examples of words containing the sequence of a palatal nasal preceding an oral alveolar stop, /ɲd/. However, when these two segments occur next to each other across a word boundary, some speakers pronounce the resulting form as /ɲd͡ʐ/ or /ɲdʒ/, with the oral stop audibly produced further back (in palato-alveolar or retroflex position) and as an affricate or fricative (for some examples, listen to E. Baewa & Kidarga, 2018 #60, 63; Sobam, 2018b #211; Sobam & Dareda, 2018 #206; T. (Tonzah) Warama, 2017b #271).

A.4.2 Consonant cluster reduction

When a sequence of consonants comes together in such a way that the sequence violates Ende’s principles of syllabification or syllable contact laws (see §3.2), epenthetic /ə/ may be inserted to resolve these phonotactic violations. For example, based on the infinitival reduplication analysis in §4.2, I assert that the apparent fixed-segmentism *Ca*-reduplication pattern of triconsonantal roots, like that in (215), is indicative of an underlyingly vowelless verb root. The high ranking of the Sonority Sequencing Principle (SSP) constraint regulates insertion of the epenthetic vowel, such that violations of the SSP are required to be repaired, while a faithfulness constraint that penalizes addition of syllables to the output restricts superfluous epenthesis (*STRUC(σ)), see Tableau 73. In this tableau, candidates (a) and (b) both violate the SSP because /pɽg/ and /ɽg/ are not permissible complex codas.

(215) //pæ-pɽg// → /papɽəg/
INF-fly.NPL ‘fly.NPL’

*Tableau 73: SSP » *STRUC(σ)*

//pæpɽg//		SSP	*STRUC(σ)
a.	papɽg	*!	*
b.	pa.pəɽg	*!	**
☞c.	pap.ɽəg		**

An example of an epenthetic repair of a syllable contact law violation is shown in (216). Syllable contact laws are not stringently upheld in Ende, and indeed, the epenthetic repair in (216) is optional. However, evidence from floating nasal alignment preferences indicates that Ende phonotactics prefer for consonant sequences across syllable boundaries to be falling in sonority. The ranking of the constraint *DIST+1 over *STRUC(σ) indicates that epenthesis is a possible repair for violations of stable or rising sonority levels across syllable boundaries.

(216) g-o-g-ne → gogəne
REM-RT.EXT-AUX-DUR 'I was becoming/doing'

*Tableau 74: *DIST+1 » *STRUC(σ)*

/gogne/		*DIST+1	*STRUC(σ)
a.	gog.ne	*!	**
☞b.	go.gə.ne		***

A.4.3 Metrical vowel syncopation

There is a regular process of vowel elision in inflected verbal forms. Often, the first vowel will elide when the root occurs after a prefix. This elision may be variable. Sometimes, the vowel reappears when the verb is repeated slowly. Compare the roots in Table 77 in their infinitival and inflected forms and notice the variable realization of the first vowel in the root in the inflected form.

Table 77: Vowel syncopation patterns

Verb ID	Infinitival form	Inflected form(s)	Gloss
[424]	toŋoj	da-tŋoj ~ da-toŋoj	'to laugh'
[23]	gonagone	da-gne ~ da-gone	'to cook/burn'
[13]	ɲoŋkoj	da-ɲkoj	'to pull'

A.4.4 Vowel harmony

There is left-to-right height vowel harmony in Ende. Mid vowels (/e/, /ə/, /o/) following high vowels (/i/, /ɪ/, /u/) are realized as [+high]. This is frequent, especially for suffix and clitic vowels, but not categorically realized especially for root vowels. A good source of seeing this type of alternation is in venitively-marked verbs, in which the venitive prefix /i/ immediately precedes the root. This often triggers high vowels throughout the entire verb, including the root. Underlying //æ// is transparent.

(217) Left-to-right height vowel harmony rule
[+mid] → [+high] / [+high](C_0|æ)_

(218)

Underlying form	Surface form	Orthographic form	Gloss
//diagirnejo//	/dejagirniju/	*deyagirniyu*	‘stay/REM.DUR.3DUS’
//daspunejo//	/daspuniju/	*daspuniyu*	‘throw/REM.3NSGA>SGP’
//digægejo//	/digegiju/	*digegiyu*	‘AUX/REM.VEN.3NSGA>3SGP’

In synthetic constructions, if there is a high vowel in the root, as there is in *ngämingg* /ŋəmiŋg/ ‘to help’ in (219), this vowel will trigger obligatory raising of any mid vowels in the suffixes, cf. -*iyu* in (219) and /-*eyo*/ in Table 71.

(219)

Ddob	*llɨg a*	*ngänäm*	*abo*	*dangmingg**iyu**.*
ɖ͡ʐob	ɽɪg=a	ŋənəm	abo	d-a-ŋmiŋg-**iju**
some	child=NOM	1.SG.ACC	then	REM-RT.EXT-help-3NSGA

‘Then, some children helped me.’
(J. (Mado) Karea, 2016 SE_SN030 #51)

If the low /a/ vowel intervenes between the high vowel in the root and the mid vowel in the suffix, as in (220), then no raising occurs.

(220)

ede	*ddäddäg alle*	*säre*	*ubi*	*dangmingg**allo***
ede	ɖ͡ʐəɖ͡ʐəg=aɽe	səre	ubi	d-a-ŋmiŋg-**aɽo**
so	meat=INS	pity	3.NSG.NOM	REM-RT.EXT-help-3NSGA.HAB

‘So they [my father’s family] would help me with meat.’
(Rind, 2018 SE_PI057 #60)

If there is a high vowel in the prefix, for example, the venitive *i*- prefix, this vowel may trigger the selection of a high or front allomorph of the root, with possible cascading harmonic effects on the suffixes. For example, compare the forms of the -g- auxiliary verbs in (221) and (222). In (222), the venitive context triggers selection of the venitive prefix *i*-, and the high allomorph of the agent suffix -*iyu* (underlying form: //-ejo//). (The alternation of /a/ and /e/ in the auxiliary root is an expected result of //æ// realization in the first or second syllable of the word.) Compare these morphemes with the neutral allomorphs in (221).

(221)	*ubi*	*däbe*	*käza de*	*matta*	*dägag**eyo***
	ubi	dəbe	kəza=de	maʈ͡ʂa	d-ə-gag-**ejo**
	3.NSG.NOM	that	crocodile=ACC	shoulder	REM-3NDUP-AUX-3NSGA

‘They shouldered that crocodile.’
(T. Dobola, 2016 SE_PN016 #38)

(222)	*Däbem*	*matta*	*dige**giyu***	*gänyowe*	*de.*
	dəbem	maʈ͡ʂa	d-i-geg**iju**	gəɲo=we	de
	that.ACC	shoulder	REM-VEN.3NDUP-AUX-3NSGA	here=ALL	FOC

‘They shouldered that [thing] here.’
(Kurupel (Suwede), 2017b SE_SN041 #76)

This allomorph selection is not only caused by venitive marking, as homophonous prefixes, such as the irrealis *i-* trigger the same selection, as shown in (223) where //b-i-gag-aɽe// surfaces as /b-i-geg-aɽe/.

(223)	*Da*	*bogo*	*sel*	*b**igeg**alle*	*wan*
	da	bogo	sel	b-**i-geg**-aɽe	wan
	if	3.SG.NOM	sell	FUT-IRR.3NDUP-AUX-IRR.SGA	one
	taosen	*a*	*paeb*	*andredd*	*kina*
	taosen	a	paeb	andreɖ͡ʐ	kina
	thousand	and	five	hundred	kina
	märäll me				
	məɽəɽ=me				
	size=LOC				

‘If he sells it for one thousand and five hundred kina (K1500)…’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #753)

There is some indication that vowel harmony may travel right-to-left as well. I have observed the accusative case clitic *=de* surface as *=di* following nominals with mid-vowels but preceding a word with a high vowel, (224).

(224)	*Bablle*	*wätät **di***	*yu*	*bägnegne.*
	babɽe	wətət=**di**	ju	b-ə-g-neg-ne
	2.SG.DAT	food=ACC	fire.cook	FUT-3NDUP-AUX-SG>PL-DUR

‘I will cook food for you.’
(Dieb, 2018 PI087 #223)

A.4.5 Realization of //æ//

While Ende only has one open vowel, /a/, all other Pahoturi River language varieties have two open vowels in their phonemic inventories, /æ/ and /a/. In Ende words that historically have a front /æ/ (i.e., all other Pahoturi River languages maintain the front vowel), */æ/ is realized as /a/ in the first syllable and /e/ in other syllables. Light vowels are ignored in terms of syllable count, as they do not head syllables.

We can observe this pattern by comparing the verb roots √paɲ ‘to discuss’ and √pɪɲ ‘to plant a lot’ in Table 78. Notice how the quality of the vowels for √paɲ and the plural /-nan/ is determined by syllable position, while the quality of the vowels for √pɪɲ are stable across the various forms.

Table 78: Comparison of verb roots with and without underspecified vowels

Root	Infinitival NPL UF: //V-√//	Infinitival PL UF: //√-næn//	REM.1SG>3SG UF: //d-ᵊ-√//	REM.1SG>3DU UF: //d-i-a-√//
√paɲ	/p**a**ɲp**e**ɲ/	/p**a**ɲ-n**e**n/	/dᵊ-p**a**ɲ/	/deja-p**e**ɲ/
√pɪɲ	/pɪɲpɪɲ/	/pɪɲ-n**e**n/	/dᴵ-pɪɲ/	/deja-pɪɲ/

This is because the underlying quality of the vowel in √paɲ is //√pæɲ//. When an underlying //æ// is in the first syllable of the word, it is realized as /a/, while when it is in any other syllable of the word, it is realized as /e/. This alternation is dependent on syllable count and is thus a useful metric for identifying light vowels within a word. For example, consider the plural suffix //-næn//. This suffix will be realized as /-nen/ if it follows a fully specified root vowel and /-nan/ if it follows a light root vowel.

Table 79: Surface realization of //-næn// following vowels of different types

Underlying form	Surface form	Gloss
//ug-næn//	/ugnen/	‘oven.cook-PL’
//ɽom-næn//	/ɽomnen/	‘break-PL’
//gᵊdæ-næn//	/gədanen/	‘beat.sago-PL’
//ɖ͡ʐᵊg-næn//	/ɖ͡ʐəgnan/	‘bite-PL’
//gᵊɖ͡ʐ-næn//	/gəɖ͡ʐnan/	‘kill.PL-PL’
//gᵊɽᵊm-næn//	/gəɽəmnan/	‘wash-PL’
// ᵒt-næn//	/otnan/	‘eat-PL’

A.5 Case and phrasal syntax

Compared to the verbal morphology, nominal morphology in Ende is much simpler. Nominal phrases may host several case clitics, which mark relations with other noun phrases, within clauses, or between clauses. Nominal phrases may also host derivational morphology, which includes reduplication and derivational suffixes.

A.5.1 Case clitics

These case clitics may be hosted by any nominal, which is a class including nouns (*e.g.*, *ine* 'water'), property nouns, which function as either a noun or an adjective (*e.g., mer* 'good, goodness'), a closed class of adjectives (*e.g., ulle* 'big'), a closed class of locational nominals (*e.g., ik* 'inside'), a closed class of quantifiers, including numerals, and personal and ignorative pronouns. Some case clitics also occur on non-finite verbs with different functions. They can also be found after non-finite verb forms when relating them as complements to a larger clause, but in these cases, they may indicate different semantic roles. For example, the clitic *me* /=me/ indicates a locative argument when following a nominal (*ma me* /ma=me/ 'in the house'), but simultaneity when following a bare verb (*kängkäl me* /kəŋkel=me/ 'while climbing'). On the other hand, the purposive clitic =*ma* has the same general meaning whether following a nominal (*up ma* /up=ma/ '(going) for bananas') or a bare verb (*tudi ma* /tudi=ma/ '(going) for fishing'). There is no overt nominalization marker that differentiates the bare verb form when it is used with nominal morphology from when it is used as the main predicate in a clause.

Case clitics are generally obligatory, adjoin to the rightmost element of the phrase, and have scope over the whole noun phrase. In cases of a split noun phrase, the case clitic may appear twice. For example, consider the following accusative marked noun phrases in which the adjective *sisor* 'new' precedes the noun in (225), follows the noun in (226), and is split from the noun in (227). In all cases, the accusative clitic *de* /=de/ follows the rightmost element in the phrase.

(225)

Ibi	*ibra*	*mɨnyi*	*ttongo*	*sisor*
ibi	ibra	mɪɲi	t͡s̪oŋo	sisor
1.NSG.INCL.NOM	1.NSG.INCL.DAT	will	a	new
bikwem ***de***	*ako*	*bangeseya.*		
bikwem=de	ako	b-a-ŋes-eja		
fireplace=ACC	then	FUT-RT.EXT-make-FUT.1NSGA		

‘Then we will make ourselves a new fireplace.’
(T. (Tonzah) Warama, 2017b RE_EE001 #64.1)

(226)

Abo	*bongo*	*ttongo*	*ma*	*sisor* ***de***	*nogo.*
abo	boŋo	t͡s̪oŋo	ma	sisor=de	n-o-ɡo
must	2.SG.NOM	a	house	new=ACC	FUT.2sgA-3NDUP-build

‘You must build a new house.’
(T. (Tonzah) Warama, 2017b RE_EE001 #13.1)

(227)

Ako	*ai*	*dan*	*ttongo*	*mälla* ***de***
ako	aj	dan	t͡s̪oŋo	məɽa=de
then	good	COP.PRS.SGS	a	woman=ACC
bällädän			*sisor* ***de****.*	
b-ə-ɽəd-ən			sisor=de	
FUT-3NDUP-marry-FUT.3SGA			new=ACC	

‘Then it is okay for him to marry a new woman.’
(Zakae, 2016f WE_PN029 #7.3)

Case clitics may have one of three functions: an adnominal function, relating one noun phrase to another noun phrase, a relational function, relating a noun phrase to a clause, or a complementizer function, relating a clause to another clause.

Table 80: Case roles by function

Case label	Semantic role by function		
	Adnominal function	Relational function	Complementizer function
Nominative		Agent	Agent
Accusative		Experiencer, Theme, Patient	Experiencer, Theme, Patient
Dative		Recipient, Beneficiary, Maleficiary	
Possessive	Possessor, Possessed		
Locative		Location	Simultaneity
Allative		Goal of motion, Purpose	Purpose
Ablative	Origin	Source of motion	Anteriority
Perlative		Motion along or through	
Instrumental		Instrument, Manner, Inclusion	Manner
Purposive		Purpose	Purpose
Attributive	Association	Association	Manner
Privative	Absence	Absence	Manner
Restrictive		Limitation	
Similative	Comparison	Comparison	
Comitative		Inclusion	
Emphatic		Emphasis	

There are multiple opportunities for rightmost elements in noun phrases to host multiple case clitics. This is known as case-stacking. Case-stacking can arise from agreement or embedding. In agreement type structures, an adnominal phrase may also agree with the internal noun phrase in case. For example, adnominal ablative phrases, which indicate an origin semantic role, agree with the noun phrase which they modify in nominative (228) or accusative (229) case.

(228) *Ttongo* *lla* ***da*** *do watt* ***a*** *deyarän*
t͡ʂoŋo ɽa=da do=wat͡ʂ=a d-ej-a-r-ən
a man=NOM there=ABL=NOM REM-VEN-RT.EXT-go.SG-3SGS
obo *mäda bom* *däbäddän.*
obo məda=bom d-ə-bəɖ͡ʐ-ən
3.SG.POSS father=3.SG.ACC REM-3NDUP-kill.NPL-3SGA
'A man from there came to kill his father.'
(Eric, 2016 SE_SN024 #10.3)

(229) *Mälla da* *bikomneyo*
məɽa=da b-i-kom-n-ejo
woman=NOM FUT-VEN.3NDUP-carry.PL-DUR-FUT.3NSGA
galbi ***di*** *yu watt* ***de****.*
ɡalbi=di yu=wat͡ʂ=de
purple.yam=ACC fire(fire.cook)=ABL=ACC
'The women will carry purple yams from the fire (fire-cooked purple yams).'
(J. (Jeks) Dareda, 2017c SE_SN046 #24.1)

In embedded structures, a noun phrase may be adnominally related to an inner noun phrase (*e.g.*, Pat's brother), which is in turn relationally oriented to the clause (*e.g.*, I saw Pat's brother). For example, consider the following four examples in which an adnominal possessive clitic *da* /=da/ occurs inside a nominative, accusative, dative, and possessive construction.

(230) *Mälla* ***da da*** *bun di* *omllawan.*
məɽa=da=da bun=di o-mɽa-wan
woman=CL.POSS=NOM head=ACC REC-tie-REC.3SGS
'His wife wrapped her head.'
(K. Baewa, 2018 #65)

(231) *Mälla da* *ade* *gullbe* ***da bom*** *kilikili*
məɽa=da ade guɽbe=da=bom kilikili
woman=NOM also husband=CL.POSS=3.SG.ACC greet
dägagän.
d-ə-ɡag-ən
REM-3NDUP-AUX.3SGP-REM.3SGA
'The woman also greeted her husband.'
(Sobam, 2018a SE_PI041 #96.3)

(232)

Kuddäll	*eka de*	*lla da*	*mɨnyi*
kud͡ʐəɽ	eka=de	ɽa=da	mɪɲi
death	message=ACC	man=NOM	will
dängawallo		*utt*	*ekaekong*
d-ə-ŋa-waɽo		ut͡ʂ	ekaeka=aŋ
REM-3NDUP-share.message-HAB.NSGA		conch.shell	sound=ATT
llabun ***da bira***	*ami*	*ddob*	*ttängäm me*
ɽabun=da=bira	ami	ddob	t͡ʂəŋəm=me
relative=CL.POSS=3.NSG.DAT	who.NSG	other	village=LOC
giddollnen	*eran.*		
giddoll-nen	eran		
live-PL	AUX.PRS.3SGS		

‘People will have shared the death news by sounding the conch shell for his/her relatives who are living in other villages.’
(Zakae, 2016a RE_EN022 #3.1)

(233)

Ngämo	*llɨg a*	*mäg* ***da bo***	*ttängäm me*	*ulleulle*
ŋəmo	ɽɪg=a	məg=da=bo	t͡ʂəŋəm=me	uɽeuɽe
1.SG.POSS	child=NOM	mother= CL.POSS=3.SG.POSS	village=LOC	grow.up
gognegän.				
go-g-negən				
REM-AUX-3PLS				

‘My children grew up in their mother’s village.’
(P. Kurupel, 2018d SE_PI053 #66.1)

Nominative

The forms of the nominative case are *da* /=da/ when following a vowel-final word and *a* /=a/ when following a consonant-final word. Pronouns have a unique form, as shown in Table 81. The nominative case marker typically functions to mark the subject of an intransitive clause (10), the agent of a transitive clause (11). It is also used to mark conjoined patients of a clause (12). The nominal case marker can follow bare verbs that are the agent or subject of a clause. It does not follow proper nouns. It is homophonous with the following words: *da* /=da/, a 3rd person possessive clitic commonly found on kinship terms, see §A.5.1.6, *da* /da/ ‘last’, *da* /da/ ‘if’, *da(n)* /da(n)/ ‘COP.PRS.SGS’, and *a* ‘and’.

Table 81: Nominative pronouns

1.SG		2.SG	3.SG	who.SG
ngäna /ŋəna/		*bongo* /boŋo/	*bogo* /bogo/	*aeya* /ajja/
1.NSG.INCL	1.NSG.EXCL	2.NSG	3.NSG	who.NSG
ibi /ibi/	ngämi /ŋəmi/	*bibi* /bibi/	*ubi* /ubi/	*ami* /ami/

(234) *O* *ngämo* *galbe **da*** *ae* *agan.*
o ŋəmo galbe=da aj a-g-an
oh 1.SG.POSS purple.yam=NOM good REC-AUX-REC.1|3SGS
'Oh, my purple yam is doing well!'
(Wäziag, 2016a SE_SN004 #23)

(235) *O* *lla **da*** *ttongo* *nyäng de* *nonyan*
o ɽa=da t͡ʂoŋo ɲəŋ=de n-oɲ-an
oh man=NOM one bag=ACC REC-carry.NPL-REC.1|3SGA
tärämpmeny ma.
təɹəmpmeɲ=ma
seek.spiritual.answer=PURP
'Then a man would take one bag to hear from the spirits (how the deceased died).'
(Zakae, 2016b SE_SN013 #21)

(236) *Obo* *tudi **da*** *a* *tokong **a***
obo tudi=da a tokoŋ=a
3.SG.POSS fishing.line=NOM and bait=NOM
dängälläbnegän.
d-ə-ŋəɽəb-neg-ən
REM-3NDUP-get-NSGA>PLP-3SGA
'(He) got his fishing line and bait.'
(Kaoga (Dobola), 2016 SE_PN006 #14)

Accusative

The form of the accusative case marker is *de* /=de/. The mid vowel may harmonize with high vowels in the root to be realized as /=di/. There is a unique pronoun set for the accusative case, see Table 82, as well as a set of pronominal clitics, =*bom* /=bom/ '3.SG.ACC', =*bim* /=bim/ '3.NSG.ACC', which obligatorily follow proper nouns, human referents, and optionally animate referents, (237)-(239).

The accusative case marker primarily functions to mark the patient in a transitive clause (240). It may also mark a subordinate verbal clause, *e.g.*, with phasal verbs like 'to start creeping', in (241). The allative case marker, §A.5.1.9, is also used for this purpose. Note that conjoined patients are marked with the nominative case marker (see §A.5.1.1). The -*m* suffix, visible in the accusative pronominal paradigm, on some determiners, and still productive as an accusative marker of a human referent in Idi, is no longer productive in Ende.

The accusative case marker is homophonous with =*de* /=de/ ‘a focus marker’ (or focus and accusative are connected), *de* ‘that, distal demonstrative’, *de* ‘COP.PST.SGS’ (short for *daeya*). The first person singular accusative pronominal form is homophonous with the simulative case marker =*ngänäm* /=ŋənəm/ ‘similative’.

Table 82: Accusative pronouns and pronominal clitics

1.SG		2.SG	3.SG	who.SG
ngänäm /ŋənəm/		*bam*	*obom, =bom*	*amom*
1.NSG.INCL	1.NSG.EXCL	2.NSG	3.NSG	who.NSG
ibim	*ngämim* /ŋəmim/	*bibim*	*ubim, =bim*	*amim*

(237)	*[Ubi]*	*Bundae* ***bom***	*ikop*	*dägaeyo.*
	ubi	bundaj=bom	ikop	d-ə-ga-ejo
	3.NSG.NOM	B.=3.SG.ACC	see	REM-3NDUP-AUX.3SGP-REM.3NPLA

‘They saw Bundae.’
(J. (Jeks) Dareda, 2016b SE_PN009 #38.2)

(238)	*ge*	*ddob*	*llɨg a*	*alla*	*medä da* ***bim***
	ge	ɖ͡ʐob	ɽɪg=a	aɽa	medə=da=bim
	this	some	children=NOM	how	father=POSS=3.NSG.ACC
	mitmit		*amallo*		
	mitmit		amaɽo		
	miss		AUX.PRS.3PLS		

‘…the way children miss their fathers.’
(Ben Danipa, 2017a RE_EN034 #5.1)

(239)	*Käsre*	*nag da*	*Däräng* ***bom***	*dangnoeyän,*
	kəsre	nag=da	dərəŋ=bom	d-a-ŋnoj-jən
	then	friend=POSS	dog=3.SG.ACC	REM-RT.EXT-ask-REM.3SGA

‘Then he asked his friend Dog,’
(T. (Tonzah) Warama, 2016a RE_EN001 #33.1)

(240)	*Ddob*	*lla da*	*ngämo*	*bin di*	*aiai*
	ɖ͡ʐob	ɽa=da	ŋəmo	bin=di	aj-aj
	some	person=NOM	1.SG.POSS	name=ACC	ADV-good
	ttaem	*erallo.*			
	ʈ͡ʂajm	eraɽo			
	call	AUX.PRS.3NSGA>3SGP			

‘Some people say my name properly.’
(G. Jerry, 2018 SE_PI045 #6.1)

(241)	*Ngäna*	*nyäroe de*	*dängkam.*
	ŋəna	ɲəroj=de	d-ə-ŋkam
	1.SG.NOM	creep=ACC	REM-3NDUP-start

‘I started to creep up.’
(Sowati Kurupel, 2017a SE_PN024 #17)

Dative

The dative case is marked with a set of pronominal clitics and unique pronoun set. Unlike the nominative and accusative cases, there is no generic case marker for the dative. Thus, the pronominal clitics are used for both animate and inanimate dative arguments, unlike the accusative. There are two pronominal clitics, *=bälle* /=bəɽe/ '3.SG.DAT' and *=(y)abira* /=(j)abira/ '3.NSG.DAT'. The glide-initial form of the nonsingular is used when attaching to vowel-final words. The personal pronoun set, in Table 83, has only been observed with animate referents.

Table 83: Dative pronouns and pronominal clitics

1.SG		2.SG	3.SG	who.SG
ngämlle /ŋəmɽe/		*bablle* /babɽe/	*oblle* /obɽe/, *=bälle* /bəɽe/	*amlle* /amɽe/
1.NSG.INCL	1.NSG.EXCL	2.NSG	3.NSG	who.NSG
ibra	*ngämira* /ŋəmira/	*bibra*	*ubira*, *=bira*	*amira*

The dative case marker has at least nine functions: it may mark (i) the recipient in a ditransitive clause, such as giving or showing, (ii) the recipient of a communication act, (iii) the affected party (beneficiary) of a clause with an act of giving implied, (iv) the affected party (beneficiary) without an act of giving implied, (v) the affected party (maleficiary) with loss of possession implied (242), (vi) the affected party (maleficiary) without loss of possession implied, (vii) the purpose of a clause (agent and patient), (viii) the experiencer subject of a clause, and (ix) the possessor (or non-possessor) in an existential clause.

Note that recipients in ditransitive clauses may be followed instead by the accusative or allative case markers, without a noted change in meaning.

(242)	*Lla da*	*dagaeya*	*kuddäll*	*gognegän*	***ngämlle*.**
	ɽa=da	dagaeja	kuɖ͡ʐəɽ	go-g-negən	ŋəmɽe
	man=NOM	COP.PST.PLS	die	REM-AUX-REM.3PLS	1.SG.DAT

'My (three) husbands died on me.'
(Wäziag, 2018 SE_PI062 #65)

Possessive

There are three forms of possessive clitics: the general possessive, the past possessive, and the close possessive. Both the general possessive and the past possessive have independent pronominal forms and pronominal clitics for third person. The pronominal clitics for the general possessive are *=bo* (3.SG.POSS) and *=(y)aba* (3.NSG.POSS).

Table 84: Possessive pronouns and pronominal clitics

1.SG		2.SG	3.SG	who.SG
ngämo /ŋəmo/		*bäne* /bəne/	*obo, =bo*	*amo*
1.NSG.INCL	1.NSG.EXCL	2.NSG	3.NSG	who.NSG
iba	*ngäma* /ŋəma/	*bina*	*oba, =ba*	*ama*

The general possessive is used (i) with inalienable and alienable possession for animate possessors, (ii) in conjunction with postpositions such as animate spatial cases and the comitative case, and (iii) in reflexive/reciprocal pronouns. Possession between inanimate objects is indicated by word order (possessee-possessed) or with the close possession construction (see below). The second singular general possessive pronoun, *bäne* /bəne/, is homophonous with the past possessive singular pronominal clitic, *=bäne* /=bəne/.

Past possessive

There are unique pronouns for the past possessive case as well as pronominal clitics. The pronominal clitics are *=bäne* (3.SG.ABL) and *=(y)abaene* (3.NSG.ABL). The nonsingular pronominal clitic is realized as *=yabaene* following vowel-final words and *=abaene* following consonant-final words. The singular pronominal clitic undergoes vowel harmony *=bäne* → *=bini* after words in which the final vowel is [+high]. The independent past possessive pronouns are listed in Table 85.

Table 85: Past possessive pronouns and pronominal clitics

1.SG		2.SG	3.SG	who.SG
ngämene /ŋəmene/		*bänene* /bənene/	*obäne* /obəne/, *=bäne* /=bəne/	*amäne* /aməne/
1.NSG.INCL	1.NSG.EXCL	2.NSG	3.NSG	who.NSG
ibaene /ibajne/	*ngämaene* /ŋəmajne/	*binaene* /binajne/	*obaene* /obajne/, *=(y)abaene* /=(j)abajne/	*amaene* /amajne/

The past possessive shares many functions of the ablative case (for example, spatial meanings, (243)) and could be considered an animate ablative case. Primarily, the function of the past possessive is (i) past possession and (ii) source. This case is only used with animate arguments.

(243)

O	*ddob*	*ge*	***ngämaene***	*lla da*
O	d͡ʐob	ɡe	ŋəmajne	ɽa=da
or	some	this	1.NSG.ABL	person=NOM
ami	*duli*	*ddob*	*ttängäm me*	*giddollnen*
ami	duli	d͡ʐob	t͡ʂəŋəm=me	ɡid͡ʐoɽ-nen
who.NSG.NOM	far	some	village=LOC	live-PL
eran	...	*Ende*	*eka de*	...
eɹan	...	Ende	eka=de	...
AUX.PRS.3SGS	...	Ende	language=ACC	...
panypeny	*erallo.*			
paɲpeɲ	eraɽo			
speak	AUX.PRS.3NSGA>3SGP			

‘Or some of our people who live in some far-off villages (also) speak Ende language.’
(Sowati Kurupel, 2018e SE_PI070 #247-248)

The singular pronominal clitic, *=bäne* /=bəne/ is homophonous with the second singular possessive pronoun. The singular pronominal pronoun for who, *amne* /amne/, is homophonous with the word meaning ‘center’.

Close possessive

The close possessive, *=da*, is a clitic found only on kinship terms with a third person possessor. That is, it follows the possessed noun ‘father’ in ‘his father’, but not ‘my father’. It may co-occur with the possessive clitics or pronouns. If a kinship term is followed by an adjective, *e.g.*, ‘his small child’, *=da* follows the adjective. Some kinship terms seem to have lexicalized the close possessive clitic, e.g., *llamda* (*llam) ‘old man’, and can now occur with two (*llamdada* ‘her old man’).

(244)

Llamda da bälle	*gazenma da*	*ddone*	*mullae*
ɽamda=da=bəɽe	ɡazen=ma=da	d͡ʐone	muɽaj
old.man=CL.POSS=3.SG.DAT	exit=NMLZ=NOM	not	able
gogon.			
ɡo-ɡ-on			
REM-AUX-REM.3SGS			

‘For her old man, there was no way to escape.’
(W. Geser, 2016 SE_SN047 #43)

List of hosts in corpus: *mäg* ‘mother’, *nag* ‘friend’, *kapera* ‘friend’, llɨg ‘child’, *ause* ‘old woman’, *mosen* ‘older same-sex sibling’, *mänyan* ‘younger same-sex sibling’, *män* ‘daughter, male’s sister’, *mäda* ‘father’, *mälla* ‘wife’, *llamda* ‘old man’, *llabun* 'relative', *lla* 'man, husband', *mällpa* 'aunt', *pope* 'uncle', *masar* 'grandfather, grandchild', *gullbe* 'husband', *mang* 'female's brother', *päzäg* 'in-law', *kaeg* 'friend'.

Some non-kinship hosts which require further investigation include *Ende* 'language name', *ttängäm* 'village', *däräng* 'dog', *ttongo* 'one', *dadel* 'harvest', *TB* 'tuberculosis', etc. In all these cases =*da* is followed by =*bo* '3.SG.POSS'. While these examples could indicate an extension of the close possessive to non-kinship forms, in these cases the *da bo* follows the possessor not the possessed argument in the construction, making it functionally different from the close possessive. Instead, it marks contrastive focus.

(245)	*Eso*	*ulle*	*a*	*ttongo*	*eka*
	eso	uɽe	a	ʈ͡s̪oŋo	eka
	thank you	big	and	one	story
	nawengaman	*ako*	*dadel* ***da*** *bo*	*eka.*	
	n-a-weŋam-an	ako	dadel=**da**=bo	eka	
	REC-RT.EXT-forget-REC.1|3SGA	also	harvest=**FOC**=3.SG.POSS	story	

'Thank you very much, I forgot [to tell you] one story, it's the harvest story.'
(J. (Jeks) Dareda, 2017c SE_SN046 #2)

This clitic is homophonous with the nominative clitic =*da*, a word meaning 'last, previous', a connective meaning 'if', and one of the various of the present singular copula *da(n)*.

Spatial cases

There are four spatial cases: locative, allative, ablative, and perlative. These four cases all function with typical directional meanings with inanimate locations. In addition, the locative, allative, and ablative have corresponding postposition forms for animate locations: *patme*, *pate*, and *patatt*, respectively. These postpositions are grammaticalized from the phrases *patt* 'body' combined with the inanimate spatial case clitic, =*me*, =*e*, and =*att*.

The inanimate spatial cases often co-occur with locational nominals (cf. locational nominals in Komnzo (Döhler, 2018)) , which follow the main noun. For instance, the phrase 'in the water' consists of the noun *ine* 'water', followed by the locational nominal *ik* 'inside' and the locative clitic =*me*: *ine ik mi* 'in the water'.

Locative

The locative case clitic has both an animate and an inanimate form. When referring to a location within or near a person, or within a person's domain (*e.g.,* their home), one can use the form *patme* /patme/. When referring to a location within or near an inanimate object, one can use the form =*me*, which harmonizes to =*mi* when following a high vowel.

The function of the locative includes: (i) marking location *in* (*e.g.*, a liquid), *on* (*e.g.*, a surface), or *at* (*e.g.*, the base of a tree), (ii) marking location within an animate referent (*e.g.*, 'I was made inside my mother', (248)), or at an animate referent's location (*e.g.*, 'at my daughter's house', (247)), or (iii) marking a temporal function meaning 'while', (246). With non-nominals, this clitic can be used in an adverbial sense meaning 'while' or 'during'. This clitic is homophonous with the word *me* 'rainbow'.

(246)	*Mälla*	*peyang* ***me***.
	məɽa	pejaŋ=me
	wife	with=LOC

'While I was married.'
(Kangge, 2018 SE_PI091 #103)

(247)	*Ngäna*	*ngämo*	*llɨg*	***patme***	*dan.*
	ŋəna	ŋəmo	ɽɪg	patme	dan
	1.SG.NOM	1.SG.POSS	child	LOC.ANIM	COP.PRS.SGS

'I am staying at my children('s house).'
(Koe, 2018 SE_PI078 #64)

(248)	*Oke*	*dedme*	*ngänäm*	*yae*	***patme***	*nangesan.*
	oke	dedme	ŋənəm	jaj	patme	n-a-ŋes-an
	okay	there	1.SG.ACC	mother	LOC.ANIM	REC-RT.EXT-make-REC.1|3SGA

'Okay, there my father made me in my mother.'
(K. Mado, 2018b SE_PI106 #246)

Allative

Similarly, the allative case marker has two forms: *pate* following animate referents, and =(*w)e* or =*(w)i* following inanimate referents. The inanimate clitic surfaces as =*we* or =*wi* following vowel-final words, as =*e* or =*i* following consonant-final words, and as =*(w)i* following words with high final vowels.

The allative marker functions to (i) mark direction towards an inanimate or animate referent, (ii) mark the recipient in a ditransitive clause, and (iii) mark a purposive argument (249). This clitic may also attach to non-nominals, such as infinitival verbs, to indicate (iv) a simple future construction when cooccurring with the basic copula, (v) an infinitival construction, or (vi) a purposive construction (250).

Note that recipients of ditransitive clauses may alternatively be marked with dative or accusative case. Moreover, purposive arguments may alternatively be marked with =ma but can also co-occur (251).

The allative case clitic is homophonous with the verb *i* ‘to weave’.

(249) *Mälla da* *sisri* *ag me* *kok de*
məɽa=da sisri ag=me kok=de
woman=NOM now morning=LOC grasshopper=ACC
nägäddaeballo *kollba* *tokong* ***e***.
n-ə-gəɖ͡ʐ-aeb-aɽo koɽba tokoŋ=e
REC-3NDUP-kill.PL-NSGA>PLP-REC.3NSGA fish bait=ALL
‘This morning, the women killed grasshoppers for fish bait.’
(T. (Tonzah) Warama, 2017b RE_EE001 #268)

(250) *Ddia da* *wa* *kottllam a* *dindu* ***wi*** *gonserbeyo.*
ɖ͡ʐia=da wa koʈ͡ʂɽam=a dindu=wi go-nserbe-jo
deer=NOM and turtle=NOM run=ALL REM-prepare-REM.3DUS
‘Deer and Turtle prepared to run.’
(Sowati (Kurupel), 2016d SE_PN005 #5)

(251) *Ngäna* *gullbe ma* ***we*** *de* *gänyaolle*
ŋəna guɽbe=ma=we de gəɲaoɽe
1.SG.NOM husband=PURP=ALL COP.PST.SGS here.ALL
yaran.
y-a-r-an
VEN-RT.EXT-go.SG-REC.1|3SGS
‘I came here to (marry a) husband.’
(Rind, 2018 SE_PI057 #51)

Ablative

The ablative case marker also has two forms: an animate form *patatt* and an inanimate form *=(w)att*. The inanimate form surfaces as *=watt* after vowel-final words and *=att* after consonant-final words.

The function of the ablative case marker with nominals is to (i) mark direction from an inanimate or animate referent and (ii) mark source or origin of a referent. With non-nominals, the ablative case may (iii) form past-participle modifiers when used with infinitival verbs (252), (iv) form result phrases with infinitival verbs in subordinate clauses (*e.g.*, after weaving the bag, he…), (v) form a simple past construction when followed by the copula (*e.g.*, *Ngäna tatuatt dan*. ‘I just washed.’).

(252)	*mägäll*	*kab*	*llatnenatt alle*	*iatt*
	məgəɽ	kab	ɽat-nen=aʈ͡ʂ=aɽe	i=aʈ͡ʂ
	tulip.tree	bark	roll-PL=ABL=INS	weave=ABL
	kollba	*gäddnan ma*		
	koɽba	gəɖ͡ʐ-nan=ma		
	fish	kill-PL=PURP		

‘[A net is] woven with rolled tulip stringy bark in order to catch fish.’
(T. (Tonzah) Warama, 2017b RE_EE001 #48)

When the ablative case marker is used to modify an argument, it is often followed by the nominative case marker (=a) or the accusative case marker (=de) to mark agreement with the modifying phrase and the referent. Also, note that sometimes sources are marked with the instrumental case.

Perlative

The perlative case marker only has one form,=*dae*, and is used following inanimate referents to mark direction along a path or through an area. The perlative case marker is homophonous with one of the variants of the restrictive case marker =*dae(be)*.

(253)	*Nyongo* ***dae***	*ibnin*	*allo.*
	ɲoŋo=daj	ib-nin	aɽo
	road=PERL	go-PL	AUX.PRS.3DUS

‘They (two) are walking along the road.’
(T. (Kwalde) Jerry & Sowati, 2018 SE_PI035 #57.2)

Instrumental

The instrumental case clitic has two forms: =*(w)alle* /=(w)aɽe/ and =*(w)ane* /=(w)ane/. The form is realized with the (w) variant after vowel-final words and with the (w)=less variant elsewhere. The =*(w)alle* form is much more common than =*(w)ane*, which may be a borrowing from Taeme, in which it also serves as the instrumental case clitic.

The instrumental case functions with nominal phrases to (i) mark instruments in a clause, (ii) mark direction from some sources, (*e.g.*, from the mountain top, from morning to night, (254)), (iii) mark some comitative constructions, especially in the inclusive *bi...alle* phrase (255), and with kinship terms. Note that the instrumental case shares some functions with the ablative and comitative case clitics.

The instrumental case clitic is homophonous the word *walle* ‘water’ and the present tense auxiliary form =*alle* ‘AUX.PRS.2SGS’.

(254)

Manggo	*toko **alle***	*ada*	*dägagän*
maŋgo	toko=aɽe	ada	d-ə-gag-ən
mango	top=INS	like.this	REM-3NDUP-AUX.3SGP-REM.3SGA

nagda bom,
nag=da=bom
friend=CL.POSS=3.SG.ACC

‘From the top of the mango tree, he said to his friend,’
(T. (Tonzah) Warama, 2016c SE_PN001 #53.1)

(255)

Wendy bi	*Lulu **alle***	*Daru mi.*
wendi=bi	lulu=aɽe	daru=mi
Wendy=3.NSG.NOM	Lulu=INS	Daru=LOC

‘Wendy and Lulu (are) in Daru.’
(Zakae, 2018 SE_PI050 #307)

Purposive

The purposive case clitic has only one form: =*ma*. It functions with nominal phrases to (i) mark the purpose of an action. For example, in (256), the nominal phrase *pa* ‘bird’ serves as the purpose of the main verb *boväll* ‘we will go’.

(256)

Pa ma	*ako*	*boväll.*
pa=ma	ako	bo-bəɽ
bird=purp	also	fut-go.pl

‘We will also go [hunt] for birds.’
(J. (Jeks) Dareda, 2016b SE_PN009 #36)

This case clitic may also be used with infinitival verb forms (ii) to mark purposive subordinate clauses, much like function (i), see (257), (iii) to derive an action/state noun, (258), (iv) to derive an agent nominal, (259), and even (v) to derive an object nominal (260).

(257)

mägäll	*kab*	*llatnenatt alle*	*iatt*
məgəɽ	kab	ɽat-nen=aʈ͡ʂ=aɽe	i=aʈ͡ʂ
tulip.tree	bark	roll-PL=ABL=INS	weave=ABL

kollba	*gäddnan ma*
koɽba	gəɖ͡ʐ-nan=ma
fish	kill-PL=PURP

‘[A net is] woven with rolled tulip stringybark in order to catch fish.’
(T. (Tonzah) Warama, 2017b RE_EE001 #48)

(258)

Ibi ma da	*ddone*	*mulldae*	*gogon.*
ibi=ma=da	ɖ͡ʐone	muɽdae	ɡo-ɡ-on
walk=NMLZ=NOM	not	possible	REM-AUX-3SGS

‘Walking was impossible.’
(J. (Mado) Karea, 2016 SE_SN030 #51)

(259)

Ddia	*llɨg*	*ekaeka ma*	*dägazen.*
ɖ͡ʐia	ɽɪɡ	ekaeka=ma	d-ə-ɡazen
deer	child	make.noise=AGT	REM-3NDUP-take.out

‘I took out the deer call (the object that makes noise like a baby deer).’
(Sowati Kurupel, 2017a SE_PN024 #21)

(260)

Tame	*eka da*	*panypeny ma*	*dan.*
tame	eka=da	paɲpeɲ=ma	da-n
Taeme	language=NOM	speak=OBJ	COP.PRS-SGS

‘Taeme language is speakable (for me).’
(Wäziag, 2018 SE_PI062 #179)

Note that the allative case also functions to mark purposive nominal and verbal clauses, and the attributive case also functions to derive agent nominals from a verb. The purposive case clitic is homophonous with the word *ma* ‘house/place’.

Attributive

The attributive case clitic has two forms: =*ang* /=aŋ/ and =*ag* /=aɡ/. The rule by which some words take =*ang* and others take =*ag* has not been established. With nominal phrases, the attributive case functions to (i) mark an attributional relationship, (*e.g.*, *popang*, hole=ATT, having a hole). With non-nominal phrases, the attributive case may (ii) derive an agent nominal from a verb, (261), or (iii) mark manner subordinate clauses (*dinduag*, run=ATT, ‘while running).

(261)

Ngäma	*mäda*	*era*	*tamenyang*	*deya.*
ŋəma	məda	era	tameɲ=aŋ	deja
1.NSG.EXCL.POSS	father	FOC	teach=AGT	COP.PST.SGS

‘Our father was a teacher.’
(Soma, 2018 SE_PI046 #26)

Note that agent nominals may also be derived with the purposive clitic =*ma*. The attributive case clitic is homophonous with the word *ag* ‘morning’.

Privative

The privative case clitic has one form, =*meny* /=meɲ/, which surfaces as =*miny* /=miɲ/ after words with high final-vowels. With nominal phrases, the privative case functions to (i) mark an attribute that is absent (*e.g.*, *mällameny*, wife=PRIV, 'lacking a wife'). With non-nominal phrases, the privative case functions to (ii) mark manner subordinate clauses (*dändär-meny*, hear-PRIV, 'without listening').

The privative case clitic is homophonous with -*meny*, which is a plural pluractional suffix for conjugation class III and the plural form of the applicative suffix. The two forms differ however in that the privative case clitic is not [+nasal], while the pluractional and applicative suffixes are [+nasal] (see §4.2 for more on morphemic nasality).

Restrictive

The restrictive case clitic has three forms, =*aebe* /=ajbe/, =*dae* /=daj/ and =*daebe* /=dajbe/. The form =*aebe* occurs after pronouns and consonant-final words, but the rule by which some words take =*dae* and others take =*daebe* has not been established. The restrictive case functions to mark the adnominal or adverbial sense of 'only'.

(262)	*Ge*	*obəne*	*eka* ***daebe***	*bogo* ***aebe***	*eka de*
	ge	obəne	eka=dajbe	bogo=ajbe	eka=de
	this	3.SG.PST.POSS	story=RES	3.SG.POSS=RES	story=ACC
	llɨtnen	*eran.*			
	ɽɪt-nen	eran			
	tell-PL	AUX.PRS.3SGA>3SGP			

'It [is] only his story, only he is telling the story.'
(Sobam & Dareda, 2018 SE_PI039 #209)

Note that the restrictive case clitic combines with the basic copula to form a restrictive copula (*daeben*, *daebegeyo*, *daebeg*, etc.), see §A.3.1. The restrictive case clitic is homophonous with the perlative case clitic =*dae*.

Similative

The similative case clitic has two forms: =*ingoll* /=iŋoɽ/ and =*ngänäm* /=ŋənəm/. The two forms are in free variation, though =*ingoll* is much more common. The simulative case clitic functions with nominal phrases to mark a referent in which an argument has similarity, (263).

(263)

(263)	*Lla ngänäm*	*polle*	*dinignän.*
	ɽa=ŋənəm	poɽe	d-i-nig-n-ən
	man=SIM	fence	REM-weave-NSGA>PLP-DUR-REM.3SGA

‘She made fences like a man.’
(Rind, 2018 SE_PI057 #162)

This case clitic is homophonous with the word *ingoll* ‘face’ and the pronoun *ngänäm* ‘1.SG.ACC’.

Comitative

The comitative case clitic has one form, *=peyang* /=pejaŋ/, and functions with nominal clauses (i) to mark an accompanying argument (*e.g.*, with my brother, with anger, with a meaning), and (ii) to mark possession of some types (23), (24).

(264)	*Särasäremäll a*	*ddone*	*midd peyang*	*dan*	*o?*
	səɹasəɹeməɽ=a	d͡ʐone	mid͡ʐ=pejaŋ	dan	o?
	place.name=NOM	not	meaning=COM	COP.PRS.SGS	VOC

‘Doesn’t [the word] Särasäremäll have a meaning?’
(W. Geser, 2018a OE_SI004 #35)

(265)	*pa ngänäm*	*ddamba **peyang***	*a*	*llo*	*popo*	*nanenang*
	pa=ŋənəm	d͡ʐamba=pejaŋ	a	ɽo	popo	na-nen=aŋ
	bird=SIM	wing=COM	and	tree	flower	drink-PL=AGT

‘[A butterfly is] like a bird with wings and a drinker of tree flowers’
(T. (Tonzah) Warama, 2017b RE_EE001 #172)

Note that accompanying arguments may also be marked with the instrumental case or the basic conjunction *(w)a* ‘and’. Other possession relationships are marked with the possessive, past possessive, or close possessive case markers or by word order.

Emphatic

The emphatic case clitic has one form, *=wa* /=wa/, but forms a special pronoun, *beyawa* /bejawa/ ‘3.SG.NOM.EMPH’ when combined with the third singular nominative pronoun *bogo* /bogo/ ‘3.SG.NOM’ (cf. *ngäna=wa* (1.SG.NOM=EMPH), *ngämo=wa* (1.SG.POSS=EMPH), and so on).

The emphatic case clitic functions to mark emphasis or focus of some type, e.g., additive (266), emphatic (267), or contrastive (268).

(266) *Aya **wa**?*
aja=wa
who.SG=EMPH
'Who else?'
(Nakllae, 2018 SE_PI088 #149)

(267)

Mami,	*ngämo*	*moko da*	*ada*	*ngämo*	*bin a*
mami	ŋəmo	moko=da	ada	ŋəmo	bin=a
mom	1.SG.POSS	desire=NOM	that	my	name=NOM

*Wagiba **wa***	*bogon.*
Wagiba=wa	bo-g-on
Wagiba=EMPH	FUT-AUX-FUT.3SGS

'Mommy, I want my name to be Wagiba.'
(W. Geser, 2018f SE_PI047 #19)

(268)

Ede	*ngäna **wa***	*Ende*	*eka de*
ede	ŋəna=wa	ende	eka=de
so	1.SG.NOM=EMPH	Ende	language=ACC
eran,	*be*	*ngämo*	*lla da*
eran	be	ŋəmo	ɽa=da
AUX.PRS.1|3SGA>3SGP	but	1.SG.POSS	person=NOM
panypeny	*erag,*	*ngämi*	*era*
paɲpeɲ	erag	ŋəmi	era
speak	where.COP.PRS.PLS	1.NSG.NOM	where.COP.PRS.plS
Idi	*ekong*	*dag.*	
idi	ek(a)=oŋ	dag	
Idi	speak=AGT	COP.PRS.PLS	

'So, I speak Ende, but my people, we are Idi speakers.'
(Kukuwang, 2018 SE_PI063 #198)

Note that a form =*de* (homophonous with the accusative case clitic and one variant of the past singular copulative) is also used to mark focus or emphasis. This focus marker also has a unique 3.SG.NOM pronominal form (*bode*). Another copulative verb, *era(n)* 'where.COP.PRS.SGS', also seems to have focus functions. The emphatic case clitic is homophonous with the words *(w)a* 'and' and *wa* 'penis'.

A.5.2 Derivational morphology

There are at least two morphological processes that serve only derivational purposes: reduplication and the adverbalizer =*ae* /=aj/. Two case clitics, the attributive and the purposive, also derive new nominals, see above.

Reduplication

Reduplication is a common morphological strategy for deriving new nominals. Reduplication can be used to express a diminutive, proprietive, or plural relationship between the base form and the reduplicated form. Reduplication is also used to form adverbs from nominals. Reduplication is also a strategy to form infinitival verbs, see §4.2.

Table 56. Derivational nominal reduplication strategies

Strategy	Base form	Reduplicated form
Diminutive	*kup* /kup/ 'hole'	*kupkup* 'small hole'
	ttängäm /t͡ʂəŋəm/ 'garden'	*ttängämttängäm* 'small garden'
Proprietive	*bärke* /bərke/ 'parrot (red male, green female)'	*bärkebärke* 'algae (red and green color)'
Nonsingular number	*män* /mən/ 'girl'	*mänmän* 'girl.NSG'
	ulle /uɽe/ 'big'	*ulleulle* 'big.NSG'
Adverbial	*mer* /mer/ 'good',	*mermer* 'properly'
	mängal /məŋal/ 'strength, speed'	*mängamängal* 'quickly'
	kuddäll /kud͡ʐəɽ/ 'death'	*kuddällkuddäll* 'slowly'

Adverbializer =*ae*

The affix =*ae* /=aj/ is used to form adverbs from nominals, often in conjunction with adverbial reduplication.

(269) a. *mer* /mer/ 'good', *mermer* 'properly', *mermerae* 'properly'
b. *mängal* /məŋal/ 'speed', *mängamängal* 'quickly', *mängalae* 'quickly'
c. *kälakäle* /kəlakəle/ 'small.PL', *kälakälae* 'a bit'
d. *llame* /ɽame/ 'together', *llameae* /ɽameaj/ 'together'
e. *ulle* /uɽe/ 'big', *ullowae* /uɽowaj/ 'loudly, quickly'
f. *tonang* /tonaŋ/ 'careful', *tonangae* 'carefully'

It may seem strange to label a derivational affix as a clitic, as typically derivational morphology attaches to words (not phrases) before inflectional morphology and case clitics. However, this adverbalizer affix attaches outside of known case clitics, such as the locative clitic =*me* and the privative clitic =*meny* /=meɲ/, see (270) and (271).

(270)

Ubi,	***ngonomenyangmeae***	*gognegnän*
ubi	ŋono-meɲ=aŋ=me=aj	go-g-neg-n-ən
3.NSG.NOM	think-PL.APPL=AGT=LOC=ADV	REM-AUX-PL-DUR-3NDUS

'They went while asking them [think+applicative=ask].'
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #484)

(271)

Be,	*ubi*	*ttang*	***gällämnanmenyae***	*otät de*
be	ubi	t͡ʂaŋ	gəɽəm-nan=meɲ=aj	otət=de
but	3.NSG.NOM	hand	wash-PL.I=PRV=ADV	food=ACC
duwem	*anggan.*			
duwem	aŋgan			
eat.meal	AUX.PRS.3PL>3SG			

'But do they eat without washing their hands?'
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #369)

A.5.3 Phrasal syntax

I will discuss two types of phrasal structures of Ende in this section: nominal phrase structure and verbal phrase structure.

Nominal phrase structure

The nominal phrase consists minimally of a nominal head, typically a noun or a property noun, a noun that functions as an adjective or a noun. This nominal may combine in a compound construction with another nominal, or be modified by an adjective, a possessive phrase, a numeral, a quantifier, a determiner, or a locational nominal.

Ende does not have any articles, but if the numeral *ttongo* were reanalyzed as an indefinite article, as suggested by the data in (328)-(331), it would typically be prenominal, (272).

(272)

[Manggeya]	***ttongo***	*za*	*ulle de*	*ikop*	*dägagän.*
maŋgeja	t͡ʂoŋo	za	uɽe=de	ikop	d-ə-gag-ən
Manggeya	one	thing	big=ACC	see	REM-3NDUP-AUX.3SGP-3SGA

'[Manggeya] saw a big thing.'
(Sobam, 2007 WE_SN012 #2.4)

The order of adnominal demonstrative, such as *ge* 'this' and *diba* 'that', and the nominal head is demonstrative-noun.

(273)

Ge	*ekaklle*	*ulle me*	*gullem*	*sapasapang a*	*dadeg.*
ge	ekakɽe	uɽe=me	guɽem	sapasapaŋ=a	dade-g
this	land	big=LOC	snake	various=NOM	COP.exist-PRS.PLS

'In this big Earth, there are many types of snakes.'
(K. Dobola, 2007 WE_SN010 #1.1)

(274)

Kwalde	*mäse*	***diba***	*bägäl peyang*	*gongosän.*
kwalde	məse	diba	bəgəl=pejaŋ	go-ŋos-ən
Kwalde	try	that	bow=com	rem-return-rem.3sgS

'Kwalde tried to return with that bow.'
(M. Warama, 2007 WE_SN015 #6.2)

(275)

Dɨdɨr	*up*	*ttam a*	***diba***	*ik i*	*gozenän*
dɪdɪr	up	t͡ʂam=a	diba	ik=i	go-zen-ən
dry	banana	leaf=NOM	that	inside=ALL	REM-enter-REM.3SGS

‘He went inside those banana leaves.’
(R. Warama, 2016b SE_PN008 #42.1)

The order of numeral and noun may be either numeral-noun, noun-numeral, or even separated by an adnominal word, as shown in (276)-(278).

(276)

Komlla	*nag a*	*guinggoemenyneyo.*
komɽa	nag=a	gu-iŋgojmeɲ-n-ejo
two	friend=NOM	REM-make.jokes-DUR-REM.3NSGS

‘Two friends were making jokes.’
(Speaker unknown 2016 WE_PN034 #1.1)

(277)

“Bongo	*ddia*	***komlla*** *de*	*ikop*	*yaralle?”*
boŋo	ɖ͡ʐia	komɽa=de	ikop	yaraɽe
2.SG.NOM	deer	two=ACC	see	AUX.REC.2SGA>3DUP

‘Did you see the two deer?’
(Ben Danipa, 2007 WE_SN021 #2.1)

(278)

Tudi	*gognän*	*ge*	*kollba*	*ulle de*
tudi	go-g-n-ən	ge	koɽba	uɽe de
fish	REM-AUX-DUR-REM.3SGS	VOC	fish	big=ACC

deyaittän	***komlla.***
d-ej-a-it͡ʂ-ən	komɽa
REM-NSGP-RT.EXT-catch-REM.3SGS	two

‘He was fishing for a long time and caught two big fish.’
(Kaoga (Dobola), 2016 SE_PN006 #17.2)

Some adjectives must precede the noun, *e.g., ai* ‘good’ (279). Some adjectives must follow the noun, *e.g., ulle* ‘big’ (280). Some adnominal property words can precede or follow the noun, *e.g., komlla* ‘two’, (276)-(277). Nouns can be modified by both a preceding and a following adnominal property word (281). Moreover, adnominal property words can occur discontinuously (282).

(279)

llo	*toko me*	*giddollag*	*ddäddäg*	***ulle***
ɽo	toko=me	giɖ͡ʐoɽ=ag	ɖ͡ʐəɖ͡ʐəg	uɽe
tree	top=LOC	live=AGT	animal	big

‘a big animal that lives in the trees’
(T. (Tonzah) Warama, 2017b RE_EE001 #154.1)

(280)

Ai	*dirom a*	*gänyan*	*kuddäll*	*agan.*
aj	dirom=a	gəɲa-n	kud͡ʐəɽ	a-g-an
good	cassowary=NOM	here.COP-PRS.SGS	die	REC-AUX-REC.3SGS

‘A good [=big] cassowary died here.’
(Rowak, 2017 WE_PN035 #4.3)

(281)

Bongo	*ngämlle*	*nanttogalle*	***ai***	*za*
boŋo	ŋəmɽe	n-a-nt͡ʂog-aɽe	aj	za
2.SG.NOM	1.SG.DAT	REC-RT.EXT-give.SG-REC.2SGA	good	thing
***ulle** daebe*				
uɽe=dajbe				
big=RES				

‘You gave me only a good, big thing.’
(D. Kurupel, 2017 SE_SN033 #53.2)

(282)

***Up** de*	*adade*	*ikop*	*dägaeyo*	***wo***	*abal.*
up=de	adade	ikop	d-ə-ga-ejo	wo	abal
banana=ACC	like.this	see	REM-3NDUP-AUX.3SGP-3NSGA	ripe	very

‘They saw very ripe bananas.’
(R. Warama, 2016a RE_EN025 #8)

There are three ways of marking possession within a nominal phrase. The pragmatically unmarked order of adnominal possessor noun and possessed noun is possessor-possessed, (283). Moreover, adnominal possession can be marked by an affix on the possessor. For example, the third person possessive clitic =*bo* attaches to the possessor and precedes the possessed noun (284). Finally, adnominal possession can be marked by an affix on the possessed noun. For example, the close possessive clitic =*da* can attach as to possessed nouns (285)-(286). This clitic is restricted to kinship terms and can only mean ‘his’ or ‘her’.

(283)

Bogo	*mɨnyi*	***llo***	***ttam** alle*	*godräballe*
bogo	mɪɲi	ɽo	t͡ʂam=aɽe	go-drəb-aɽe
3.SG.NOM	will	tree	leaf=INS	REM-decorate-HAB.SGA

‘She would decorate herself with leaves…’
(W. Geser, 2017b RE_EN041 #7.1)

(284)

Kakayam	***pa bo***	***pite** da*	*mer*	*tutpi*
kakajam	pa=bo	pite=da	mer	tutpi
bird.of.paradise	bird=3.SG.POSS	tail.feathers=NOM	good	long.PL

dag.
da-g
COP-PRS.PLS
'The Bird of Paradise's tail feathers are very long.'
(T. (Tonzah) Warama, 2016b SE_EE025 #5.1)

(285)

Manggo	*toko alle*	*ada*	*dägagän*
maŋgo	toko=aɽe	ada	d-ə-gag-ən
mango	top=INS	like.this	REM-3NDUP-AUX.3SGP-REM.3SGA

***nagda** bom,*
nag=da=bom
friend=CL.POSS=3.SG.ACC
'From the top of the mango tree, he said to his friend,'
(T. (Tonzah) Warama, 2016c SE_PN001 #53.1)

(286)

Bogo	*ako*	***mälla da** bälle*	*bonttogän*
bogo	ako	məɽa=da=bəɽe	b-o-nt͡ʂog-ən
3.SG.NOM	then	wife=CL.POSS=3.SG.DAT	FUT-3NDUP-give.SG-FUT.3SGA

gullbe da
guɽbe=da
husband=CL.POSS
'Her husband would then give his wife some [food].'
(Zakae, 2016c SE_SN014 #11.1)

Pronominal possessive markers may also be used to mark possession. Typically, possessive pronouns precede the noun they modify, but they two may be disjoined within the utterance, (287).

(287)

Pätt a	*malla*	*obo*	*ulle*	*dan.*
pət͡ʂ=a	maɽa	obo	uɽe	da-n
body=NOM	not	3.SG.POSS	big	COP-PRS.SGS

'His body is not big.'
(K. Kidarga, 2018b SE_PI055 #163)

The adnominal collective universal quantifier *tämamae* 'all' can precede or follow the noun.

(288) ***Tämamae*** *wute endagaeya mermerae*
təmamaj wute enda-gajja mermeraj
all sore what.COP-PST.PLS properly
dänggllämnegän.
d-ə-ŋgɽəm-neg-ən
REM-3NDUP-clean-SG>PL-REM.3SGA
'She cleaned all the sores properly.'
(J. (Mado) Karea, 2016 SE_SN030 #55.1)

(289) *Llɨg* ***tämamae*** *bibi wiyamom!*
ɽɪg təmamaj bibi wija-mom
child all 2.NSG.NOM come.IMP-FUT.2|3PLS
'All you children, come!'
(T. (Tonzah) Warama, 2017c SE_SS082 #3.1)

(290) *Kollba da* ***tämamae*** *dadrowän a be*
koɽba=da təmamaj d-a-dro-wən a be
fish=NOM all REM-RT.EXT-die-REM.3SGS and but
kottllam aebe ttam dagirnän.
koʈ͡ʂɽam=ajbe ʈ͡ʂam d-a-gir-n-ən
turtle=RES live REM-RT.EXT-stay-DUR-REM.3SGS
'All the fish died, but turtle lived on.'
(T. (Tonzah) Warama, 2016e WE_PN012 #2.7)

Verbal phrase structure

With regards to verbal phrase structure, the pragmatically unmarked order of subject, object, and verb, is subject-verb in intransitive clauses and subject-object-verb in transitive clauses. One exception is the so-called experiencer object construction, in which the animate object precedes the inanimate, and often abstract, subject. In these constructions, the animate argument is marked with the accusative case and has less control or volition than a prototypical agent would have. The nominative subject is typically a feeling, like sleep, hunger, pain, or sickness.

(291) *Llɨg de yuna da dägnegän*
ɽɪg=de junu=da d-ə-g-neg-ən
child=ACC sleep=NOM REM-3NDUP-AUX-SG>PL-REM.3SGA
a gotaramän.
a go-otaram-ən
and REM-sleep.PL-3SGS
'The children felt sleepy and fell asleep.'
(K. Dobola & Kurupel (Suwede), 2007 WE_SN004 #7.1)

(292)	*Obom*	*eraeya*	*wätät*	*abal da*	*dägnän.*
	obom	erajja	wətət	abal=da	d-ə-g-n-ən
	3.SG.ACC	COP.where.PST.SGS	hunger	very=NOM	REM-3NDUP-AUX-DUR-3SGA

‘She was very hungry.’
(Sowati (Kurupel), 2016c SE_PN004 #26.1)

(293)	*Bam*	*tutu*	*kälngkäl me*	*ttäle*	*kakep a*	*nallan.*
	bam	tutu	kəlŋkəl=me	t͡ʂəle	kakep=a	naɽan
	2.SG.ACC	hill	climb=LOC	foot	pain=NOM	AUX.PRS.3SG>3SG

‘Are you tired from climbing the hill? [Has leg pain gotten you?]’
(T. (Tonzah) Warama, 2017a OE_SI003 #62)

(294)	*Oba*	*pu mi*	*biye de*	*ddone*	*itrel a*	*anggan.*
	oba	pu=mi	bije=de	d͡ʐone	itrel=a	aŋgan
	3.NSG.POSS	floating.garden=LOC	taro=ACC	not	sickness=NOM	AUX.PRS.3NSG>3PL

‘Diseases are not striking the taro in their floating garden.’
(T. (Tonzah) Warama, 2017b RE_EE001 #86)

Some verbs, such as *kam* ‘to start’, *ttamän* ‘to finish’, occur in phasal verb constructions and take verb clauses as arguments. In such constructions, the subordinate verb is in its infinitival form, occurs in preverbal position, and is marked with the accusative case, see (295).

(295)	*Ngäna*	*nyäroe de*	*dängkam.*
	ŋəna	ɲəroj=de	d-ə-ŋkam
	1.SG.NOM	creep=ACC	REM-3NDUP-start

‘I started to creep up.’
(Sowati Kurupel, 2017a SE_PN024 #17)

Because infinitival forms of the verb cannot host inflectional affixes, some inflectional categories of the subordinate clause may be hosted by the verb in the main clause. Compare the object agreement in the prefix of the verbs in the main clauses of (295) and (296). In (296), the subordinate clause has a third dual patient, and this is marked on the verb of the main clause.

(296)	*Llamda da*	*abo*	*ubim*	*ngonoenen de*
	ɽamda=da	abo	ubim	ŋonoj-nen=de
	old.man=NOM	then	3.NSG.ACC	ask-PL=ACC

deyangkamän.
d-ej-a-ŋkam-ən
REM-3DUP-RT.EXT-start-REM.3SGA
‘He started to question them [two].’
(R. Warama, 2016a RE_#EN025 #24)

Another example of this type of category raising happens if a subordinate event, such as *ibi* ‘to go’ has venitive or associated motion semantics. The prefix that marks the venitive is hosted on the verb in the main clause as the verb in the subordinate clause cannot host it, (297).

(297)

Ngäna	*obom*	*gänyaolle*	*ibi wi*	*tab*
ŋəna	obom	ɡəɲawɽe	ibi=wi	tab
1.SG.NOM	3.SG.ACC	here.ALL	go=ALL	promise

*d**i**ge.*
d-i-ge
REM-VEN-AUX.3SGP

‘I promised her to come.’
(W. Geser, 2017a OE_SI003 #72)

In non-phasal verb constructions, clausal objects do not usually occur in the same position as nominal objects. Clausal objects typically occur after the verb (SVO, (298)) whereas nominal objects typically occur before the verb (SOV, (299)). Short phrasal objects can appear before the verb, however, (300).

(298)

Yae	*ako*	*ada*	*eka*	*gogän*	*lla*
jaj	ako	ada	eka	go-g-ən	ɽa
mother	then	like.this	say	REM-AUX-REM.3SGS	person

ddägnanang	*gullem a*	*ade*	*dadeg.*
d͡ʐəg-nan=aŋ	guɽem=a	ade	dade-g
bite-PL=AGT	snake=NOM	also	exist.COP-PRS.PLS

‘My mother also said that biting snakes also exist.’
(K. Dobola, 2007 WE_SN010 #4.1)

(299)

Bogo	*ge*	*eka de*	*eka*	*gogon.*
bogo	ge	eka=de	eka	go-g-on
3.SG.NOM	this	word=ACC	say	REM-AUX-REM.3SGS

‘He said these words.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #251.5)

(300)

Matthew	*ao*	*eka*	*gogän.*
Mæθju	aw	eka	go-g-ən
Matthew	yes	say	REM-AUX-REM.3SGS

‘Matthew said yes.’
(M. Bodog, 2007 WE_SN013 #1.3)

The order of constituents is the same in main and subordinate clauses.

(301)

Ngäma	*kame*	*daeya*	*ada*	*käza*	*ulle da*
ŋəma	kame	da-jja	ada	kəza	uɽe=da
1.NSG.EXCL.POSS	ignorance	COP-PST.SGS	like.this	crocodile	big=NOM
walle	ik mi	daden.			
waɽe	ik=mi	dade-n			
water	inside=LOC	exist.COP-PRS.SGS			

‘We didn’t know that a big crocodile was in the water.’
(T. Dobola, 2016 SE_PN016 #26.1)

(302)

Kottllam bom	*amne*	*abal me*	*bod alle*	*mällam e*	*umllang*
koʈ͡ʂɽam=bom	amne	abal=me	bod=aɽe	məɽam=e	umɽaŋ
turtle=3.SG.ACC	center	very=LOC	mouth=INS	hold=ALL	tell
dägagän.					
d-ə-gag-ən					
REM-3NDUP-AUX.3SGP-REM.3SGP					

‘[The bird] told the turtle to hold [the stick] with his mouth in the very center.’
(T. (Tonzah) Warama, 2016e WE_PN012 #2.20)

(303)

Ddone	*aeya*	*umllang*	*gogon*	*ada*	*erowattäm*
ɖ͡ʐone	ajja	umɽaŋ	go-g-ən	ada	erowaʈ͡ʂəm
not	who	tell	REM-AUX-REM.3SGS	that	where.from
dan	*ge*	*za da*	*gogezän.*		
da-n	ge	za=da	go-gez-ən		
COP-PRS.SGS	this	thing=NOM	REM-come.out.PL-REM.3SGS		

‘No one said where these things came out from.’
(Speaker unknown, 2016b WE_PN033 #1.2)

Standard negation is marked by a non-inflecting word, *ddone*. A separate form, *malla* is used for negation of locational, existential, and nominal types of predication. Finally, a different negator is used for the imperative (prohibitive) form, *mudan*. These negation markers may be found clause-initially, -medially, or -finally.

(304)

Kottllam	*nindug,*	...	*llätt a*	***mudan**!*
koʈ͡ʂɽam	n-indug		ɽəʈ͡ʂ=a	muda-n
turtle	FUT.2SGA-run		stop=NOM	prohib.COP-PRS.SGS

‘Turtle, run! Don’t stop!’
(Sowati (Kurupel), 2016b RE_EN005 #12.1)

(305)

Lama	***ddone***	*kuddäll*	*gogon.*
lama	ɖ͡ʐone	kuɖ͡ʐəɽ	go-g-on
Lama	not	die	REM-AUX-REM.3SGS

‘Lama didn’t die.’
(Sowati (Kurupel), 2016c SE_PN004 #33.1)

(306)	*Oba*	*pu mi*	*biye de*	***ddone***	*itrel a*
	oba	pu=mi	bije=de	d͡ʐone	itrel=a
	3.NSG.POSS	floating.garden=LOC	taro=ACC	not	sickness=NOM
	anggan.				
	aŋgan				
	AUX.PRS.3PLA>3PLP				

‘Diseases did not strike the taro in their floating garden.’
(T. (Tonzah) Warama, 2017b RE_EE001 #86.1)

(307)	***Malla***	*bogo*	*iba*	*kullum me*	*dan.*
	maɽa	bogo	iba	kuɽum=me	da-n
	not	3.SG.NOM	1.NSG.INCL.POSS	group=LOC	COP-PRS.SGS

‘He’s not in our group.’
(Kurupel (Suwede) & Warama, 2009 WE_ET005 #538.1)

(308)	*Gudae*	***malla***	*säspen a*	*dadegaeya*	*be*	*ttägäll*
	gudaj	maɽa	səspen=a	dade-gajja	be	t͡ʂəgəɽ
	before	not	pot=NOM	EXIST.COP-PST.PLS	but	anthill
	ugnen.					
	ug-nen					
	oven.cook-PL					

‘Before, there were no pots, just anthill ovens.’
(Zakae, 2016b SE_SN013 #26.1)

(309)	*Sukul*	*ttoen a*	***malla***	*ttongdae*	*wik mi*	*daeya.*
	sukul	t͡ʂojn=a	maɽa	t͡ʂoŋgdaj	wik=mi	da-jja
	school	thing=NOM	not	one.RES	week=LOC	COP-PST.SGS

‘School wasn’t just one week.’
(R. Warama, 2007 WE_SN020 #2.1)

(310)	*Täre we*	*särämbae a*	*eraeya*	***malla***	*kälsre*	*ttoen*
	təre=we	sərəmbaj=a	era-eja	maɽa	kəlsre	t͡ʂojn
	feast=ALL	prepare=NOM	FOC-PST.SGS	not	little	thing
	daeya.					
	da-jja					
	COP-PST.SGS					

‘Preparing for the feast is not an easy task.’
(Zakae, 2016e WE_PN019 #5.10)

(311)	***Malla***	*ge*	*tongoeang*	*ttoen da*	*angesan.*
	maɽa	ge	toŋojaŋ	t͡ʂojn=da	a-ŋes-an
	not	this	laugh=ATT	thing=NOM	REC-happen-REC.1|3SGS

‘This was not a funny thing that happened.’
(Sowati (Kurupel), 2016a RE_EN004 #20.1)

(312) ***Ddone*** *ngämlle* *mulldae* *gogon* *tikop* *ttänttäm att a.*
d͡ʐone ŋəmɽe muɽdaj go-g-on tikop t͡ʂənt͡ʂəm=at͡ʂ=a
not 1.SG.DAT able REM-AUX-REM.3SGS heart heat=ABL=NOM
'I was not able to do anything because of the pain in my heart.'
(J. (Mado) Karea, 2016 SE_SN030 #48.1)

(313) *Oi* *walle* *Karama,* ***mudan*** *bongo* *darbänen a.*
oj waɽe karama muda-n boŋo darb-ənen=a
oh water Karama prohib.COP-PRS.SGS 2.SG.NOM decorate-PL=NOM
'Oh Karama water, don't decorate yourself!'
(Kurupel (Suwede), 2007 WE_SN009 #3.1)

There is an optional interrogative marker *ke* 'INT' that frequently occurs in second position or immediately preceding the verb, (314)-(315), but can also occur phrase finally, (316). This particle co-occurs with ignorative pronouns, which frequently occur in preverbal position, (317)-(318), but are also accepted in situ, (319).

(314) *Ngäma* *Dowabunang me* *gällall de* ***ke*** *ami*
ŋəma dowabunaŋ=me gəɽaɽ=de ke ami
1.NSG.EXCL.POSS Dowabunang=LOC pandanus.leaves=ACC INT who.NSG
dägäddaebeyo?
d-ə-gəd͡ʐ-ajb-ejo
REM-3NDUP-kill.PL-NSG>PL-3NSGA
'Who cut our pandanus leaves at Dowabunang?'
(M. Bodog, 2007 WE_SN013 #1.3)

(315) *Yowede* ***ke*** *gongesne?*
jowede ke go-ŋes-ne
why INT REM-make-DUR
'Why were you made like this?'
(Kurupel (Suwede), 2017a RE_EN044 #16)

(316) *Ngämo* *märäl a* *aenen* ***ke****?*
ŋəmo mərəl=a ajnen ke
1.SG.POSS size=NOM who.COP.PRS.SGS INT
'Who is my size?'
(Rind, 2018 SE_PI057 #92)

(317) *Gänyme* *nge* *kopnen ma* *patt de* ***aeya***
gəɲme ŋe kop-nen=ma pat͡ʂ=de ajja
here.LOC coconut scrape-PL=AGT long.object=ACC who.SG
dängkänän?
d-ə-ŋkən-ən
REM-3NDUP-pull.out.PL-REM.3SGA
'Who pulled out the coconut husker sticks?'
(T. (Tonzah) Warama, 2017b RE_EE001 #52.1)

(318)

Däbe	*bäne*	*banggu de*	***aeya***	*diwän?*
dəbe	bəne	baŋgu=de	ajja	d-i-wən
that	2.SG.POSS	headdress=ACC	who.SG	REM-weave-REM.3SGA

‘Who wove that headdress for you?’
(T. (Tonzah) Warama, 2017b RE_EE001 #70.1)

(319)

Enda	*bam*	*naddägan?*
enda	bam	n-a-ɖ͡ʐəg-an
what.NOM	2.SG.ACC	REC-RT.EXT-bite-REC.1|3SGA

‘What bit you?’
(J. (Jeks) Dareda, 2017a OE_SI003 #63)

Relative clauses may be unmarked (adjoined; (320)-(321)) or marked with a relative clause marker that agrees with the head of the clause in the nominative (322) or accusative (323) case. The relative clause markers may follow the noun (322)- (323), precede the noun (324), or the clause may be internally headed, (325)-(327).

(320)

Käza de	*ngämi*	*däbäddeya*	*ulle*
kəza=de	ŋəmi	d-ə-bəɖ͡ʐ-eja	uɽe
crocodile=ACC	1.NSG.EXCL.NOM	REM-3NDUP-kill.SG-REM.1|2NSGA	big
daeya.			
da-jja			
COP-PRS.SGS			

‘The crocodile that we killed was big.’
(J. (Jeks) Dareda, 2017a OE_SI003 #64)

(321)

Bogo	*pa de*	*naddägan*	*ngämäne*	*gäzatt de.*
bogo	pa=de	n-a-ɖ͡ʐəg-an	ŋəməne	ɡəz=aʈ͡ʂ=de
3.SG.NOM	bird=ACC	REC-RT.EXT-bite-REC.1|3SGA	1.SG.PST.POSS	kill=ABL=ACC

‘He ate the bird that I killed.’
(E. Baewa, 2017 OE_SI003 #65)

(322)

Däräng de	*bongo*	***ere***	*ikop*	*nägagalle*	*ngämo*
dərəŋ=de	boŋo	ere	ikop	n-ə-gag-aɽe	ŋəmo
dog=ACC	2.SG.NOM	REL.ACC	see	REC-3NDUP-AUX.3SGP-REC.2SGA	1.SG.POSS
dan.					
da-n					
COP-PRS.SGS					

‘The dog that you saw is mine.’
(J. (Jeks) Dareda, 2017a OE_SI003 #66)

(323) *Däräng a* *bam* ***era*** *da* *naddägan* *ngämo*
dərəŋ=a bam era da n-a-d͡ʐəg-an ŋəmo
dog=NOM 2.SG.ACC REL.NOM NOM REC-RT.EXT-bite-REC.1|3SGS 1.SG.POSS
dan.
da-n
COP-PRS.SGS
'The dog that bit you is mine.'
(J. (Jeks) Dareda, 2017a OE_SI003 #67)

(324) *Pollnen* *allan* ***era*** *däräng a* *ngämo* *dan.*
poɽ-nen aɽan era dərəŋ=a ŋəmo da-n
bark-PL AUX.PRS.3PLS REL.NOM dog=NOM 1.SG.POSS COP-PRS.SGS
'The dog that is barking is mine.'
(J. (Jeks) Dareda, 2017a OE_SI003 #68)

(325) *Bongo* ***ere*** *mälla de* *ikop* *nägagalle*
boŋo ere məɽa=de ikop n-ə-gag-aɽe
2.SG.NOM REL.ACC woman=ACC SEE REC-3NDUP-AUX.3SGP-REC.2SGA
ngämo *nag* *dan.*
ŋəmo nag da-n
1.SG.POSS friend COP-PRS.SGS
'The woman that you saw is my friend.'
(J. (Jeks) Dareda, 2017a OE_SI003 #69)

(326) *Bam* ***era*** *mälla da* *papa* *nagan* *ngämo*
bam era məɽa=da papa n-a-g-an ŋəmo
2.SG.ACC REL.NOM woman=ACC hit REC-RT.EXT-AUX-REC.1|3SGA 1.SG.POSS
nag dan.
nag da-n
friend COP-PRS.SGS
'The woman that hit you is my friend.'
(J. (Jeks) Dareda, 2017a OE_SI003 #70)

(327) *Ngäna* *nge de* ***ere*** *nänawan* *mokowang*
ŋəna ŋe=de ere n-ə-na-wan mokowaŋ
1.SG.NOM coconut=ACC REL.ACC REC-3NDUP-drink-REC.1|3SGA sweet
daeya.
da-jja
COP-PST.SGS
'The coconut that I drank was sweet.'
(J. (Jeks) Dareda, 2017a OE_SI003 #71)

A.6 Numerals

Much more can be said about all subclasses of nominals, but I will only provide some information about the numeral subclass below, as it is influenced by many languages and may be of regional interest. Following this, I will discuss the inflectional case clitics.

There are four sets of cardinal numbers in use in Limol: Ende numerals, a body-part counting system, yam counting numerals, and English numerals. The Ende numeral system is bound and goes up to six. It shares some similarities with a senary-based system, such as the yam counting numerals, except its use of *kumuddägakumuddäga* 'three-three' as a word for six indicates that the system would not be senary even if it were extended.

The body-part numeral system is also bound but goes up to nineteen. For use in quantifying objects, only *tupi* ‘four’, *mända* ‘five’, *gabɨn* ‘six’, and *ddäll* ‘ten’ occur in the corpus. Presumably, the Ende numerals for one to three block the use of the lower body-part numerals and the derived words for four, five, and six in the Ende numeral system are quite long. It is possible that higher body-part numerals were in use before the introduction of the English numerals.

The yam counting numerals are almost certainly borrowed from the *kämag* ‘west’ languages to the west of the Pahoturi region. It is a senary-based system used in highly ritualized yam counting traditions, as described in (Evans, 2009) and (Döhler, 2018) for Yam languages of the Morehead-Maro region. While many people can recite these yam counting numerals, I have never heard them used outside of elicited speech. Pahoturi River languages like Idi, which are in closer contact with Yam languages, use this numeral system more frequently. The fact that the same numerals are used in the restricted Ende system and the yam counting system suggests that either the restricted Ende system is a diminished form of the yam-counting system or that Ende only borrowed the senary power numerals from the west. Yam counting is not currently practiced in Limol, which may explain its rare usage.

Finally, the English numerals that have been borrowed wholesale into Ende are frequently encountered in everyday speech and are almost exclusively used for numbers greater than three.

Table 86: Numeral systems in use in Limol

Number	Ende	Body-part	Yam	English
1	*ttongo*	*tɨrangesa* 'pinky'	*ttongo*	*wan*
2	*komlla*	*nɨtkin* 'ring finger'	*komlla*	*tu*
3	*kumuddäga*	*kllatollma* 'middle finger'	*komlla a ttongo duma*	*tri*
4	*komlla komlla* 'two-two'	*tupi* 'pointer'	*komlla komlla*	*po*
5	*komlla komlla a ttongo duma*	*mända* 'thumb'	*komlla komlla a ttongo duma*	*paeb*
6	*kumuddäga kumuddäga* 'three-three' or *komllaebme komllaebme komllaebme* 'two-two-two'	*gabɨn* 'wrist'	*putt*	*siks*
7		*ttangkum* 'elbow'		*seben*
8		*matta* 'shoulder'		*eit*
9		*ngam* 'breast'		*naen*
10		*ddɨll* 'chest'		*ten*
11		*apte ngam* 'other breast'		*eleben*
12		*apte matta*	*komlla putt* 'two-six'	*tuwelb*
13		*apte ttangkum*		
14		*apte gabɨn*		
15		*apte mända*		
16		*apte tupi*		
17		*apte kllatollma*		
18		*apte nɨtkin*		
19		*apte tɨrangesa*		
36			*pärta*	*teti siks*

Number	Ende	Body-part	Yam	English
216			*taromba*	*tu andredd wa sebenti siks*
1,296			*damona*	*wan taosen wa naenti siks*
7,776			*waramakae*	*seben taosen wa seben andredd wa sebenti siks*

Ordinal numerals (second, third, fourth) can be formed with the Ende numerals and the allative clitic =*we*. The form for first, *ngattong*, is irregular. In the case of fourth, the allative is repeated along with the word for two. There are no examples of fifth or sixth in the corpus.

Table 87: Ordinal numerals

Number	Ende numeral	Ordinal numeral
1	*ttongo*	*ngattong (e)* /ŋaʈ͡ʂoŋ/
2	*komlla*	*komlla we*
3	*kumuddäga*	*kumuddäga we*
4	*komlla komlla*	*komlla we komlla we*

Ttongo ‘one’ is the most frequent numeral in the corpus as it is also used to introduce indefinite nominals, (328). *Ttongo* can also mean ‘next’ (329) or when used with *ako* ‘again’, *ttongo* can mean ‘another’ (330). It can also be used with abstract non-countable nouns, as with ‘happiness’ in (331).

(328)

Ttongo	*mälla*	*ause bo*	*bin a*	*Madima,*
ʈ͡ʂoɲo	məɽa	ause=bo	bin=a	Madima
2.SG.DAT	food=ACC	fire.cook	name=NOM	Madima
Kinykiny	*ttängäm me*	*deya.*		
kiɲkiɲ	ʈ͡ʂəŋəm=me	deja.		
Kinkin	village=LOC	COP.PST.SGS		

‘There was an old woman named Madima who lived in Kinkin.’
(W. Geser, 2017d SE_PN023 #6.2)

(329)

Ttongo	*ag me,*	*llamda da*	*gudae*	*dallän*
ʈ͡ʂoɲo	ag=me	ɽamda=da	gudaj	da\ɽ/ən
one	morning=LOC	old.man=NOM	early	REM-RT.EXT-go.SG-REM.3SGS

‘The next morning, the old man left early.’
(R. Warama, 2016a RE_EN025 #17)

(330) *Ddob* *kakab de* *ako* *dowattälleya* *ttongo*
ɖ͡ʐob kakab=de ako d-o-waʈ͡ʂəɽ-eja ʈ͡ʂoŋo
some leftover=ACC again REM-3NDUP-put.PL-REM.1|2NSGA one
ebdo we.
ebdo=we
day=ALL
'We left the leftovers for another day.'
(Sowati Kurupel, 2017a SE_PN024 #73.3)

(331) *Kili da* *ttongo* *ddone.*
kili=da ʈ͡ʂoŋo ɖ͡ʐone.
happiness=NOM one no
'There is no happiness.'
(K. Kidarga, 2018c SE_PN033 #40)

Inflected forms of *ttongo* include *ttongda* 'one.NOM', *ttongdae* 'one.EXCL (only one)', and *ttongottongo alle* 'one~one=INS (one-by-one)'. Inflected forms of *komlla* 'two' include *komllaebe* 'two.EXCL (only two)'. Both *komllakomlla* and *komllaebmae* can mean 'both'.

Other words for numbers include *ttongo ttang llɨpɨt* 'one hand' for five and *komlla ttang llɨpɨt* 'two hand' for ten. There is one example in the corpus of the Ende numeral *komlla* 'two' combining with the English numeral *ten* 'ten' to make twenty.

(332) *Mänmän a* *komlla* *ten* *ada* *gotbanegän*
mən~mən=a komɽa ten ada go-tba-neg-ən
PL~girl=NOM two ten like.this REM-prepare-REM.3PLS
'Twenty girls were getting ready.'
(Wäziag, 2016b SE_SN018 #2)

A.7 Familial features

The Pahoturi River family comprises at least six named varieties that are spoken in the mid-eastern area of the South Fly. This area extends at least as far west as Idi-speaking Sibidiri (-8.95778, 142.24079), as far north as Taeme-speaking Kondobol (-8.53085, 142.51207), as far south as Agob-speaking Sigabaduru (-9.32339, 142.60889) and as far east as Em-speaking Kibuli (-8.8812, 142.78599), see Map 1 on page 123. Known varieties within the family are Agob, Em, Ende, Idi, Kawam, and Taeme. This list differs from sources such as Evans et al. (2018) and Lindsey (2017a), as more information is learned about the area. The list may never be complete as some Pahoturi River varieties have already been lost, even in recent history (M. (Lynette) Bewag, 2018 #112; Kurupel (Suwede), 2018d #140-146; Zakae, 2018 #189; Schokkin, p.c.).

Table 88: Names, villages, and sources for Pahoturi River language varieties

Variety	Other names (as provided by Ende speakers)	Known villages with speakers
Agob	*Pawaturi eka* (after the Pahoturi river)	Seme, Ngawo, Berr, Wamorong, Buzi, Sigabaduru, Adamorang, Dug, Kodoro (Mororang)
Em	*Agäb* (/æɡəb/), *Pawaturi*, *Apang* (/apaŋ/)	Kibuli, Kurunti, Beyambod
Ende	*Iba eka* (our language), *Keiti eka* (village name)	Limol, Malam, Kinkin
Idi		Dimsisi, Dimiri, Sibidiri
Kawam	*Wim eka* (village name)	Wim, Kapal, Beyambod
Taeme	*Yao eka* (*yao* means ‘no’ in Taeme), *Kondobol eka* (village name)	Kinkin, Kondobol, Bok, Kuiwang

I use the term language varieties to remain agnostic to the divide between language and dialect until further work is done on the family. While I am comfortable classifying Idi and Ende as distinct languages, further classifications require more data from the other four varieties. Traditionally, the family has been treated as a dialect continuum with Idi and Taeme at one end and Agob and Ende on the other (Simons & Fennig, 2018). Comparative data below suggest that Kawam and Em are closer to Agob and Ende. Ende speakers classify each Pahoturi River variety as an individual *eka* just as they do with unrelated languages such as Bitur, Motu, Tok Pisin, and English (e.g., Kurupel (Suwede), 2018d SE_PI052 #115). Moreover, when asked about language mixing in a Sociolinguistic Questionnaire collected in 2018, many speakers gave examples of mixing with other Pahoturi River varieties (e.g., Kawam and Taeme, see J. (Jeks) Dareda, 2018c #189-194) as well as mixing with English (Frank, 2018b #175).

(333) In response to the question “What do you think about language mixing in Limol?”, Pingam Wäziag replies:
Ngäna adingnoll ŋonomeny allan ada, “Bibi ewede Tame peyang panynen eralle, Tame eka peyang? Be Ende eka da era sapang dan.”
‘This is what I think about that, “Why are you all speaking mixed with Taeme language? Ende language is different (than Taeme).”’
(Wäziag, 2018 SE_PI062 #321)

On the other hand, when meeting a Kawam speaker, Ende speakers often reassured me saying, *bogo iba eka de panypeny eran* ‘she speaks our language’. In the ensuing exchange, Ende speakers will continue to speak Ende, and the Kawam visitor will speak in Kawam. Similarly, when I interviewed an Em speaker who had long settled in Limol, he struggled and laughed when trying to pronounce words “the Ende way”, indicating that this Em speaker likely never accommodated his pronunciation for Ende speakers, at least in cognate words (Galwe, 2017). These observations, coupled with the comparative data below, suggest that many of the linguistic varieties are mutually intelligible, but are actively kept conceptually separate by the linguistic community.

A.7.1 Phonemic inventory

The table below organizes the consonant inventories of the six Pahoturi River varieties. Divergences of note are listed in the footnotes.

Table 89: Pahoturi River consonant inventories

	Bilabial	Alveolar	Retroflex	Palatal	Velar	Labial-velar
Plosive[42]	p b	t d			k g	k͡w g͡bʷ[43]
Affricate			ʈ͡ʂ ɖ͡ʐ[44]			
Nasal	m	n		ɲ	ŋ	
Fricative		s z		ʃ ʒ[45]		
Tap or flap		r/r	ɽ[46]			
Approximant				j		w
Lateral approximant		l		ʎ[47]		

A.7.2 Lexicon

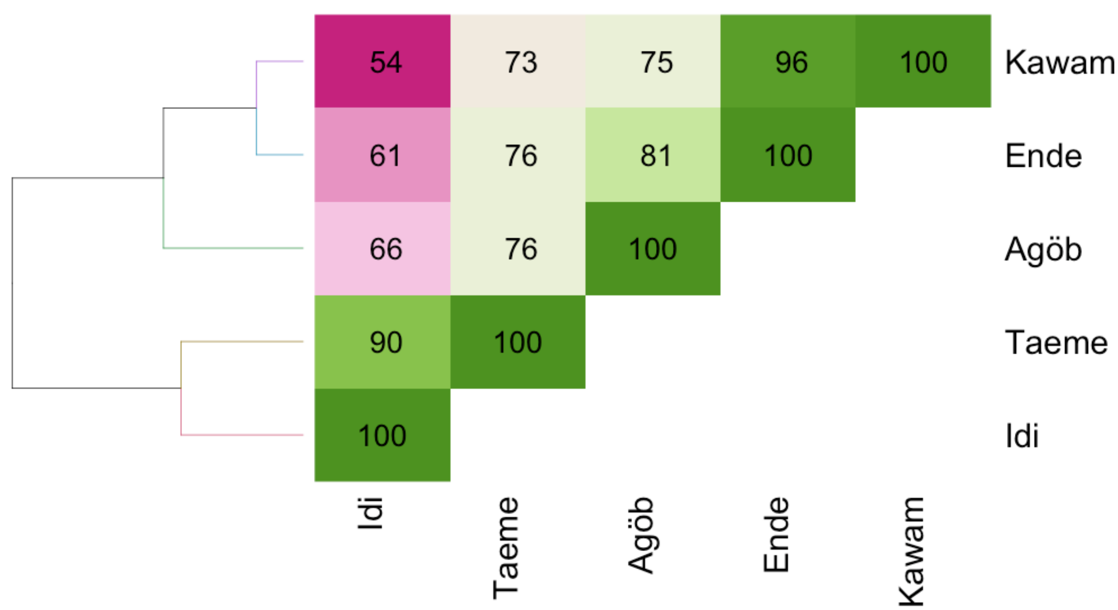
In order to better understand the familial relationships between the Pahoturi River varieties, I gathered wordlist data for all six varieties. I used the Yamfinder Lexical Database survey, which includes 338 words that are relevant specifically to the region of Southern New Guinea (Carroll et al., 2016). In 2017, D. Schokkin, M. Ellison, and I did a pairwise comparison of all comparable lexemes of five of the Pahoturi River varieties: Kawam,

[42] All Pahoturi River varieties show evidence of floating nasal or prenasalization patterns (depending on one’s analysis). Ende, Kawam, Em, and Agob allow floating nasals or prenasalization before voiceless and voiced obstruents. Idi and Taeme only allow these before voiced obstruents.
[43] Only Idi and Taeme have labialized velar plosives.
[44] All Pahoturi River varieties except Kawam have retroflex obstruents.
[45] Only Kawam has palatal fricatives.
[46] Agob, Em, and Ende have retroflex tap.
[47] Only Idi and Taeme have palatal laterals.

Ende, Agob, Taeme, and Idi (Ellison et al., 2017). Each lexeme pair (e.g., Ende *llo* /ɽo/ 'tree' and Idi *lu* /lu/ 'tree') was marked for relative cognate status: exact cognate, non-exact cognate, or non-cognate. Comparing each of the lexemes across each of the language varieties gives us an idea of the lexical similarities, and possibly the historical relationships, within the family.

As represented by the tree structure on the left of Figure 9, these preliminary data point to a first-order split between the western Pahoturi River varieties (Idi and Taeme) and the eastern Pahoturi River varieties (Agob, Ende, and Kawam). The bright green corner in the bottom left indicates a high level of similarity between Idi and Taeme (90%, based on shared cognates). The bright green corner in the top right indicates a high level of similarity between Kawam and Ende (96%). Agob patterns with Ende and Kawam. The bright pink through the middle indicates that Idi is the most different lexically from the eastern branch of the Pahoturi River languages. This is likely due to the close influence of the non-related Yam family just to the west of where Idi is spoken.

Figure 9: Lexical comparison within the Pahoturi River family (Ellison et al., 2017)



A.7.3 Morphology

The following table contrasts the various case clitics known to exist in both Ende and Idi. Data for Ende and Idi are based on large corpora and extensive fieldwork (for Idi, this was done by Dineke Schokkin, see Schokkin (2015)), whereas the data for Em, Kawam, Agob, and Taeme, are more preliminary. Data for these languages were gathered by translating the 21 sentences in Table 91 into each of the languages by a bilingual speaker living in Limol in 2018. Thus, these data are potentially biased by the speaker's other language(s), especially Ende, and may be incomplete. For example, these varieties may have more case markers or more variants than were encountered in the elicitation. Much more work is needed on these languages. There are many interesting patterns in Table 90, but perhaps one of the most interesting idiosyncrasies is the merger of nominative and accusative (or patient) marking in Idi, where both nominative and accusative inanimate arguments are marked with the same clitic *=a*. The nominative/accusative pattern is found elsewhere in the language, for example in animate marking and the pronominal paradigm. Schokkin uses the term core case for this neutralized marker.

Table 90: Nominal case morphology in Pahoturi River languages

	Ende	Em	Kawam
Nominative (subject or agent)	=(d)a	=(d)a (SG), =ja (NSG)[48]	=da
Inanimate patient	=de	=de	=de
Animate patient	=bom (SG), =bim (NSG)	=de	=bom (SG)
Recipient	=bəɽe (SG), =bira (NSG)	=bəɽe (SG), =bira (nsg)	=bəre (SG)
Beneficiary	=bəɽe (SG), =bira (NSG)	=bəɽe (SG), =bira (nsg)	=bəre (SG)
Instrument	=aɽe	=aɽoŋ	=aroŋ
Comitative	=aɽe, pejaŋ	=aɽoŋ	=aroŋ
Possessor	=bo (SG), =(j)aba (NSG)	=bo (SG)	=bo (SG)
Past possessor (source)	=bəne (SG), =(a)bajne (NSG)	=bo (SG)	=kom
Animate locative	=bo patme (SG) =(j)aba patme (NSG)	=bo səreme	=bo sərme
Inanimate locative	=me	=me	=me
Animate allative	=bo pate (SG), =(j)aba pate (NSG)	=bo səre	=bo səre
Inanimate allative	=(w)e	=we	=we
Animate ablative	=bo patat͡ʂ (SG), =(j)aba patat͡ʂ (NSG)	=bo sərat͡ʂ	=bo səre aʃ
Inanimate ablative	=(w)at͡ʂ, =aɽe	=(w)at͡ʂ	=(w)aʃ
Perlative	=daj	=daj	

[48] At least for the noun *ɽabo* 'man'.

Proprietive	=aŋ/ag	=n	=aŋ
Privative	=meɲ	=meɲ	=meɲ
Restrictive	=dajbe	=daj	=daj
Similative	=iŋoɽ, =ŋənəm	=iŋoɽ	=iŋor
	Agob	Taeme	Idi
Nominative (subject or agent)	=(d)a (SG), =ja (NSG)[49]	=(d)a	=a
Inanimate patient	=de	=de	=a
Animate patient	=da=bom	=de	-m
Recipient	=da=bəɽe	-m, =de	-m, =blæ
Beneficiary	=da=bəɽe	=ble (SG)	=blæ
Instrument	=anoŋ	=(w)ane	=ændæ
Comitative	=anoŋ, =da=bo pejaŋ	=aloŋ	=aloŋ ~ =ala, peaŋ
Possessor	=bo (SG)	=bo (SG)	=bo (SG), =ba (NSG)
Past possessor (source)	=bo (SG)	=bəne	=bænæ (SG), =bana (NSG)
Animate locative	=bo pætme / =da pætme	=bo pəlme	
Inanimate locative	=me	=me	=mæ
Animate allative	=da pæte	=ble pəlwe	=pætæ
Inanimate allative	=we	=we	=awa
Animate ablative	=da pætaʈ͡ʂ	=bo pəlaʈ͡ʂ	
Inanimate ablative	=(w)aʈ͡ʂ	=aʈ͡ʂ	=aʈa, =ændæ
Perlative	=dibi	=e	=e
Proprietive	=aŋ	=aŋ	-aŋ/-æg
Privative	=meɲ	=meɲ	=mnd
Restrictive	=dibi	=dəbe	=dæbe
Similative	=ŋanoŋ	=ŋane	=ŋanda

Table 91: Example sentence for each nominal case

Case marker	Ende example	English translation
Subject	*Lla **da** dugiwän.*	The man stood up.
Agent	*Lla **da** up de notan.*	The man ate a banana.
Inanimate patient	*Lla da up **de** notan.*	The man ate a banana.
Animate patient	*Lla da mälla **de** ikop nagan.*	The man saw the woman.
Recipient	*Lla da nge de mälla **bälle** dottongän.*	The man gave the coconut to the woman.
Beneficiary	*Lla da mälla **bälle** wätät de yu dägagän.*	The man cooked for the woman.
Instrument	*Lla da giri **alle** nokowan.*	The man cut with a knife.
Comitative	*Lla da mosen da **peyang** deyareyo.*	The man went with his brother.
Possessor	*Lla **bo** ttängäm da ulle dan.*	The man's garden is big.
Past possessor	*Lla **bäne** eka da mer dan.*	The man's words are good.
Animate locative	*Lla da Wagiba **bo patme** dan.*	The man is at Wagiba's.

[49] At least for the noun *ɽabo* 'man'.

Case marker	Ende example	English translation
Inanimate locative	*Lla da ma **me** dan.*	The man is <u>in the house</u>.
Animate allative	*Lla da mälla **pate** ibi allan.*	The man walks <u>towards the woman</u>.
Inanimate allative	*Lla da ma **we** ibi allan.*	The man walks <u>towards the house</u>.
Animate ablative	*Lla da mälla **bo patatt** ibi allan.*	The man walks <u>from the woman</u>.
Inanimate ablative	*Lla da ttängäm **att** ibi allan.*	The man is from the village.
Perlative	*Lla da nyongo **dae** ibi allan.*	The man walks <u>along the road</u>.
Proprietive	*Nge da koko **wang** dan.*	This is a coconut <u>with shoot</u>.
Privative	*Nge da koko **meny** dan.*	This is a coconut <u>without shoot</u>.
Restrictive	*Lla da sana **daebe** otät allan.*	The man is eating <u>only sago</u>.
Similative	*Lla da bärke **ngänäm** bandra allan.*	The man sings <u>like a parrot</u>.

Table 92-Table 95 organize the personal pronouns in each of the Pahoturi River languages in the nominative, accusative, dative, and possessive cases. Across the paradigms, many patterns surface that suggest further segmentation of the pronouns is possible. For example, there is a prevalence of /-m/ in the accusative case, /-ɽe/ and /-re/ in the dative case, and /-o/ and /-a/ in the genitive case. Also, notice how the Idi forms differ quite dramatically from the other five languages, not only in form but in paradigmatic structure. For example, Idi and Taeme collapse the number distinction between the second person and third person pronouns in the nominative case, but not in the other three cases. Formally, Idi differs in that many forms with initial-/ŋ/ in the other five languages are truncated or noncognate in Idi. The Idi data were provided by D. Schokkin (p.c.).

Table 92: Nominative personal pronouns in Pahoturi River languages

Referent	Ende	Em	Kawam	Agob	Taeme	Idi
I 1.SG	ŋəna	ŋəna	ŋəna	ŋəna	ŋən	ŋən
you 2.SG	boŋo	boŋo	buŋo	boŋo	bæ	bæ[50]
s/he 3.SG	bogo	bogo	bo	bo	bo	bo
we 1.EXCL.NSG	ŋəmi	ŋumi	ŋəmi	ŋumi	ŋəmi	bi
we 1.INCL.NSG	ibi	ibi	ibi	ibi	jɪbi	jəbi
you all 2.NSG	bibi	bibi	bibi	bibi	bæ	bæ
they 3.NSG	ubi	ubi	ubi	ubi	bo/wɪbi	bo/ubi[51]

[50] *Boŋgo* is encountered on a few occasions in spoken data, but said to have emphatic meaning (D. Schokkin, p.c.).
[51] *Ubi* is encountered in spoken speech but never in elicitation (D. Schokkin, p.c.)

Table 93: Accusative personal pronouns in Pahoturi River languages

Referent	Ende	Em	Kawam	Agob	Taeme	Idi
I 1.SG	ŋənəm	ŋənam	ŋonom	ŋənam	ŋənəm	bom
you 2.SG	bam	bæm	bæm	bæm	babom	babom
s/he 3.SG	obom	obom	obom	obom	obom	obom
we 1.EXCL.NSG	ŋəmim	ŋumim	ŋəmim	ŋənam	ŋəmim	bim
we 1.INCL.NSG	ibim	ibam	ibim	ibom	jɪbim	jəbim
you all 2.NSG	bibim	bæm	bibim	bæm	bibim	bibim
they 3.NSG	ubim	obæm	ubim	obam	ubim	ubim/wəbim

Table 94: Dative personal pronouns in Pahoturi River languages

Referent	Ende	Em	Kawam	Agob	Taeme	Idi
I 1.SG	ŋəmɽe	ŋəmɽe	ŋəmre	ŋɵmɽe	ŋəmʎæ	blæ
you 2.SG	babɽe	babɽe	bæbre	bæɽe	bæbʎe	bæblæ
s/he 3.SG	obɽe	obɽe	obo	obɽe	obʎe	oblæ
we 1.EXCL.NSG	ŋəmira	ŋumra	ŋəmira	ŋɵmra	ŋəmʎi	bli
we 1.INCL.NSG	ibra	ibra	ibra	ibra	jɪbʎi	jəbli
you all 2.NSG	bibra	babra	bibra	bæra	bibʎi	bibli
they 3.NSG	ubira	obra	ubira	obra	ubʎi	ubli

Table 95: Possessive personal pronouns in Pahoturi River languages

Referent	Ende	Em	Kawam	Agob	Taeme	Idi
I 1.SG	ŋəmo	ŋəmo	ŋomo	ŋɵmo	ŋəmo	bo/bænæ
you 2.SG	bəne	bəne	bəne	bəne	bənæ	bənæ
s/he 3.SG	obo	obo	obo	obo	obo	obo/obænæ
we 1.EXCL.NSG	ŋəma	ŋəma	ŋəma	ŋəma	ŋəma	ba
we 1.INCL.NSG	iba	iba	iba	iba	jəba	jəba
you all 2.NSG	bina	bina	bina	bina	bəna	bəna
they 3.NSG	oba	oba	oba	oba	wəba	oba

A.7.4 Kinship

The next two tables illustrate additional paradigmatic differences across the language family. In the Pahoturi River family, sibling terms are differentiated for relative age only for same-sex relations, while this age distinction is collapsed for cross-sex relations.

Table 96: Sibling terms in Pahoturi River languages

Relation	Ende	Em	Kawam	Agob	Taeme	Idi
male’s older brother (meB)[52]	mosen	mosen	mosen	mosen	mosen	mosən
male’s younger brother (myB)	məɲan	moɲen	məɲan	moɲen	məɲan	məndʒən
male’s older sister (meZ)	mən	mon	mon	mon	məʎbæ	məʎpæ
male’s younger sister (myZ)	mən	mon	mon	mon	məʎbæ	məʎpæ
female’s older brother (feB)	maŋ	maŋ	maŋ	maŋ	maŋ	maŋg
female’s younger brother (fyB)	maŋ	maŋ	maŋ	maŋ	maŋ	maŋg
female’s older sister (feZ)	mosen	mosen	mosen	mosen	mosen	mosən
female’s younger sister (fyZ)	məɲan	moɲen	məɲan	moɲen	məɲan	məndʒən

There is a paradigmatic split across the family with regards to grandkin terms. In Agob, the terms are reciprocal: *masar* is used for grandfather and a male’s grandchild while *kakai* is used for grandmother and a female’s grandchild. In Taeme, the terms are not reciprocal and do not distinguish gender: *kwak* is used for grandparents and *kak* is used for grandchildren. Ende, Em, and Kawam exhibit an intermediate stage between these two systems. Terms for grandfather are optionally reciprocal: *masar* is used for grandfather and may be used for a male’s grandchild. The term for grandmother is *kak*, and the term for a female’s grandchild (or optionally a male’s) is *kok*.

Table 97: Grandkin terms in Pahoturi River languages

Relation	Ende	Em	Kawam	Agob	Taeme	Idi
male’s child’s child (mCC)	kok (masar)	kok (masar)	kok (masar)	masar	kwak	kak
female’s child’s child (fCC)	kok	kok	kok	kakai	kwak	kak
parent’s father (PF)	masar	masar	masar	masar	kak	kak
parent’s mother (PM)	kak	kak	kak	kakai	kak	kak

A.7.5 Other work

Work on the Pahoturi River languages includes the following linguistic projects: Nicholas Evans’ fieldwork on Idi as spoken in Bimadbn and his collaboration with Wasang Baiio on a Field Methods course using Idi as the target language at the LSA Institute in 2011 (archived in Evans, n.d., and informing Evans 2012a; Evans et al., 2018); Volker Gast’s fieldwork on Idi as spoken in Sibidiri (Barth & Evans, 2017; Evans et al., 2018; Gast, 2013,

[52] Abbreviations used in this section include the following: B = brother; C = child; D = daughter; e = elder; f = female ego; F = father; H = husband; m = male ego; M = mother; S = son; X = exchange; W = wife; y = younger; Z = sister. For example, meB indicates a male ego’s elder brother.

2014, 2015a, 2015b, 2017a, 2017b); Philip Tama's fieldwork on Taeme (informing Evans et al., 2018); Dineke Schokkin's fieldwork on Idi as spoken in Dimsisi and Bimadbn (archived in Schokkin, 2014, and informing Ellison et al., 2017; Evans et al., 2018; Schokkin 2015, 2016, 2018; Schokkin & Lindsey, 2018; Schokkin & The Idi Language Committee, 2019); my own fieldwork on Ende as spoken in Limol (archived in Lindsey 2015, and informing Brickhouse & Lindsey, 2020; Ellison et al., 2017; Evans et al., 2018; Evans, Lindsey, & Schokkin, 2019; Gonzalez, Travis, Grama, Barth, & Ananthanarayan, 2018; Lindsey, 2017a, 2017b, 2017c, 2018a, 2019a, 2019b,; Strong, Lindsey, & Drager, 2019), Catherine Scanlon's fieldwork on Ende as spoken in Limol (archived in Lindsey, 2015; and Scanlon, 2018a, and informing Scanlon 2018b, 2019), and Lauren Reed's fieldwork on Ende as spoken in Limol (archived in Lindsey, 2015; and informing Reed & Lindsey, n.d.). This work was predated by areal survey work done by Stephen Wurm (archived in Wurm, 1955, and informing Ross, 2005; Wurm, 1975) and a short sketch on Idi verbal morphology from an unknown source, likely Tom and Robin Coleman during their short stay in Dimsisi in 1988 (Unknown, 1988).

A.8 Regional features

Though the Pahoturi River language family is currently considered to be a maximal family-level isolate, meaning that the family cannot be reliably shown to be related to any other family, there are some linguistic features that appear to permeate the greater geographical area of southern New Guinea (Evans et al., 2018, p. 738). The Pahoturi River languages match this typological profile which includes such features as (i) no tone, (ii) double agreement on verbs, (iii) a system of verbal morphology, in which information is distributed, constructive, and cumulative, (iv) a complex tense system, with two or more inflectional past tense values, (v) a complex aspectual system organized around momentaneous vs. durative rather than ongoing vs. completive, (vi) complex number agreement in verbs, with at least three and often four number values, (vii) split alignment system for intransitives, and (viii) limited or no gender.

This geographic typological profile has been informed by ongoing work in the area, notably in the Yam family of languages by Nicholas Evans' fieldwork on Nen as spoken in Bimadbn (archived in Evans, n.d., and informing Barth & Evans, 2017; Ellison et al., 2017; Evans 2009, 2012a, 2012b, 2014, 2015a, 2015b, 2017, 2019a, 2019b; Evans et al., 2017, 2018; Evans & Miller, 2016), Jeff Siegel's fieldwork on Nama as spoken in Daraia, Mata, and Ngaraita (informing Siegel 2014, 2017, *to appear*; Ellison et al. 2017; Evans et al. 2017), Jenny Lee's fieldwork on Ranmo as spoken in Yenthoroto and Menggeti (archived in Lee, 2013, and informing Lee 2014a, 2014b, 2014c, 2015a, 2015b, 2015c, 2015d, 2015e, 2016d, 2016e, 2016c, 2016b, 2016a), Matthew J. Carroll's fieldwork on Ngkolmpu as spoken in Yanggandur and other Yam languages (informing Carroll, 2016, 2017; Evans et al., 2018, 2017), Christian Döhler's fieldwork on Komnzo as spoken in Rouku (informing Döhler, 2018; Evans et al., 2018, 2017), and Eri Kashima's fieldwork on Nmbo as spoken in Gubam, Bebdeben, and Arovwe (informing Ellison et al., 2017; Evans et al., 2018; Kashima, Williams, Ellison, Schokkin, & Escudero, 2016).

This profile has also been informed by work done on Trans New Guinea, including Bruno Olsson's fieldwork on Coastal Marind as spoken in the villages of Wambi and Duhmilah (informing Evans et al., 2018; Olsson, 2017), Charlotte van Tongeren's fieldwork on Suki (informing Evans et al., 2018), and Phillip Rogers' fieldwork on Bitur as spoken in Upiara and Abom (archived in Rogers, 2018; and informing Rogers, 2016, 2017; Evans et al., 2018).

Finally, this profile is enriched by studies of language family isolates, such as Tina Gregor's fieldwork on Yelmek and Maklew as spoken in Wanam (informing Evans et al., 2018).

Appendix B: Cultural profile of Ende

Written by Kate L. Lindsey, with contributions from Grace Maher and Elizabeth Conlan

Da ngäna ulle bog, ngäna mɨnyi bablle sana de bäkämne.
‘If I were big, I would squeeze sago for you.’
- Michaelin, Kares Soka’s six-year-old child

B.1 Environment and geography[53]

Ende is spoken primarily in the three villages of Limol, Malam, and Kinkin, as indicated on Map 1 on page 123.

These settlements are spread out over an area of 45 square miles or 116 square kilometers dominated by the five main branches of the Bituri River. The Bituri River plays a significant role in Ende life as a source of food and method of transportation.

The general area can be divided into four ecoregions: *tawa* ‘swamp’, *ap* ‘savannah, grassland’, *wälläng* /wəɽəŋ/ ‘bush’, and *enddäna* /enɖ͡ʐəna/ ‘clear places’. The swampy areas cluster around the Bituri River and its tributaries that flow in a generally northward direction to the great Fly River. In these wet areas grow *sana* /sana/ ‘sago’ trees, a cherished year-round staple food crop for the Ende tribe. These wet areas are also a home for many types of *pa* ‘birds’, *kollba* /koɽba/ ‘fish’, *kätt* /kəʈ͡ʂ/ ‘shellfish’, *käza* /kəza/ ‘crocodiles’, and other reptiles. The grasslands spread out from the rivers and contain both wooded areas and large grassy areas that are renewed annually through controlled burning during the dry season. The savannah is more sparsely populated by wildlife than the bush but is known to be a home for *ttall* /ʈ͡ʂaɽ/ ‘wallaby’, *ddia* /ɖ͡ʐia/ deer, *kubiag* ‘Papuan Black snake’, and other snakes and reptiles. The bush is densely wooded and populated by *dirom* ‘cassowary’, *sɨmell* /sɪmeɽ/ ‘pig’, and *kubull* /kubuɽ/ ‘bush wallaby’. The largest trees are cut to build *ma* /ma/ ‘houses’ and *gall* /gaɽ/ ‘canoes’.

Unlike the tropical rainforests to the north, the climate of this area of New Guinea is characterized by stark monsoon and dry seasons.

[53] The organization of this section is modeled after Hannah Sarvasy’s cultural introduction in her grammar of Nungon (Sarvasy, 2017a).

B.2 Settlements

The village of Limol is mobile and moves between different settlements. The current settlement of Limol is *Kurupel täräp* /kurupel tərəp/ or KT (*Keti*) /kejti/, shown on Map 1 on p. 123. Limol villagers moved to KT from the settlement of *Kibobma*, which was located approximately five kilometers to the west in the early 1990s. Before that, Limol was located in *Llimoll ma kuddäll* /ɽimoɽ ma kuɖ͡ʐəɽ/ 'Old Limol', which was approximately seven kilometers to the east of KT. Villagers moved from Old Limol to Kibobma around 1940. Kibobma is near the swamp, and those who were born there suggest its proximity to the river as the reason for the move. The move to the current settlement in KT was motivated by a desire to be closer to the gardens (W. Geser, p.c.). The name *Kurupel täräp* /Kurupel tərəp/ comes from the name *Kurupel*, referring to Kurupel Suwede, an important man in the village, and the word *täräp*, a hunter's amassment of tokens, like jawbones, which represent the number of animals he has killed. At the time when Limol village was relocated to *Kurupel täräp*, Kurupel Suwede was regarded as one of the most successful hunters and was often staying at this site where Biku (Madura) Kangge had made a camping place (K. Dareda, 2018). The site quickly became the happy medium between the gardens and the river.

In 2018, there was again talk of moving the village closer to the river. This may also be motivated by the longstanding drought in the area and the poor hunting yield that year.

B.3 Demography

According to local census data, there were 284 residents in Limol village in 2014 (Table 98; Sowati Kurupel, p.c.). We can estimate a similar population size in the Ende village of Malam and about half this size in the mixed Ende/Taeme village of Kinkin. Thus, a low estimate of the Ende tribe population is about 700, and a high estimate would be closer to 1000 (J. (Jeks) Dareda, 2016a #6).

Table 98: 2015 Limol census (Summary; Sowati Kurupel, p.c.)[54]

Demographic	Size	Percentage (of total)
Total	284	100%
Men	127	44.7%
Women	157	55.3%
0-13	74	36.7%
14-29	70	26.2%
30-45	59	22.1%
46-61	23	8.6%
62+	17	6.4%

Data from the 2014 Limol Census and the Sociolinguistic Questionnaire survey indicate that the demographic makeup of Limol is shifting as people may be living longer. While many of the oldest community members surveyed related that their grandparents, and even their fathers, had died before they were born, the youngest surveyed often live with their grandparents. Of the oldest members in Limol, many have great-grandchildren. According to the 2014 census, the average family size is six, ranging from single adults to families of 12 in one household.

B.4 Language ideology and multilingualism

Komlla eka da ako mer dan.
‘Two languages are better (than one).’
- Gladys Mado (2018 #186)

The type of multilingualism practiced in Limol and the general Pahoturi River area has been described as egalitarian, in which no one language has greater prestige or power than any other. Most people in Limol speak between three and four languages comfortably and may understand or know words and phrases from many other regional languages. Commonly spoken languages in Limol besides Ende include English, Gogodala, Kawam, Taeme, Em, and Bitur. Typically, children learn the language(s) of both their parents and grandparents, the language of the place they live or go to school, and the language of schooling, usually English.

[54] Birthdates are missing for 17 people. Age percentages are calculated out of 267.

Language is passed patrilineally from father to children. This means that speakers who grow up outside of their father's homeland may claim a language that they do not speak or understand as their language.

There are many signs that language and place are deeply connected, much like language ideologies to the west (Kashima, 2019) and the south in Australia. For example, to ask someone what language they speak, speakers do not use the copulative meaning 'what', but the copulative meaning 'where' (see §A.3 on copulatives).

(334) *Bäne* *eka da* *eran?*
bəne eka=da era-n
2.SG.POSS language=NOM COP.where-PRS.SGS
'What (where) is your language?'

When people discuss languages, village names and language names are used interchangeably. Someone who speaks Kawam, the language of a place called Wipim, may say that they speak *Wipim eka* 'Wipim language' or *Kawam eka* 'Kawam language'.

B.5 Special types of language

B.5.1 Public oration

There is a special type of public oration performed within the Ende community called *kawa*. Nowadays, the verb *kawa* is used most often to refer to the preaching performed by Christian pastors delivering religious instruction. It is also used in the Ende translation of the Book of Mark to refer to the type of preaching that Jesus did on the streets and to the multitudes (Kurupel (Suwede) et al., 2009). However, *kawa* is a practice that predates the Christian missionization of the mid-1900s. *Kawa* is a type of public oration, in which members of the community, particularly those in positions of respect or leadership, instruct other members of the community in best practices for living a good life (W. Geser, p.c.). This public speech may take place outside one's home, in a public square, while walking along the village paths, or even in front of the home of the intended recipient of the instruction. Often, these speeches take place early in the morning (between 3am and 5am) after the first birds start to call. Sometimes, *kawa* is performed in the evenings after the sun has set (around 6pm), when families are in their homes having the evening meal. Less regularly, speakers will perform *kawa* in the heat of the moment (*e.g.,* after discovering a garden theft) or at large public town halls. I did not observe this type of oration being performed from inside of one's home in an argumentative type fashion, as observed elsewhere in Papua New Guinea, *e.g.* by D. Kulick (1992, 1993).

The content of the speech may be informative (*e.g.*, *tomorrow, we are collecting logs to build the school house*), instructive (*e.g.*, *early morning and during rainfall are good times to go hunting*), admonishing (*e.g.*, *our women and children are sick, why haven't you finished building the health post?*), or persuasive (*e.g.*, *the best thing for our community is to build an airstrip*). Depending on the linguistic repertoire of the speaker and the intended audience, the speech may be monolingual or involve heavy code-switching. I have observed how a *kawa* performer translated his speech into English while passing by my house. Religious speeches may quote the bible extensively in Ende or in English.

Quite often, *kawa* is performed at a distance from the intended recipient. Thus, the speech may include phonological and morphological features of a Call-at-Distance form, similar to the Nungon Call-at-Distance form observed by H. Sarvasy (2017a, pp. 106–109, 2017b). The Call-at-Distance form is located at the end of an utterance and entails final vowel lengthening, the addition of /-oː/, and often a rise in pitch (W. Geser, 2017c; G. Jerry, 2016a, 2016b, 2016c, 2016d, 2016e). For example, at distance *mer ag* 'good morning' is pronounced /mer agoː/ and *mer iddob* 'good night' is pronounced */mer id͡ʐoːb/*. This Call-at-Distance form is not only available for use in *kawa*, but in any interaction in which the listener is not visible or at some distance away.

B.5.2 Names of people

Ende speakers often have many names. At birth, names are given from the parents, but also from relatives and friends of the family. Often people give one of their own names or a family name to the child to establish a namesake relationship or to grow a name's lineage (Sobam, 2018b #23-24). Sometimes a special namesake ceremony is performed, in which the two namesakes are not allowed to see each other until a feast and presents are prepared. Then the older namesake can greet the baby and present a gift. Namesakes do not call each other by name but by *binang* /binaŋ/ or *nadum* 'namesake'. *Nadum* is often simplified to *adu* for small children. Other popular names include *mabun* 'clan' totems, such as *Bunkuttang* /bunkuʈ͡ʂaŋ/ 'catfish' or *Ttall* /ʈ͡ʂaɽ/ 'wallaby'. Children may also be given names of other significance, for example, a baby born on Christmas was named *Kris*. People may also choose names for themselves: a woman from the place *Pingäm* /piŋəm/ gave herself the name *Pingäm* (Wäziag, 2018). Finally, many people have an additional Christian or English name. For example, Pastor Karea Mado gave himself the name Matthew or *Meteas* when he became a disciple for the church (K. Mado, 2018b #15). It is not uncommon for children in the same family to share a name (M. (Matthew) Bodog, 2018 #11-19; Paul (Joanang), 2018 #186). For official purposes, speakers give their biological or adopted father's name as their second name, but these are not used in everyday speech.

B.5.3 Terms of address and name avoidance

Addressing relatives by name, especially relatives by marriage, is currently avoided and used to be strictly forbidden (W. Geser, 2015 #7; Nakllae, 2018 #13-16). This taboo extends beyond the actual relative to any person, or object, bearing their name.[55] Thus, there are many ways to address someone besides calling out one of their names. One may use a kinship term to refer to a relative, for instance, *kok* 'daughter-in-law'. Parents are often addressed by their relationship to one of their children, for instance, *Winson bo mäg* 'Winson's mother'. Other terms of address include *mabun* 'clan' names such as *käza* 'crocodile' or *daeyag mälla* 'daeyag woman', occupations such as *polis* 'police' or *rikoda* 'recorder', or even salient characteristics such as *gabma mälla* 'white woman'. One particularly creative nickname is the use of *Westan Prabäns* 'Western Province' for a man with the same initials, Warani Pewe. Over time, these alternative forms of address become codified, and people may even include them in their own list of names (for example, W. Geser, 2018f #7).

There are many names for places. Place names can be very descriptive, *e.g.*, 'the place where Kidarga slept' or quite simple, *e.g.*, 'the road to Kibobma'.

B.5.4 Speaking to children

Adults often use a separate phoneme inventory and vocabulary when speaking to children. Retroflex affricates and fricatives tend to be replaced with alveolar stops, and liquids /r/

[55] This can be quite difficult as many people are named after common plants or animals, such as *Karamapopo* /karamapopo/ 'swamp flowers' and *Ttall* /ʈʂaɽ/ 'wallaby'.

and /ɽ/ tend to be elided or replaced with the lateral /l/. Syllables also tend to assimilate in form. A selection of words and their child-directed counterparts is listed in Table 99.

Table 99: Examples of child-directed speech

Ende (standard)	Ende (child-directed)	Meaning
mer ag	*mel ag*	'good morning'
nadum	*adu*	'namesake'
däräng /dəɾəŋ/	*deng* /deŋ/	'dog'
otät /otət/	*mama*	'food'
kapu	*papu*	'carry'
ddäddäg /d͡ʐəd͡ʐəg/	*tata*	'meat'
susu	*tutu*	'breastmilk'
inu	*anu*	'go to sleep'
Gres	*Gles*	'Grace'

Children also play with language, sometimes speaking in *tongoe eka* 'silly language' with their friends. Children are raised by many people: their parents, grandparents, older siblings, and relatives. In this way, they get more varied input during their early years. Many families are multilingual, especially in Taeme, Kawam, Bitur, and Gogodala, and this is apparent in child-directed speech as well, as mothers or fathers talk to their children in multiple languages.

B.6 Agriculture and subsistence

Written and included with permission by Elizabeth Conlan

Limol village (Lat -8.64 Long 142.69) relies on subsistence farming with everyone from children to the elderly participating in agricultural activities such as clearing land, planting, and harvesting. Gardens are spread throughout the forests and marsh areas around the village, as well as in the village, and are often differentiated by the predominant crop grown in the garden. All agricultural cultivation activities, including soil preparation, planting, and harvesting are done by hand. The agricultural systems are rain-fed and extremely low input with supplemental fertility limited to leaves and other organic matter while a couple of native plants are used as pesticides. The staple crops are yams (*Dioscorea spp.*), sago palm (*Metroxylon sagu*), taro (*Colocasia esculenta*), banana (*Musa spp.*), and coconut (*Cocos nucifera*). Other important crops include sweet potato (*Ipomoea batatas*), cassava (*Manihot esculenta*), squash (*Cucurbita spp*.), and pineapple (*Ananas comosus*).

B.6.1 Wet season gardening

Yam garden – *Mätta ttängäm*

The primary agricultural system is slash and burn; an area of forest is burned, and a new garden is built for one harvest, then is left to regrow and not used again. The most essential garden for food supply is the yam garden, which is not located near the village. During the 2016 season, the yam garden was located about an hour and fifteen-minute walk from Limol village. This garden is subdivided by family but is often shared by the village. However, some gardens are shared by the whole village and some by just several families. Musato Giwo (p.c., 2016) said that yam garden work was harder than other garden work because it involves clearing vegetation, planting, weeding, and harvesting.

During the *yäbäd* (/jəbəd/ 'sun') season (October) men search for a site deemed suitable for a yam garden, which is usually assessed by the presence of certain indicator plants. Yams require good soil on high ground and cannot be planted in the *ap* 'grassland' (M. Giwo, p.c.). Once a site has been selected men will begin cutting down small trees followed by big trees (W. Geser, W. Warama, and R. Warama, p.c.). The trees too large to be chopped down with the available axes remain standing. Men then wait one to two weeks for the cleared area to dry out before returning to burn the area (W. Geser, W. Warama, and R. Warama, p.c.). The clearing fire is initiated from the side where the fence entrance will go. If the area is not clear enough after the first burn, men will return to burn the area again.

Several different species of yams are cultivated with differentiation between the species. The two largest groups of species grown are *D. esculenta* and *D. alata*, *mätta* /mə͡ʈʂa/ and *galbe*, respectively. Varieties of yams, along with other cultivated plants, are given names. Thirty-two varieties of *mätta*-type yams and twenty-two varieties of *galbe*-type yams have been recorded (B. Zakae and Sowati Kurupel, p.c.). Three varieties of yam are classified as neither *mätta* or *galbe*; they are *bogobogo*, *mutae* /mutaj/, and *pongoll* /poŋoɽ/. Yams are differentiated by the presence or absence of thorns, presence or absence of bulbils (*maeya /majja/*), yam size, flesh color, and abundance of root hairs.

The *mätta ttängäm /mə͡ʈʂa ͡ʈʂəŋəm/* 'yam garden' is the area of the garden where mostly yams are grown. *Goeg* /gojg/ is the other area of the garden where families might grow banana, taro, pumpkin, or maybe cassava or pineapple. E. Conlan observed that yams tend to be planted in the most level sections of the garden and the hillside/slope in the yam garden had more bananas and cucurbits.

Figure 10: View of the yam garden showing the yam vines covering poles, other crops intercropped among the yams, and large, fire-damaged trees that remain from burning the area.

Yams, pumpkin (*pamker*), watermelon (*wayati* /wajati/), and aibika (Ende: *mompel*; Species name: *Abelmoschus manihot*) are planted first, with pumpkins reaching maturity before other crops. The garden also includes taro (*biye* /bije/), banana (*up*), and cucurbits. Planting (*mätta ibeny* /mət͡ʂa ibeɲ/) occurs in the Ende month of *sis*, around

November. Planting is primarily the work of women, but men and children help. Girls begin helping their mothers with planting when they are six, and older girls are given their own row to plant (M. Giwo, p.c.). Planting involves loosening up the soil with a spade and making mounds (*po*) where the yams are planted. While women are focused on planting yams and other crops, men will collect sticks from the forest to build a fence that surrounds the entire garden (W. Geser, R. Warama, and W. Warama, p.c.). Fencing is important to keep animals such as wild pigs and deer from eating and destroying the crops.

The yam garden is weeded periodically, and when the vine emerges from the mound, sticks are collected for use as stakes (*dade* /dade/) for the yam vine to grow up. The growing season is punctuated by several stages of development. During the *bib* /bib/ season, the growth of the yam tubers causes the soil to break, at which point more soil is added to the mound (Kaoga Dobola and Manaleato Kolea, p.c.). The next important stage of yam growth development occurs when the yam vine is at the top of the *dade* and begins to wind around it; this is called *ttälma popoang /t͡s̺əlma popoaŋ/* and people say *mätta da zäme zeg allan* /mət͡s̺a da zəme zeɡ aɽan/ 'the yam is born already'. At this stage, the plant has grown sufficiently for immature yams to have formed (Jerry (Jeks) Dareda, p.c.). This is followed by the vine having wound all around the *dade* and the yams multiplying and poking through the ground in a stage called *pipmawang* /pipmawaŋ/ 'the beehive stage'. The *pipmawang* stage is a sign that it is time to begin checking the *mätta* 'yams' to see if they are ready to harvest (J. (Jeks) Dareda, p.c.).

Harvest occurs over a few months, primarily from May through July, with some of the harvested yams brought back to the village for immediate consumption and others being stored in the *gaguma* /ɡaɡuma/ 'yamhouse'. Yams are harvested by digging with a hand, knife, or digging stick (*ibik* /ibik/), which reduces the risk of injury to the root. The first yam harvest of the year (*dadal* /dadel/) is a significant event in the village. When the early season yams are ready to be harvested, the community will plan a day for everyone to go to the garden to harvest. On the first day of yam harvesting, all the women from the village will walk to the garden in a single-file line, with strong women at the front and back and menstruating or pregnant women left behind in the village. Upon their return, the women will walk in reverse order, with the morning leader returning last. Yams are cleaned with banana leaves and tree bark, placed along the road to show the harvest of the day, and visitors are welcomed (K. Dobola and Manaleato Kolea, p.c.). Everyone will greet the yams by saying *mätta sebor e* /mət͡ʂa sebor e/ 'yams, welcome' because the yams have been in the ground for many months (J. (Jeks) Dareda, p.c.) Yams are then cooked in a traditional oven (ttägäll */t͡ʂəgəɽ/*) and eaten with coconut (K. Dobola and Manaleato Kolea, p.c.) Everyone contributes a portion of their first harvest as a tithe for the church, for church leaders, and the elderly and disabled (W. Geser, R. Warama, and W. Warama, p.c.). Subsequent harvesting is done at one's own pace and is primarily done by women (W. Geser, R. Warama, and W. Warama, p.c.). When the yam leaves begin to dry out, in a stage called *tapnenang* /tapnenaŋ/, the rest of the yams are harvested and brought to the yamhouse (J. (Jeks) Dareda, p.c.)

In the *gaguma* 'yamhouse', yams are stacked on top of tree bark covering the ground. Yams can be stored until around late December (Christmas). However, if the yam harvest is very big, the supply of yams can last almost the entire year (K. Dobola and Manaleato Kolea, p.c.). In addition to yams stored as food, some yams are stored as planting material for the following season (W. Geser, R. Warama, and W. Warama, p.c.). If a yam is damaged in part, it will be kept for planting (K. Dobola and Manaleato Kolea, p.c.).

The yam crop is at risk from insects (*mättmätt* /mət͡ʂmət͡ʂ/) that make holes in the yams, and other wildlife such as wild pigs, bushfowl, and bandicoots. Too much rain can also cause yams to spoil and rot. Sometimes drainage is dug to limit the risk of pooling water (K. Dobola and Manaleato Kolea, p.c.). Drought can also kill plants, in which case the village relies heavily on sago and swamp gardens.

Many other plants including squash, banana, taro, sweet potato (*nae* /naj/), sugarcane (*wäll* /wəɽ/), and cassava (*manika*) are also planted in yam gardens. Squash and watermelons are planted from seed in areas of the *ma ttängäm* /ma t͡ʂəŋəm/ 'home garden' where there is space. In addition to the squash fruit, young squash leaves (*wutt* /wut͡ʂ/) are eaten as a green. Squash pests include bandicoots. Seeds of squash and watermelon are saved for subsequent plantings; after harvest they are washed, dried, and stored until the next planting.

Some varieties of banana are only planted in yam garden areas because the soil quality is better in the *mätta ttängäm* and they do not grow as well near houses (S. Karao, p.c.). Bananas are propagated by suckers. Bunches of ripening fruit are sometimes covered with old netting or leaves to keep birds away.

Cassava is often planted in its own smaller gardens (*manika polle /manika poɽe/*) in the forest. One to four stem pieces (*kutt /kut͡ʂ/*) are planted (M. Giwo, p.c.). Cassava varieties can be distinguished by stem color. Roots are harvested when the seeds begin to form.

Sago areas – *Sanawang*

Sago palms are planted around multiple creeks and swamp areas near Limol village. Sago is not planted in other gardens unless the area is beside a creek. Swamps are never created for the purpose of cultivating sago (W. Warama, G. Pewe, and K. Kidarga, p.c.). Sago areas are called *sanawang* /sanawaŋ/. The sago in these areas belongs to those in the village with historical ties to Limol. Most sago palms that are used for food are planted specifically for this purpose. Wild sago are called *du sana*. These sago were "not planted by human beings and have been there since the world beginning."

Figure 11: Creek area planted with sago palms near Limol village.

Sago varieties are named and there are about 20 different names for sago grown and consumed around Limol village. These names may correspond with as many as 20 distinct varieties, or they may reflect different names by people from nearby villages. Sago varieties are differentiated by characteristics including spinescence, pith color and texture, leaf shape, and plant size.

Sago suckers (*däm /dəm/* or *käng* /kəŋ/) are planted by digging a hole with a large stick (*ibek*), partially filling the hole with organic matter like tree leaves and short sticks, and then covering the sucker with soil (W. Warama, G. Pewe, and K. Kidarga, p.c.). The area around the planting is cleared of trees and grass to minimize fire damage risk and is maintained before the start of the dry season every year. Sticks are placed around a new planting to prevent it from being dug up by wild pigs. Planting occurs every year and only during the wet season (J. Ben Danipa and K. Dobola, p.c.).

Families often find different creeks for planting sago to avoid ownership disputes. People will mark their creek area to indicate that it belongs to someone, often by planting a *yure* /jure/ variety of sago at one end and a *bisel* variety of sago at the other end of their plantings (M. Giwo, p.c.). The owner of the tree is the person who planted it or the child for whom it was planted, and the owner gets to decide with whom the sago is shared. Parents will often plant sago for their children as palms can take up to 15 years to mature (M. Giwo, p.c.; W. Warama, G. Pewe, and K. Kidarga, p.c.).

Sago growth stages are described by the size of the palm, the emergence of the apical shoot, and the growth and maturity of the inflorescence. Seven developmental stages were described with some stages having multiple names (M. Giwo, p.c.).

(335) *Developmental stages of sago* (M. Giwo, p.c.)

1. *Källamitang* /kəɽamitaŋ/ - sago growth stage when the root has developed following planting and the plant is about one meter tall
2. *Sana wuttang* /sanawuʈ͡ʂaŋ/ - sago growth stage when the plant is about three meters tall and is growing
3. *Dwelsära* /dwelsəra/ or *Pättang* /pəʈ͡ʂaŋ/ - sago growth stage when the palm is almost ready to harvest and the leaves are shorter
4. *Täpgazenatt /təpgazenaʈ͡ʂ/* - sago growth stage when the shoot (*täp* /təp/) emerges indicating that it is time to harvest

5. *Ddageddage* /ɖ͡ʐageɖ͡ʐage/ - sago reproductive structure and can also describe the growth stage when the inflorescence has emerged. The *ddageddage* stage can be subdivided into the early stages of inflorescence development when they are small, called *bädmaol* /bədmawl/, and the latter stage when they are large called *käzabun* /kəzabun/.
6. *Gwaga* /gwaga/ - sago growth stage when there are mature fruits on the *ddageddage.* This stage is undesirable for harvesting as the pith is drier and the yield will be less than in previous stages. *Gwaga käp /gwaga kəp/* also refers to the sago fruit.
7. *Pllulleaga* /pɽuɽeaga/ or *Yɨdmeny* /jɪdmeɲ/ - final sago growth stage describing a plant that will not yield any starch if chopped down

People know that a sago palm is ready to harvest when the shoot emerges and is visible (J. Ben Danipa and K. Dobola, p.c.). Harvest labor is traditionally divided by gender with men chopping down the palm and peeling off the leaf sheaths with an ax, both genders beating the pith to break it down into smaller pieces, and women washing the sago which involves rinsing, kneading, and straining the pith fibers to extract the starch (J. Ben Danipa and K. Dobola, p.c.). The beating or pounding process is done sitting down. The washing process requires women to use their feet to squeeze the starch through a plant fiber bag (W. Geser and R. Warama, p.c.).

Tools used to process sago include a beating stick (*abor),* a squeezing bag (*nyukukum* /ɲukukum/), a container to collect the sago starch (*käg /kəg/*), and a shell for scooping water (*kakoll* /kakoɽ/). The *abor* is made from *wadar* cane and held from the longer end. The *käg* is made from the stalk of the sago plant and is hung over a fire to be dried out. Sago starch that has been beat with the *abor* and is ready to be washed is called *sana taya* /sana taja/ and then *sana konkonmatt taya /sana konkonma͡ʈʂ taja/* after the squeezing process is complete.

Figure 12: Sago processing tools. From top left, clockwise: abor 'beater', wadar cane, nyukukum 'squeezing bag', käg 'container', and kakoll 'coconut shell'

Sago starch is stored in bags made of reeds or wrapped in sago leaves. This "flour" should be eaten within 1-2 months of being harvested as it will spoil after that (W. Geser and R. Warama, p.c.). The flour is often divided into small bundles and kept in sheltered areas of the bush where people will pick them up when needed. If the sago palm is harvested near the village, the sago flour will be stored under the house (J. Ben Danipa and K. Dobola, p.c.).

In addition to its use as a staple food crop, sago palms are used for roofing material (leaves), walling in houses (leaf stalks), a wrapping for cooking food (leaves), grass skirts and decorations (young shoots), and torches for night time use (dried stalks) (J. Ben Danipa and K. Dobola, p.c.).

B.6.2 Dry season gardening

During the dry season, the residents of Limol plant and rely on two types of swamp gardens: one on floating grass (*pu*) and the other in an area (*wutara*) that is swampy during the dry season .

Floating grass garden – *Pu*

The *pu* garden is a sort of platform of grass constructed on/from two types of grass that grow along the Bituri River: *kapalla* /kapaɽa/ and *ttallme* /ʈ͡ʂaɽme/. If this grassy area is stable enough for someone to stand, it will be made into a garden. The *pu* floats on the top of the river and so if there is a flood, the platform of grass with rise with the water (D. Karea, p.c.). Most people in Limol have two to four *pu*-type swamp gardens which are accessed by dugout canoe (*gall* /gaɽ/) (J. (Jeks) Dareda, p.c.). The *pu* gardens are located in different locations along the river and their size depends on the availability of useful land (J. (Jeks) Dareda, p.c.).

The *pu* gardens are good for planting taro, sweet potato, cassava, aibika, and sugarcane (D. Karea and J. (Jeks) Dareda, p.c.). Planting can occur year-round. Sweet potatoes take 3-4 months until harvest and taro takes about 6 months (D. Karea, p.c.). Taro is planted by wrapping the sucker in two cut *kapalla* leaves to prevent the sucker from sinking and putting it in a hole in the *pu* made with a digging stick. For sweet potato and cassava, a small hole is made by hand for the shoots and then is covered with *kapalla* grass. The garden is maintained by continually cleaning the area and covering plants with *kappalla*, *ttallme*, or *kitar* leaves.

Harvesting happens over time. For taro, when the leaves begin to yellow, that is the sign that it is ready to be harvested. The taro corm can be extracted by just pulling it; no tools are needed (J. (Jeks) Dareda, p.c.). For cassava and sweet potato, roots are not harvested en masse, but only as they become ready to eat. Sugarcane is harvested when flowers are present; it is cut and chewed (J. (Jeks) Dareda, p.c.).

In some ways, the *pu* garden is less intensive than bush gardens as it does not require fencing, planting and harvesting do not require extensive digging and spading, and the garden can be left without maintenance for months. Although weeds are not an issue in the *pu* garden, clearing the space with a machete is hard work (J. (Jeks) Dareda, p.c.). Some challenges to agriculture in the *pu* include issues with taro, sweet potato, and cassava rotting if not harvested at the right time and grubs making holes in the taro corm (D. Karea, p.c.). Furthermore, big floods can move the garden downriver, turn it over, or merge it with another person's *pu* garden (J. (Jeks) Dareda, p.c.).

Figure 13: Dukes (Dugal) Karea planting taro between the kapalla grass leaves at his pu swamp garden on September 7, 2016

Dry season swamp garden – *Wutara*

The *wutara* is a garden made and planted during dry season time in a dry swamp. Typically people start planting in May and June and harvest in August and September (J. (Jeks) Dareda, p.c.) The *wutara* can be planted with numerous different crops including corn, beans (*tametame* /tametame/), watermelon, squash, taro, sweet potato, aibika, cucumber, lettuce, and cabbage (D. Karea, p.c.; J. (Jeks) Dareda, p.c.). The lettuce and cabbage seeds are purchased in shops in Daru (J. (Jeks) Dareda, p.c.).

A dugout canoe is often required to get to the swampy area that will become a *wutara* garden. The *wutara* area is shared by all Limol village. Dried grass canes and leaves are used to denote garden boundaries (D. Karea, p.c.). People typically have one to four *wutara* sites as they are valued for their fertility (J. (Jeks) Dareda, p.c.).

Taro are planted using suckers or root pieces. For sweet potato, three to five shoots are planted in the ground and when the plants begin growing, a mound is made around the plants. For the cucurbits (watermelon, pumpkin, and cucumber) and beans, a knife or stick is used to dig a small hole, 4-5 seeds are placed in the hole, and the seeds are covered. For lettuce and cabbage, seeds are broadcast and when the seedlings emerge, they are transplanted for wider spacing (J. (Jeks) Dareda, p.c.).

Cucumbers, pumpkins, and greens are the first to mature in the *wutara* and are ready to harvest by August. In addition to harvesting taro for food from the *wutara*, these gardens are specifically used for taro propagation. The *wutara* garden was described as the best place to plant taro for sucker production; these suckers are then traded for other plant material like yam suckers. People from Malam and Wim come to Limol to trade for taro suckers (J. (Jeks) Dareda, p.c.). Harvesting must finish before January and February when the rainy season begins and the area where *wutaras* are built become flooded.

Some people are nervous about planting *wutara* gardens because flooding can cover plantings and gardens. Fire damage is also a risk, both from when there is drought, a fire could spread and ruin the garden, or from an out of control bushfire created while hunting (D. Karea, p.c.). Birds will eat watermelon, so the fruit are covered with swamp grass for protection. Additionally, small insects can destroy young watermelon and pumpkin shoots (J. (Jeks) Dareda, p.c.).

Wutara Construction – Case Study with Dukes (Dugal) Karea

E. Conlan traveled with Dukes (Dugal) Karea when he was creating a *wutara garden* for his family on September 12, 2016. Once reaching the site, Dugal cleared *wariwari* grass, which is tall, and *tawa*, a shorter grass. The grass was cleared with a machete and the garden was planted the same day or cleared and planted the next day, if there was a lot of grass to remove. The grasses were left on the ground after cutting. The size of the area cleared by Dugal and then planted with taro was 6 x 7.15m.

Figure 14: Dukes (Dugal) Karea after clearing a swamp area as a wutara garden. He later planted taro in this garden.

Taro suckers were planted by making a hole with a digging stick and placing the sucker in the muddy water. Daughter corms were also planted in a muddy patch to be transplanted when larger. In a drier area near to the taro planting, another part of the garden was weeded to prepare to plant pumpkin and watermelon. To plant squash and watermelon, D. Karea dug a hole with a knife about 5-7 cm deep, dipped the seeds in the water, and then covered the seeds with soil. He planted ten seeds per hole and does not plan to transplant the seedlings. The holes were spaced about 1m apart in rows. New shoots will emerge after about 4-7 days. Old mosquito bed nets were used as netting to protect the cucurbits from insects. The seeds used were dried and saved from the previous year. D. Karea planned to return to burn dried grasses, a big tree, and plant more squash, watermelon, and corn.

B.6.3 Year-round cultivation near houses

Every house has a garden near the house, or backyard (*ma edi*) garden. Planting by houses is recognized as extremely important as a source of food for when people do not have time to go to the yam garden or for when it is raining (M. Giwo, p.c.). Near houses, families often plant bananas, sweet potatoes, aibika, and coconuts (*nge* /ŋe/).

Close to Limol village (an approximately 15-20-minute walk) is the site of *Llimoll ma kuddäll* /ɽimoɽ ma kuɖ͡ʐəɽ/, the old village where there are about 70-80 mature coconut palms. There are four color-types of coconuts: *ttall nge* /ʈ͡ʂaɽ ŋe/ (yellow, with yellow leaves); *gogo /gogo/* (dark green); *pall* /paɽ/ (red); and *bäb nge* /bəb ŋe/ (light yellow and green). These colors describe the color of the outermost layer (exocarp) of the coconut.

The growth and development of the coconut palm and fruit are characterized by eleven stages of development (S. Karao, p.c.) (Figure 15).

(336) D*evelopmental stages of coconut* (S. Karao, p.c.)

1. *Kokoang* /kokaŋ/ - coconut growth stage where the new shoot first emerges
2. *Ttambllag /ʈ͡ʂambɽag/* - coconut growth stage after *kokoang* where the seed is ready for planting
3. *Sisi* /sisi/ - coconut growth stage where the new shoot first emerges
4. *Ngepopo* /ŋe popo/- coconut growth stage where the shoot opens and the plant flowers
5. *Bänbän* /bənbən/- coconut growth stage where new fruits form
6. *Ngetikop* /ŋetikop/ - coconut growth stage where fruit is about 5cm in diameter
7. *Kukrub* /kukrub/ - coconut growth stage where the fruit is immature, and the endosperm is all liquid (prior to the solidification of the endosperm)
8. *Gonglem /goŋlem/* - coconut growth stage where the fruit is immature, and the endosperm solidifies (coconut meat forms)
9. *Kuang /kuaŋ/* - coconut growth stage where the fruit is mature, the coconut water is ready to drink, and the meat is good to eat
10. *Tawekutt /tawekuʈ͡ʂ/* - coconut growth stage where the fruit begins to get dry and the outer skin starts browning
11. *Dɨdɨr* /dɪdɪr/ - coconut growth stage where the coconut fruit is completely dry

Figure 15: Ten of the eleven coconut growth stages as described by Limol residents

Many deciduous fruit trees can be found around the village including pawpaw, breadfruit, mango, guava, soursop, and starfruit. These trees are propagated by seed (*kutt*).

B.6.4 Food preparation

Yams are consumed baked on a fire or in an earth oven. They are cut into pieces and boiled, then eaten plain, with meat, or topped with creamed coconut (W. Geser, p.c.).

Sago is eaten plain or with other foods. Plain sago is either cooked as a round cake on a pan, wrapped in leaves and placed on a fire, or as a lump on a fire, in which case only the outer, cooked, layer is eaten. Sago can be boiled with coconut cream. It is also baked in an earth oven, usually mixed with banana, meat, coconut, or greens (J. Ben Danipa and K. Dobola, p.c.).

Cultural notes

Many of the older men and women in Limol report that some native plants or older cultivars have disappeared, and new ones are coming in to replace them. For example, some of the yams and taro varieties described are no longer grown around Limol.

A harvest song and an arrangement ceremony in which yams were counted used to be an annual tradition in the village (D. Kurupel, p.c., 8/17/16). In the counting ceremony two yams are placed on a stick (*katmer*) and a circle of six yams is placed around the stick; the first circle is called the *tarumba*. Yams are counted with a base of six. Six yams are a *putt* and six groups of six yams is a *purta*.[56] Everybody in the community's yams were counted this way before putting the yams in the yamhouse. This arrangement and counting after harvest occurred when the women who are now old were young girls. It is unclear whether this tradition continues currently for when people contribute yams for religious retreats.

If someone from the yam clan leads the planting ceremony, there was a belief that there will be a good harvest. Another custom to produce a big yam crop is for a woman (or women) to climb a coconut tree while carrying a sago bundle and knock one green coconut to the ground. The women will then make a container and into it mix the coconut water from the green coconut, a tuber from a wild plant called *gamu* (ginger family), some clay, and banana stem and bring the mixture and one yam to the garden to plant (K. Dobola and Manaleato Kolea, p.c.).

B.7 Hunting

Hunting is an essential activity in the community, and skilled hunters are celebrated. It is a men's activity, and young boys are taught from a young age how to make bows and spears and later how to hunt. Hunting bows and spears are very long, about the height of the hunter. There are many types of spears, as illustrated by Andrew Kaoga (Dobola) in Figure 16.

There are many types of animals to hunt in the area including *ttall* /ʈ͡ʂaɽ/ 'wallaby', *kubull* /kubuɽ/ 'bush wallaby', *dirom* 'cassowary', *sɨmell* /sɪmeɽ/ 'pig', *pa* 'birds', *maigag* /majɡag/ 'bandicoot', *wadär gullem* /wadər ɡuɽem/ 'python', *käza* /kəza/ 'crocodile', and *ddia* /ɖ͡ʐia/ 'deer'.

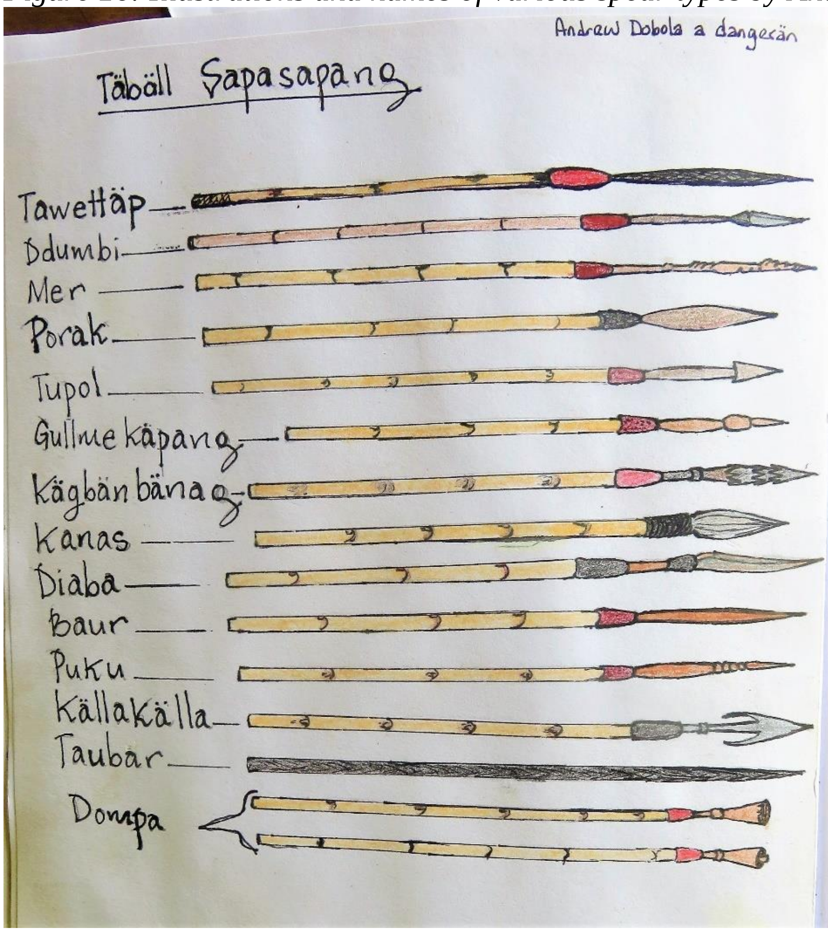
There are also many methods of hunting. *Mamoe* /mamoj/ is hunting in a group (listen to a description by Pentae Narma (2017) or a live reenactment by Jerry (Jeks) Dareda (2016c)). In this style of hunting, a large group of people splits into two lines. The herders (men, women, or dogs) cover a considerable distance moving together and scaring animals towards a line of hunters who block a narrow escape and shoot the animals. If any animals

[56] This description differs from that given by N. Evans and C. Döhler in their accounts of the senary yam counting systems to the West (Döhler, 2018; Evans, 2009).

are caught, the herders take home the prized meat as their job is more difficult than the shooters' job. *Käba* /kəba/ or *koenmäll* /kojnməɽ/ is a style of hunting in which a single hunter goes out by himself without dogs (listen to a description by Geoff Rowak (2016 SE_PN014)). *Kokngal* /kokŋal/ refers to hunting that is done in the rain. The hunter is at an advantage because the animals are less likely to hear him (W. Geser, p.c.). *Iddob koenmäll* /id͡ʐob kojnməɽ/ or *iddob käba* /id͡ʐob kəba/ refers to hunting done at night. *Ekaklle papa* /ekakɽe papa/ (Ende) or *puyem* /pujem/ (Taeme) is a technique of hunting in which a single hunter goes out in moonlight to pound the ground imitating a wallaby. He may also call out like a baby wallaby to attract wallabies to the area. (Listen to a description by Sowati Kurupel (2017b SE_PN024). *Tätän* /tətən/ is a type of hunting using a trap. The trap is built like a fence. Inside the fence is a trigger and when the animal steps on it, a large weight will fall from above killing or trapping the animal. A new method of hunting involves a rope that is tied onto a planted bamboo. The bamboo is bent down with a short length of rope. When the trap is triggered, the bamboo snaps up, catching the animal's leg or neck in the rope. A crocodile was caught this way in 2017, as told by Jerry (Jeks) Dareda (2017b SE_SN043). Successful hunters may display a *täräp* /tərəp/ on their home, which is a collection of jawbones of all the animals that they have killed.[57]

[57] Many of these terms have also been observed in the nearby Idi community (Schokkin, p.c.). *Mamoy* indicate hunting with dogs, perhaps not necessarily still with a group of people. *Dmond* is used for hunting game, but also e.g., mudcrabs. *Qélqél yumä* or *indnän* is a hunting technique where grass is burnt in order to lure out the animals. *Ttn* /tɐtɐn/ and/or *ttl* /tɐtɐl/ refers to a trap (made from sago) or hunting with a trap. Finally, *puyäm* refers to the (sound of) slaughter with sticks (in Schokkin's corpus used in the context of headhunting). Related to this, Idi has at least two different terms for barking: *täränd* 'dogs barking when they are chasing an animal' and *pulpul* 'dogs barking when they reach the animal'. It seems quite likely that the dogs are trained to give different signals for consecutive stages of hunting. Displays of jaw bones are common in Idiland too and are called simply *thäth qémb* 'jawbone' (Schokkin, p.c.).

Figure 16: Illustrations and names of various spear types by Andrew Kaoga (Dobola)



B.8 Fishing

Just are there are many types of hunting, there are also many types of fishing. Fishing is a women's activity and is often more effective than hunting. Women often go to *källäm* /kəɽəm/ 'ponds', *walle ddage* /waɽe d͡ʑage/ 'creeks', *ddage bun* /d͡ʑage bun/ 'creek sources', or *karama* 'swamp' to look for fish. As told to me by Wagiba Geser and Jerry (Jeks) Dareda in 2018, traditionally when women headed off for fishing in a group, the group was led and tailed by strong, brave women, who could face an animal or spirit and would not fall behind. The last woman was responsible for obstructing anything unpleasant that might be following them by destroying creek crossings or leaving *tab* /tab/, 'sign',[58] pointing the wrong way. Pregnant and menstruating women were not supposed to go on these trips and were blamed if the catch was poor. In fact, the word for menstruation, *giddollag* /ɡid͡ʐoɽaɡ/, literally means 'those who stay (behind)'. When the women returned to the village, they walked in the same line but in reverse. This walking practice may have also extended to trips of other sorts including to the gardens or for sago.

Methods of fishing include *tudi* 'fishing with hooks', *walle pampem* /waɽe pampem/ 'fish a pond with circular nets', *tada* /tada/ 'fish with a cane or bamboo trap' or *rarararae* /rarararaj/, which is a type of group fishing similar to *mamoe* /mamoj/ 'group hunting'. Women enter the water, join their nets, and walk together in a line. Another way to fish is called *kämbag* /kəmbaɡ/ 'diving'. Diving is only done by men and involves goggles (*ikop glas*) and a roped spear instead of a net. Other tools for fishing include *tudi käp* /tudi kəp/ 'hook', *tudi tär* /tudi tər/ 'fishing line', *dadär* /dadər/ 'circular net', *gall* /ɡaɽ/ 'canoe', *gull* /ɡuɽ/ 'net', *gull tupitupi* /ɡuɽ tupitupi/ 'long net', *tada* /tada/ 'cane or bamboo trap', and *tokong* /tokoŋ/ 'bait'.

There are many kinds of *kollba* /koɽba/ 'fish' to be caught including, *bunkuttang* /bunkuʈ͡ʂaŋ/ 'catfish', a fish prized for its fat and bone-free meat, *mozaya* /mozaja/, *boge* /boge/ 'mudfish', *dompak* /dompak/ 'eel fish', *inbunatt* /ibunaʈ͡ʂ/, *zire* /zire/, *kalläg* /kaɽəɡ/, *mänyän* /məɲən/, and *wɨd* /wɪd/. Many ponds and creeks dry up in the dry season (*yäbäd bäng* /jəbəd bəŋ/), so even small fish are brought home.

B.9 Entertainment

There are many forms of entertainment in Limol village, some with long histories and some more contemporary. One of the oldest forms of entertainment is likely song and dance. As re-enacted in the documentary film *Ende tän e indrang* 'Light into Ende tribe', traditional singing and dancing have long been a part of everyday life in Ende culture,

[58] *Tab* /tab/ is a word that means 'sign' or 'promise'. Common *tab* includes plants, which can be used near forks in path to indicate which direction the traveler is heading. They can also be used as a sign of ownership, for example a branch may be placed over a sago bundle or a pile of watermelons to indicate the owner is returning for the goods. A blade of grass may even be placed in a bowl during a feast if many similar looking bowls are set out to be served. People from different clans choose different plants. This term, identical in form, is also found in Nen (Evans, 2019a).

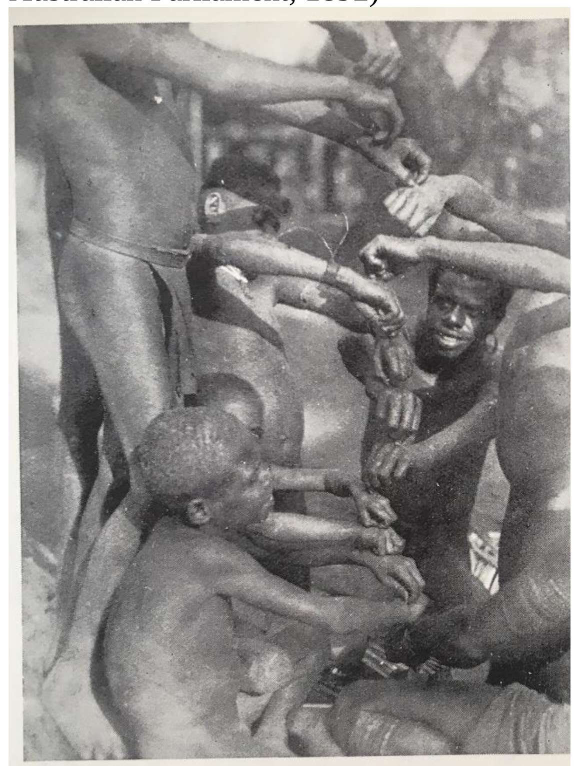
especially during times of celebration (T. (Tonzah) Warama, Lindsey, & The Ende Language Committee, 2018). Many of the oldest songs and dances were borrowed from the people to the West (*i.e.*, the Yam language family). These types of songs are called *kämag bandra* /kəmag bandra/ ‘songs of the western wind’. The Ende Language Corpus includes audio and video recordings of many of these songs (Lindsey, 2015). The singing and dancing tradition is practiced by elders, such as Saly Goge and Rhoda Kukuwang, who lead a traditional community cultural group in Malam, and by community leaders, such as Jerry (Jeks) Dareda, who leads a more contemporary community cultural group in Limol. The corpus includes contemporary secular songs, as well as religious songs, and many songs in other languages.

Nowadays, song and dance are performed to the music of guitar, kundu drums, and shell rattles and shakers. Traditional instruments include the *borale* ‘a bamboo flute, also used to scare wallaby’ (Terrance, 2016), the *darombe* ‘jews harp’, the *alläp* ‘a big kundu drum, made of a special tree with river snake skin or iguana skin stretched over’, and the *gora* ‘rattle’.

There is also a long history of games in Limol popular among children and adults alike. Some popular games include *rokaroka* ‘I spy’ (J. Bodog & Karea, 2016a, 2016b), *skidol* ‘a coconut husk and ball game’ (W. Geser, 2018h), various string games such as *kätt gämällang* /kət͡ʂ gəməɽaŋ/ ‘bone stealer’, *yu patkoll* /ju patkoɽ/ ‘bundle of firewood’, and *ause da yu ikom* /awse da ju ikom/ ‘granny brought the firewood’ (K. Baewa, 2016; Madura, 2016a, 2016b), various types of tag: *mangki mangki* /məŋki mənki/ ‘tag game’ *tupi imonzimonz* ‘touching with finger’, and various types of hide and seek: *togotogol* ‘hide and seek’ or *bungkli bungkli* /buŋkli buŋkli/ ‘hide and seek’ (E. Baewa, 2016). Children also play a game called *tintromäll* /tintroməɽ/ ‘biting brown ant’, which was documented being played among children in the region as early as 1892, see the comparison of pictures below. In this game, players pinch the skin of the top of the hand below (much like a biting ant) to create a tower.

Figure 17: Children playing tintromäll, the game of ants (Limol village, 2018)

Figure 18: Children playing homban, the game of ants (British New Guinea & Australian Parliament, 1892)



Children and adults also play games introduced after Australian colonization, including marbles, basketball, soccer (football), volleyball, and rugby. These sports are especially popular during holidays such as Christmas, New Years, and Independence Day. Typically, the village splits into two large clan groups to compete in these games.

B.10 Daily routines

As the Ende community lives primarily in a subsistence lifestyle, daily routines fluctuate with the seasons as families decide where is the most advantageous place to live, fetch water, collect food, and hunt for animals. Throughout the year, typical daily work for women includes collecting firewood, cooking, caring for children, sweeping the house and yard, cutting the grass, maintaining the house and toilet, washing clothes, gardening, hauling food, fetching water, fishing, and crafts, including making baskets, mats, canoes, bows, and spears. Men typically engage in hunting, controlled burning, falling trees for lumber, building houses, and cutting back grass and the bush within the village.

Community work includes maintaining community buildings, cutting community grass, building wells, and organizing feasts for celebrations and funerals.

B.11 Yearly cycle

There are several seasons that define the Limol year that may be characterized by annual weather, harvest, or hunting patterns. These are organized in Table 100. This information was provided to me by Kaoga Dobola, who also teaches the elementary school students. The fact that twelve seasons are listed may be an instructional technique to help the students learn the twelve months of the Gregorian calendar. More generally, the year can be divided into a long dry season (*yäbäd bäng*), which lasts August to December, and a wet season (*bawa*) that lasts April-July. Kaoga has observed that the seasons have changed since the 1990s, that now it can rain anytime.

Table 100: Seasons

Month	Season	Sustenance patterns	Weather patterns
January	*Kämag* ‘west wind’	Banana, cassava, sweet potato, sago, no yams	Storms and wind strong enough to knock down houses come from the West.
February	*Beyat ullullang* ‘flowering.tree flourish’	Trees are flowering, yams are already having fruits in the ground.	
March	*Tarme ballmenyang* ‘greeting of the *tarme* bird’		The *tarme* bird greets people with *kru kru kru*.
April	*Kunun*	Time when garden vegetables are ready.	Light showers.
May	*Dadel* ‘harvest’	Season of harvesting yams and other vegetables from the gardens.	
June	*Bawa* ‘showers’	Time for tree flowers and mushrooms. Baby deer and pigs.	Rainy season, big rain falls and floods the creeks and swamps.
July	*Bawa sasam* ‘light showers’	Continue harvesting yams. Time to fish with hook and nets. Birds and crocodiles are laying eggs. Pigs are building houses for babies. Waterlilies are ripe.	Water and floods are going down. There are lots of flowers blooming.
August	*Yäbäd* ‘sun’	Fruits are ready, continue with yams, pumpkins, taros, palm trees.	Dry season begins. Water going down to low levels. All the birds are singing because of the dry season.

September	*Yäbäd bäng* ‘sun fire’	People burn grasses, go hunting, chop trees for new gardens.	Dry season continues.
October	*Yäbäd ttänttämang* ‘sun burning’	All the creeks are dried up. People poison creeks with poison root to stun fish. Animals are looking for water, so hunters build small houses near pools. New gardens are burned, and fences are built.	Dry season continues. Ground is so hot that it burns people’s feet. People work early in the morning to avoid midday heat.
November	*Sis* ‘insect type’		This season is marked by the first thunder, first rain, and new grass. Insects called *sis* come out from the ground and fly at first rain.
December	*Sisor pazi* ‘new year’	Mango, taro, and pandanus season	Everything is green. Christmas feasts. New grass, new tree leaves, new year.

B.12 Kinship

The kinship system is in extensive use in everyday conversation, even more so because it is a strategy for avoiding someone’s name. The terms used exhibit a fair amount of variation. In what follows, I will present what I have observed to be the most common system in use in Limol and then present the variants. I’ve organized the system based on form. I have not included English loanwords, but these are being used more and more by younger speakers.

B.12.1 Immediate relations

Words for immediate kin include terms for parents, siblings, and children. The most common words for parents are *yae* ‘mother’ and *baba* ‘father’, although *mäg* ‘mother’, *yaya* ‘father’, and *mäda* ‘father’ are also all in frequent use, even by the same person (A. Mado, 2018 #24). Words for siblings distinguish both the gender of the speaker, the gender of the opposite-sex sibling, and the age of the same-sex sibling. Thus, a woman calls her older sisters *mosen* ‘older’, her younger sisters *mänyan* ‘younger’, and her brothers *mang* ‘female’s brother’, regardless of age. Similarly, a man calls his older brothers *mosen*, his younger brothers *mänyan*, and his sisters *män*. The meaning of *män* extends to ‘daughter’ and ‘girl’ as well. *Mosen* and *mänyän* can be used to qualify any relation, such as *män mosen* ‘male’s older sister’ (Kurupel (Suwede), 2018b #5), or even non-relations, such as

Yugui ngämo mänyan dan ‘Yugui is younger than me’ (Kukuwang, 2018 #40). Another term used for younger siblings is *koenmäll* ‘follower’ (Dimsen, 2018 #17), and the term used for the last born is *sära pipi* (M. Kidarga, 2016a #30).

Words used for children are also quite general. The word *llɨg* means child and son. To specify, one can also say *lla llɨg* ‘male child’. The word *män* means ‘daughter’, ‘sister’, and ‘girl’. *Llɨg* and *män* are also used to mean ‘niece’ and ‘nephew’, as well as ‘member of the following generation’. For example, when I asked Rhoda Kukuwang if Kagär Kidarga (a non-relation) was older or younger than her, she replied, *Kagär ngämo llɨg dan* ‘Kagär is my child(‘s age)’ (Kukuwang, 2018 #37).

The word *mäg* ‘mother’ is also used to refer to big things, like *wätät mäg* ‘big hunger’ (T. Mado, 2016 #14) or *walle mäg* ‘source of the creek’ (T. Dobola, 2016 #4, 7). Similarly, the word *llɨg* ‘child’ is used to refer to small things, like *giri llɨg* ‘small knife’.

Table 101: Immediate kinterms (parents, siblings, children)[59]

Kinship term	Function(s)	Variant(s)
yae /jaj/	mother (M[60])	*mäg* /məɡ/ (M)
baba /baba/	father (F)	*yaya*, *mäda* /jaja, məda/ (F)
mosen /mosen/	older (feZ, meB)	
mänyan /məɲan/	younger (fyZ, myB)	*koenmäll* /kojnməɽ/ (yZ, yB)
mang /maŋ/	brother (fB)	*mang mosen* /maŋ mosen/ (feB), mang mänyan /maŋ məɲan/ (fyB)
män /mən/	sister (mZ), daughter (D)	*män mosen* /mən mosen/ (meZ), *män mänyan* /mən məɲan/ (myZ)
llɨg /ɽɪɡ/	child (C), son (S)	*lla llɨg* /ɽa ɽɪɡ/ (S)

B.12.2 Grandkin relations

Grandkin terms include the words for grandparents and grandchildren. Grandmothers are called *kak* and grandfathers are called *masar*. These terms are extended to great-aunts and great-uncles (W. Geser, 2018c #30), great-grandparents and indeed all higher generations. The plural forms of these words, *kakak* and *masamasar*, both mean ‘ancestors’. The general word for grandchildren is *kok*, homophone with ‘female’s daughter-in-law’, ‘moon’, and ‘grasshopper’. In the same way as above, this term extends to great-nieces and great-

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[59] All immediate kinterms are also extended to secondary kin relations.

[60] Abbreviations used in this section include the following: B = brother; C = child; D = daughter; e = elder; f = female ego; F = father; H = husband; m = male ego; M = mother; S = son; X = exchange; W = wife; y = younger; Z = sister

nephews (W. Geser, 2018c #34). Interestingly, some men call their grandchildren *masar* (G. (Garayi) Pewe, 2018a #51-65). This may be an extension of the reciprocal kinterm *masar* used with male's daughter-in-laws. Alternatively, *kok* may be an extension from female's grandchildren to include male's grandchildren as well.

Table 102: Grandkin terms (grandparents, grandchildren)[61]

Kinship term	Function(s)	Variant(s)
kak /kak/	grandmother (PM)	
masar /masar/	grandfather (PF), grandchild (mCC)	
kok /kok/	grandchild (CC)	*masar* /masar/ (mCC)

B.12.3 Secondary relations

Secondary kin terms include the words for aunts, uncles, nieces, nephews, and cousins. The words *llɨg* (also 'child', 'son') and *män* (also 'daughter', 'girl') are used for 'nibling, nephew' and 'niece', respectively. The word *mädaulle*, literally 'big father', is used for both father's older brother (Dimsen, 2018 #61) and older sister (also some affinal relations). The terms *meyang* and *nane* are used for father's younger brother and sister, respectively (T. (Tonzah) Warama, 2017b #108). The words *baba* 'father' and *yae* 'mother' are often extended to include these younger siblings (Dimsen, 2018 #69-71).

Mother's sibling terms (see below) follow a different system and are not considered 'direct relations' by some people, as they are not in the same *tän* 'clan' (W. Geser, p.c., 2015). *Pope*, mother's brother, is an exceptional relationship. Because of the sister exchange system in which brothers exchange sisters to get married, men take credit for the existence of their sister's children. Children are expected to pay back their *pope* in the form of a gift (*pope mu*) and a lifetime of respect (see, *e.g*., the *pope* celebration discussed in Dieb & Giniya, 2017; G. (Garayi) Pewe, 2017; Y. Pewe & Kurupel, 2017). Mother's sisters are called *mällpa* or *mällpa yae* (Sowati (Kurupel), 2018b #83).

[61] All grandkin terms are also extended to affinal kin relations.

The general word for cousin is *yäkäl*[62] (Sowati (Kurupel), 2018b #84), but speakers also use sibling terms to refer to their cousins on both sides (Dimsen, 2018 #73). Special cousin terms exist for cousins of an exchange relation.

Table 103: Secondary kinterms (aunts, uncles, nephews, nieces, cousins)[63]

Kinship term	Function(s)	Variant(s)
llɨg /ɽɪg/	nibling (ZC, BC), nephew (ZS, BS)	
män /mən/	niece (ZD, BD)	
mädaulle /mədawɽe/	father's older sibling (FeB, FeZ)	
meyang /mejaŋ/	father's younger brother (FyB)	*baba* /baba/ (extension from F)
nane /nane/	father's younger sister (FyZ)	*yae* /jaj/ (extension from M)
pope /pope/	mother's brother (MB)	
mällpa yae /məɽpa jaj/	mother's sister (MZ)	*mällpae mäg* /məɽpaj məg/ (MZ)
mosen /mosen/	older same-sex cousin (fPZeD, fPBeD, mPZeS, mPBeS)	*yäkäl* (PZC, PBC)
mänyan /məɲan/	younger same-sex cousin (fPZyD, fPByD, mPZyS, mPByS)	*yäkäl* (PZC, PBC)
mang /maŋ/	female's male cousin (fPZS, fPBS)	*yäkäl* (PZC, PBC)
män /mən/	male's female cousin (mPZD, mPBD)	*yäkäl* (PZC, PBC)
yäkäl /jəkəl/	cousin (PZC, PBC)	

B.12.4 Affinal relations

Affinal kinterms refer to all relations created by marriage and are in frequent use as it is taboo to refer to one's in-laws by name. A specialized subgroup of affinal kinterms refer to relations formed by an exchange marriage, and I will address these first.

In an exchange marriage, two men exchange their sisters in order to get married. One man in this foursome calls his sister or the other man *erang* 'exchange sibling'.[64] The same term is used by the women. These couples will call the children of the other couple

[62] Regional kinship systems indicate that Ende may have (currently or historically) a more complex cousin term system. For example, in Nen cousin terms are best understood by considering how the relation of the ego's parents' place them in terms of their clans and the ego's clan: cousins who are in the same clan as oneself are called by sibling terms. Cousins in different clans, not linked by exchange, will be called by skewed terms based on the relationship linking ego to their clan: MBC by *baba*, a consanguineal relationship, and MZC by *yakali*, the term one's father uses to the relevant cousin's father. Cousins resulting from symmetrical exchange of their fathers' sisters are the only ones to receive a specialized cousin term, namely *miti*; here FZC=MBC. Note, however, that since in such a situation the same person can be reckoned as either one's father's sister's child or one's mother's brother's child, the regular term for MBC (*baba*) may also be used in a broad way (Evans, p.c).

[63] Many secondary kinterms are used for immediate and affinal relations.

[64] The form of the word *erang* /eraŋ/ 'exchange sibling' is curiously similar to the form *är* 'man' in Nen with =*ang* /-aŋ/ the Ende attributive case clitic (Evans, p.c.).

erngazeg. Children will call their exchange uncle *erngazenda*, their exchange aunt *erngazmäg*, and their exchange cousins *erngazeg*.

Table 104: Exchange kinterms (exchange siblings, nieces, nephews, cousins)

Kinship term	Function(s)	Variant(s)
erang /eraŋ/	exchange sibling	
erngazeg /erŋazeɡ/	exchange nibling (XC), exchange cousin (PXC)	
erngazenda /erŋazenda/	exchange uncle (FX)	
erngazmäg /erŋazməɡ/	exchange aunt (MX)	

The word used for husband is *gullbe*, which also means ‘big and strong’. The cognate for this word is restricted to male animals in Idi. One can also refer to one’s husband with the word *lla* ‘man’. The word used for wife is *mälla*, which also means ‘woman’.

The kinterms used for spouse’s parents are reciprocal. A man and his wife’s mother and father will call each other *mänang*. A woman and her husband’s father will call each other *masar*, which also means ‘grandfather’. She will call her husband’s mother *kak*, which also means ‘grandmother’, and will be called *kok*, which also means ‘grandchild’. When the kinship system is described in the abstract, it is said that a man should call his wife’s siblings *päzɨg*, while a woman should call her husband’s older siblings *mädaulle* (W. Geser, 2018c #115, 125), and his younger siblings *inbo* (W. Geser, 2018c #139; K. Kidarga, 2018a #13). *Inbo* and *mädaulle* are also used for brother’s wife (K. Kidarga, 2018a #23; Kurupel (Suwede), 2018b #14). *Päzɨg* is also used for sister’s husband (Kurupel (Suwede), 2018b #83) and even extends to husband’s sister’s husband (W. Geser, 2018c #117). Finally, the term *mäg ulle* can be used for father’s older brother’s wife.

Mänang also has the general meaning of ‘a female relation’s male affine’ or ‘a female affine’s male relative’. For instance, *mänang* can refer to one’s wife’s father’s brother (Kurupel (Suwede), 2018b #81), one’s wife’s father’s father (Kurupel (Suwede), 2018b #83), one’s sister’s husband (W. Geser, 2018c #14), or even one’s sister’s daughter’s husband (W. Geser, 2018c #40).

There are additional reciprocal terms for the relationship between two people married to siblings, or even to the same person. *Kobeyam* is used between two men married to sisters, while *izig* is used between two women married to brothers, or to the same man (co-wife).

Table 105: Affinal kinterms (spouse and spouse's relatives)

Kinship term	Function(s)	Variant(s)
gullbe /guɽbe/	husband (H)	*lla* /ɽa/ (H)
mälla /məɽa/	wife (W)	
mänang /mənaŋ/	son-in-law (DH), male's parents-in-law (WP), wife's male relatives (e.g., WFB, WFF), female relative's husband (ZH, ZDH)	
masar /masar/	male's daughter-in-law (mSW), female's father-in-law (HF)	
kak /kak/	female's mother-in-law (HM)	
kok /kok/	female's daughter-in-law (fSW)	
päzɨg /pəzɪg/	wife's sibling (WB, WZ), sister's husband (ZH)	
mädaulle /mədawɽe/	husband's older sibling (HeB, HeZ), older brother's wife (eBW)	*inbo* (BW)
inbo /inbo/	husband's younger sibling (HyZ, HyB), brother's wife (BW)	*mädaulle* (eBW)
mäg ulle /məg uɽe/	father's older brother's wife (FeBW)	
kobeyam	two men married to sisters (WZH)	
izig	two women married to brothers (HBW), co-wife (HW)	

B.12.5 Friendship relations

Besides kinship terms in the traditional sense, there is also a set large set of reciprocal terms used for special types of friendship. These terms are established at an event of some significance, for example, during an initiation ceremony (*omad*), or when sharing a twinned banana (*wupma*).

Table 106: Friendship terms

Friendship term	Function
omad /omad/	two women who sit together during initiation, also a female friend at a wedding
kaeg /kajg/	two men who entered initiation at the same time
kämany /kəmaɲ/	
kamo /kamo/	term for the young man and the older man who led him through initiation
kapera /kapera/	a man befriended from another place, also out-of-town boyfriend
irwema /irwema/	two friends who share twinned fruit from the *irwe* tree
kokallma /kokaɽma/	two friends who share twinned fruit from the *kokall* tree (a palm tree in the bush)
mägällma /məgəɽma/	two friends who share twinned fruit from the *mägäll* tree (two-leaf tree)
spallma /spaɽma/	two friends who split a twinned coconut frond.
wupma /wupma/	two friends who share a twinned *up* 'banana'.

B.13 Segmentation of groups of people

People in Limol can be separated into groups of people called *tän* often translated as 'clan'. *Tän* membership is inherited from the father, and there are restrictions as to which *tän* one can marry into. One cannot marry into one's one *tän*. At the most general level, all Ende *tän* can be divided into two moieties: *ddɨlag* and *yamkong*. *Ddɨlag* is associated with the color *pällämpälläm* ‘white’ and the *kakayam* ‘bird of paradise’. *Yamkong* is associated with the color *mamam* ‘red’ and the *inpiak* ‘eagle’ (K. Dobola, p.c., 2018). Nowadays, this large group distinction is used during the holidays for dividing the village into two teams to play volleyball, basketball, rugby, and soccer.

At the next level, the *tän* can be divided into several subgroups (or subsubgroups). The names of these subgroups consist of a place name and the attributive clitic *=ag, =ang* /=ag, =aŋ/, indicating where the group originally came from. For example, the *wedag tän* originally came from a place called *Wed* (Kurupel (Suwede), 2018d #137).

Finally, each *tän* is associated with a *mabun* ‘totem’, a *pa* ‘bird’, and a *tawar* ‘mark’. *Mabun* also means ‘sacred’ and indicates an ownership or special relationship between the *mabun* and the members of that *tän*. For example, traditionally anyone who killed a crocodile had to sing a particular song to let the members of the *bobzag tän* that their *mabun* had been killed (Nakllae & Rowak, 2017). The hunters then had to repay the members of the *bobzag tän* (K. Nakllae, p.c., 2016). Traditionally, *wedag* and *dumollang* members did not eat *bunkuttang* ‘catfish’, the *mabun* of these clans (D. Kurupel, 2018b #148-156). It is said that the origin place of the *bäzräbag tän* was in a valley that resembled a vagina, whence their *mabun*: *yowa* ‘vagina’ (W. Geser, p.c., 2018).

The *tawar*, on the other hand, is usually a plant that can be used as a type of *tab* ‘totem, sign’, but also may have special characteristics. For example, the *bikme* palm is the *tawar* for the *bäzräbag tän* and was traditionally worn in the bush to avoid detection from others (W. Geser, p.c., 2018). Subgroups and subsubgroups with the same totem, bird, or mark are more closely related than other groups. A full list of *tän* is organized in the table below.

Table 107: Ende tän 'clan' organization

Tän (large clan)	*Tän* (subclan)	*Mabun* (totem)	*Pa* (bird)	*Tawar* (mark)
Ddɨlag	*bubog* /bubog/	*mätta* /mət͡ʂa/ 'yam'	*kakayam* /kakajam/ 'bird of paradise'	
	dumollang /dumoɽaŋ/ *(dumollang)*	*bunkuttang* /bunkut͡ʂaŋ/ 'catfish'	*kakayam* 'bird of paradise'	
	dumollang (pingamang) /piŋamaŋ/	*bunkuttang* 'catfish'	*kakayam* 'bird of paradise'	
	wedag /wedag/	*bunkuttang* 'catfish'	*bulloll* /buɽoɽ/ 'owl'	*kokeyam moleg* /kokejam moleg/ 'stone with marks'
	bodenang /bodenaŋ/	*sana* /sana/ 'sago'		
	llimollang /ɽimoɽaŋ/	*wadär gullem* /wadər guɽem/ 'python'		
	tizag (igeigel) /tizag, igeigel/			*pia* /pia/ 'plant type'
	tizag (bobzag) /bobzag/	*käza* /kəza/ 'crocodile'		
	tizag (bugbunang) /bugbunaŋ/			
	yawinang /jawinaŋ/	*kalläg* /kaɽəg/ 'fish type'	*kakayam* 'bird of paradise'	
	ttallkämänyang /t͡ʂaɽkəməɲaŋ/	*lla up* /ɽa up/ 'banana type'		
Yamkong	*pallong* /paɽoŋ/	*ttall* /t͡ʂaɽ/ 'wallaby'	*inpiak* 'eagle'	*pia* 'plant type'
	izag /izag/	*kämlla* /kəmɽa/ 'anteater'	*inpiak* 'eagle'	
	dumang /dumaŋ/	*kämlla* 'anteater'	*inpiak* 'eagle'	
	bobeag /bobeag/	*kämlla* 'anteater'	*inpiak* 'eagle'	
	bäzräbag /bəzrəbag/	*yowa* /jowa/ 'vagina'	*inpiak* 'eagle'	*bikme* /bikme/ 'palm type'
	kutkutang /kutkutaŋ/	*yowa* 'vagina'	*inpiak* 'eagle'	*bikme* 'palm type'
	därälag /dərəlag/	*inpiak* /inpjak/ 'eagle'	*inpiak* 'eagle'	
	käballag (käballag)/kəbaɽag/	*däräng* /dərəŋ/ 'dog'	*inpiak* 'eagle'	*tawe* /tawe/ 'palm type'
	käballag (kungkumiang) /kuŋkumiaŋ/	*däräng* 'dog'	*inpiak* 'eagle'	*tawe* 'palm type'
	magiag /magiag/	*kämag* /kəmag/ 'west wind'		
	glluag /gɽuag/			

Each *tän* owns a stretch of land that starts near Kurunti at a river junction where the Agob and Ende languages originated (for the origin story, listen to Ben Danipa, 2017b; Kollowam, 2015). The land areas follow three parallel paths north towards present-day Limol and end at the Bituri river where Upiara is located. The table below crudely illustrates the paths and which *tän* are neighbors. The rightmost column is the eastern-most path going south to north, while the rightmost column is the western-most path going south to north. This orientation where south is top was always offered to me by Ende speakers but inverting the table will give you a north = top orientation.

Table 108: Geographic representation of Ende subclans

<table>
<tr><td></td><td colspan="3">South (near Kurunti)</td><td></td></tr>
<tr><td rowspan="6">East</td><td>Magiag</td><td>Pallong</td><td>Wädär mittang</td><td rowspan="6">West</td></tr>
<tr><td>Bobeag</td><td>Pallong izag</td><td>Izag</td></tr>
<tr><td>Bubog</td><td>Glluag</td><td></td></tr>
<tr><td>Bunkollog</td><td>Bäzräbag</td><td>Käballag</td></tr>
<tr><td>Bodenag</td><td>Kuttkuttang</td><td>Kukumiang käballag</td></tr>
<tr><td>Minkomang Bodenag</td><td>Därälag</td><td></td></tr>
<tr><td></td><td colspan="3">North (near Upiara)</td><td></td></tr>
</table>

These *tän* groups were established when most people in the area lived in family-size hamlets that frequently changed location. When a family only produces female children, as is the case with the *minkomang bodenag*, *bobeag*, and *glluag* groups, the group “dies” and the land is split between the neighboring groups. For example, negotiations are ongoing between the *bodenag* and *därälag* groups who neighbor the ownerless *minkomang bodenag* land (K. Dobola, p.c., 2018).

Many speakers point out dialectal differences between the clans (K. Dobola, 2018b; Kollowam, 2015; Kurupel (Suwede), 2018d #253), but this has not yet been investigated extensively. In the sociolinguistic questionnaires gathered in 2018, some people did not know their mother’s *mabun* (Kurupel (Suwede), 2018d #160), their spouse’s *mabun* (Sowati, 2018 #212), or even sometimes their own (Geoff, 2018 #103). This lack of awareness could indicate a shift in the importance or usefulness of *tän* groups within the community.

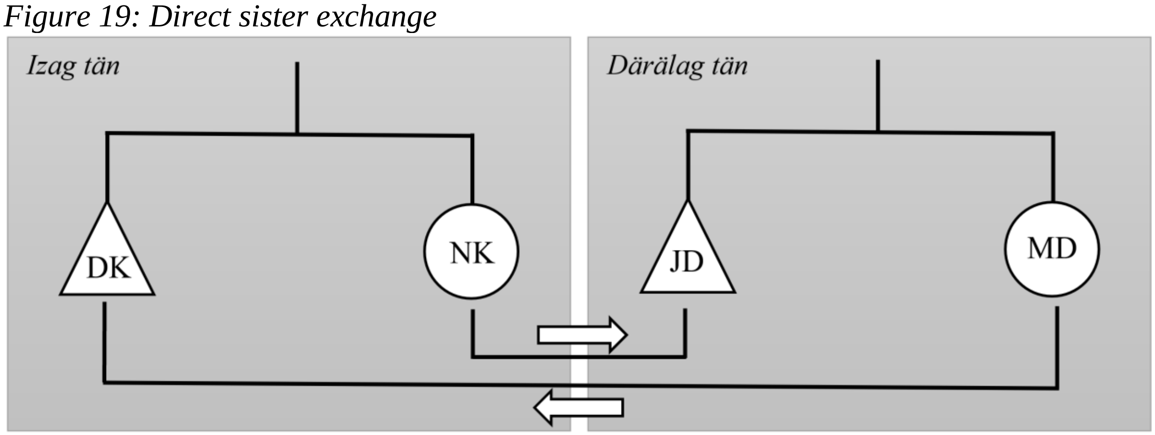
B.14 Marriage and sister exchange

Ngämi gollädeya llame, moko gogeya…erang peyang. Ngämo erang a däban Pentae.
'We got married together, we fell in love…It was by exchange, my exchange sister is that one – Pentae.'
(Y. Pewe, 2018 SE_PI093 #159)

Traditional marriage in Ende culture involved sister exchange. This is a common practice in the region. In sister exchange, two men exchange their respective sisters. The couples must be in seperate *tän* or large clan groups. If a man does not have a sister to use as exchange, he may use another unmarried girl in his *tän*, or he may get married without exchange. In these cases, the man typically goes to live with the woman's family until they have a daughter, or the exchange is satisfied in some other way. In case the exchange is made with a daughter, the daughter is then used to be married out of the *tän* again. Marriages are often arranged by the parents and can also occur without the man's consent (Sobam, 2018b #120). Approximately half of the current population of married individuals in Limol married by exchange, the other half forewent tradition and got married in the church without exchange. Nowadays, marriage is still the primary mode of migration into and out of Limol.

The following is an example of a direct sister exchange. A man in Limol named Dukes (Dugal) Karea (DK) has a sister named Namaya Karea (NK). They are both in the *Izag tän*. Another man in Limol, Jerry (Jeks) Dareda (JD), has a sister Megiz Dareda (MD). They are both in the *Därälag tän*. Dukes marries Megiz and Jerry marries Namaya. In this way, the count of females in the *Izag* and *Därälag* groups stays the same.

Figure 19: Direct sister exchange



The following is an example of a less direct sister exchange that may be more typical, as rarely do direct sister-for-sister exchanges line up perfectly. In the 1950s, a *Käballag* man named Bewag (Be) married a *Dumollang* woman named Bibiae Zakae (BZ) without exchange. The *Käballag* group now owes the *Dumollang* group one female. Some years later, a *Bodenang* man named Giwo (Gi) marries a *Käballag* woman named Sapusa (Sa). Giwo does not have a sister, so instead, he uses a woman from the neighboring *Wedag* group, Donae Kurupel (DK), as his exchange. She marries Sapusa's brother Tergo (Te) in the *Käballag* group. Now, the *Bodenang* group owes the *Wedag* group one female. Much later, Bibiae's daughter Yina Bewag (YB), a *Käballag* woman, marries Sowati Kurupel (SK), a *Wedag* man and Donae Kurupel's brother, without exchange. Now the *Wedag* group owes the *Käballag* group one female. Finally, when Giwo died, a *Dumollang* man, Karao (Ka), marries Giwo's widow, Sapusa, originally a *Käballag* woman but now belonging to the *Bodenang* group, without exchange. The *Dumollang* group now owes the *Bodenang* group one female. Only now does a quick tally of these five marriages show that the female count is even in all groups, thus completing the exchange. (Every group has one in-arrow for every out-arrow in the figure below.)

Figure 20: Less-direct sister exchange

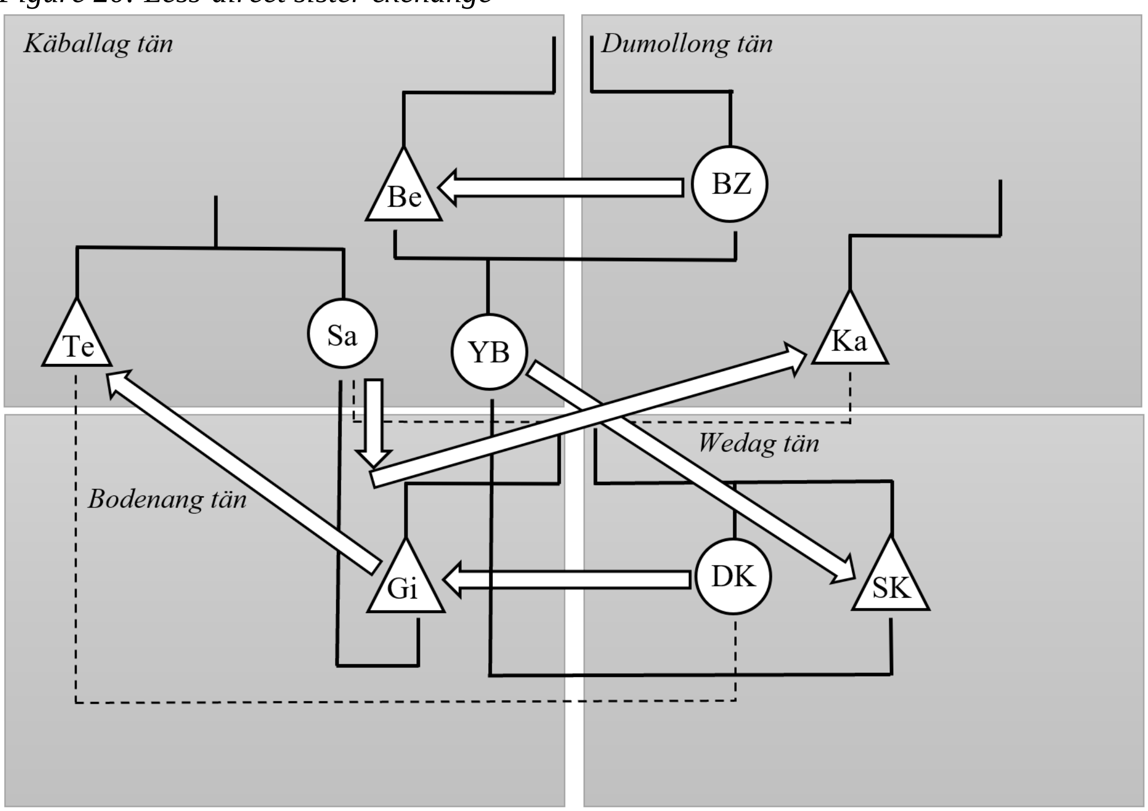


Table 109: Less-direct sister exchange

Wife	Husband	*Dumollang*	*Käballag*	*Bodenang*	*Wedag*
Bibiae Zakae	Bewag	-1	+1		
Sapusa	Giwo		-1	+1	
Donae Kurupel	Tergo		+1		-1
Yina Bewag	Sowati Kurupel		-1		+1
Sapusa	Karao	+1		-1	
Sum		0	0	0	0

B.15 Child rearing and adoption

Ngämo yae bi, ngämo baba bi, ngämo mosenmosen bi, ngämo mänmän a, ngämo mädaolle, ubi ngängäm ulle dageyo tämamae alle.
'My mother, my father, my older brothers, my sisters, my uncles, they all raised me together.'
- Jubli Sowati (2018 #57-58)

Family sizes in Limol are very large. There are many families with seven or more children. This is new. Wagiba Geser remembers that couples used to have only one or two children, even if the family included multiple wives (p.c.).

Adoption is widespread and may happen for several reasons. It is not uncommon for children to be adopted multiple times and to be raised in many families (Kurupel (Suwede), 2018d #42-50). The word for 'adoptive' (as in 'adoptive father') is *mändmändag* (Duiya, 2018 #13) from the verb *mändmänd* /məndmənd/ 'to adopt, to raise' and the agentive marker =*ag*. The word for 'birth mother' is *zegag* (Zakae, 2018 #58), from the verb *zeg* /zeg/ 'to birth' and the agentive marker, while 'birth father' is *ngasngesang* (Joanang, 2018 #119), from the verb *ngasnges* /ŋasŋes/ 'to make'.

Adoptive relationships may be common knowledge, open secrets known generally to community members but not talked about openly, or kept from the adoptee when they are young. There was an instance in which a woman did not want her adopted son, who grew up mainly in Daru, to come with her back to the village because he might overhear people talking about how he was adopted, which he did not know.

B.16 Religion

The village of Limol is entirely Christian. Most of the community attends the PNG Evangelical Church, which has Sunday services and prayer and worship meetings throughout the week. There are less than ten individuals who belong to the Seventh Day Adventist (SDA) church and observe the sabbath and strict food taboos, such as wallaby, pig, bandicoot, and greasy fish such as catfish (K. Nama, 2018 #290-328). The SDA church is not currently active in Limol, but there is an active congregation in Malam. PNG Evangelical services in Limol are in Ende but include frequent code-switching into English.

Prayer is performed in Ende before meals in many households, over sick people, before peacemaking conversations, and before community meetings. Major Christian holidays, including Easter and Christmas, are multi-day celebrations and include services, singing, and feasts.

Religious conferences are one of the most common reasons for travel, along with health care, marketing, and visiting. Conference locations rotate throughout the villages in a large area and can be a multi-day walk away. Because of this, they are typically multi-day affairs and are held in English.

The church also offers leadership positions in the community. There are at least four Limol-based pastors (Warama Kurupel (Suwede) , Karea Mado, Duiya Sobam, and Bodog Paul), deacons (Giniya (Garayi) Pewe), secretaries, treasurers (Dukes (Dugal) Karea), Sunday school teachers (Loni Giniya), and even flower arrangers (Sarbi Kurupel, 2018b #191).

Women's fellowship groups are the primary way in which women gain leadership positions in the community. These fellowship groups are women-led at the local and regional levels and enable women to raise important issues and get recognition and support from the government for their activities, such as local marketing.

B.17 Economy

The economy in Limol is almost entirely based on trade. Ripe food, fresh meat, and village work are shared when present, and people in the community benefit at different times. Many people collect sago bundles, woven mats, animal parts, and other items to sell at the markets in Tapila (less frequent) or Daru. The money made from marketing often goes towards travel costs and to children's school fees.

When people travel to Daru to market, they often do so in groups and stay until they have sold all their product and have enough money to make the return trip home. While the market in Tapila is closer than Daru, it only operates every fortnight, so it is harder to ensure that you sell everything you bring. People marketing in Daru will also often use their earnings to buy other products at the shops to sell in the village, such as instant noodles, batteries, sweets, and soap.

B.18 Schooling

There are four tiers of education that are generally accessible to people in Limol. An elementary school, taught in both Ende and English, was built in Limol (KT) in 1999 or 2000.[65] Children born in 1989 were the first to attend this school (Sowati (Kurupel), 2018b). Nearly everyone in the village attends or attended Bituri Primary School, opened in 1965 (Kurupel (Suwede), 2018d #55) and taught in English since that time in Upiara. However, a new primary school built in Limol in 2016 has now taken over part of Upiara's catchment. Although the school is in Limol, it is still taught exclusively in English. Those whose families can afford secondary school must travel to Balimo, Kiongga, or Daru. Finally, some students are selected for specific vocational schools after secondary school: including teaching, engineering, bible school, and health care. These levels of school are not always attended consecutively or completely, especially as families with many children struggle to save money for school fees (Frank, 2018b #38) and food (M. Warama, 2018 #52). In this way, motivated students continue to study well into their thirties.

B.19 Health and sickness

Health is an important issue in Limol. Hard labor keeps the population cardiovascularly fit and very strong. Traditionally, adults and young people abstained from greasy foods such as fatty meats and coconut cream so as not to grow old too quickly (Kurupel (Suwede),

[65] An elementary school opened in Malam in the same year (George, 2018 #41).

2016). Washing places can be found around the periphery of the village and are especially popular among children. One bathing spot called *Iräm* even has an ode written to it celebrating its bountiful clear and cold waters (W. Bewag, 2007). Washing places are segregated between men and women and are places for bathing, washing clothes and sometimes cookware, conversation, and play.

The most common reasons for seeking outside medical help include pregnancy and childbirth, malaria, and snake bites. Daily, however, the most common affliction is muscle pain, toothaches, and skin ailments such as sores likely caused by mycobacterial tuberculosis of the skin, boils, and fungal rashes.

The nearest health center is in Upiara, a couple of hours away by canoe or on foot. An aid post in closer Malam was out of commission during the entire 2015-2018 period. A new aid post was built in Limol (KT) in 2018. These local stations are of limited use as they are often out of necessary immunizations, medicines, bandages, and dressings and they often give antibiotics for non-bacterial ailments and consequently too small doses of antibiotics for bacterial infections. The Upiara health center does have trained nurses on staff, beds, and a way to keep records and track pregnancies. For most health matters, villagers must travel to Daru - a multi-day journey by canoe or foot. Even in Daru, obstacles such as hospital fees, shoe requirements, medicine shortages, approval signatures (*e.g.*, from one's husband for gynecological treatment), and a general fear of other sick patients keep many from seeking and receiving health care.

B.20 Funeral traditions

There are many funereal traditions that are observed in Limol. When someone dies, there is a period of mourning that is observed throughout the community. Loud mourning wails announce a death to the immediate neighborhood, and a loud *utt* /uʈ͡ʂ/ 'conch shell' is blown to inform all villagers outside the main settlement that something serious has happened. Messengers then go on foot or bicycle to nearby villages to inform friends and family members. For several days processions of mourning *llabun* /ɽabun/ 'relatives' will come bearing food and supplies for the mourning family. Mourners will mourn together in a common area, wailing, singing, and praying night and day until the day of the burial. The burial typically occurs on a day when the village has been able to go out and chop enough sago and hunt enough meat for the burial feast. Nowadays, a pastor will lead a short service while a group of men digs a grave. The person's possessions and gifts will often be buried in the grave as well.

After the burial, a large feast is held. As with all feasts, a large amount of rice, noodles, or sago will be prepared with any meat that the hunters or fishers managed to acquire. This primary starch and meat will be served in the center of the large dining area, typically the community hall or the rugby field, and families will come with their woven mats, personal plates and cutlery, and additional food from their gardens. Everyone will place their bowl in the center of the room and the community leaders evenly portion out the community food into each plate. Families typically sit together near their neighbors or other members of their clan group. Young men typically sit off on their own. Families will serve up extras of their personal food to give to any guests of honor, and at a funeral feast, the mourning family. This means that sometimes guests will be presented with ten or more plates of food. Not only guests of honor, but all feasters do indeed feast. Portion sizes at a feast are often more than what someone may eat in a typical day, due to a general shortage of food.

Traditionally after a death, one brave member of the community would take a possession of the deceased's, such as their bag or bow, and go out into the bush to spend the night (Zakae, 2016a). This is called *tärämpmeny* /tərəmpmeɲ/. During the night, the volunteer will not sleep but will be visited by spirits and will learn how the death occurred. If multiple people volunteer, they will complete this night in shifts. In the morning, the volunteers will return the possessions to the family and tell them what they learned. The family will welcome them with tears and gratitude. This is no longer practiced.

If it is a married man that dies, there used to be a ritual for the widow. She would be washed in the river, painted with clay, and dressed in tree bark from the *kapang* /kapaŋ/ 'acacia' tree. The widow would wear this tree bark outfit until the feasting and burial were completed (Zakae, 2016a).

The funeral feast used to be called *yu molle täre* /ju moɽe təre/ 'fire scent feast' because on the day of the feast, "people will burn the dead person's house and some of his things, and will throw in bamboo, which will blow up" (W. Warama and Zakae, 2016a

#37). Another feast would be thrown one year after the *yu molle* feast. Usually, around Christmas, the community will redecorate the graves.

B.21 Hospitality

Ngäma mer abal eka da ngäma gänyan ge, lla de bongo ada näga, "Mer ag, mer toto, mer yebdo."
'The best words in our language are these, you say to someone, "Good morning, good afternoon, good day."'
- Geoff Rowak (2018 #238)

Hospitality is a valued and respected character trait (W. Pewe, 2018 #354-355). Though the economy in Limol could be described as a trade and barter system, there is substantial cultural value in taking care of one another. Throughout the day, and especially during mealtimes, the village paths fill with women carrying food to one another's homes. Successful hunts and fishing trips are cause for great joy in the village as the fresh meat gets shared around the village. Strangers to the village are housed and fed well. Even passersby on the roads between villages are typically given a small portion of whatever food or supplies an Ende traveler is carrying (M. Giwo, p.c., 2016).

In Grace Maher's 2015 survey of women's lives, one of the most common responses to questions about personal characteristics that one takes pride in was the desire to welcome and host visitors. Many women explained that when a person comes through the village, they give them food and water, ask them where they are going, give them a place to sleep, and send them on their way when they are ready to continue. Because the village is small, any visitor is known to just about everybody shortly after their arrival. Even if they are not staying the night, visitors, especially those on longer journeys, will take the time to sit and talk with people. They might explain who they are and where they are from, what connections they may have with individuals in the village (*i.e.*, my uncle is from your *tambu*'s mother's village), and what the purpose of their trip is.

This urge to give to the needy is so strong, it even led to the dismissal of the Ende Language Committee from the Lewada Bible Translation Center in 2009, as W. Kurupel (Suwede) and W. Geser would too frequently pass along the agricultural bounty they grew on the compound to their hungry relatives passing by (Shim Jae Wook, p.c.).

It is considered impolite to walk near a group of seated people standing straight up, especially when inside a house. The polite thing to do is to bend down, hold one's skirts, and say *ekskyuz* 'excuse', one of the only loans from Tok Pisin that has made its way into daily speech. It is also considered impolite to drink from a shared cup without pouring out some water when finished (Zakae, 2018 #318).

B.22 Transport

To engage in the local economy, visit friends and relatives, attend school, receive medical care, collect food, and hunt, the Ende community, must adeptly navigate a large swath of the South Fly region. The surrounding villages and major waterways are all connected via a complex network of dirt paths that snake through the bush, leveled roads that have fallen into disrepair, and humanmade bridges that are regularly rebuilt.

People refer to the time as an Australian colony as one of better transportation infrastructure (K. Dobola, p.c.). The roads, limited though they were, were better maintained because they were used by Australian officials. There is one leveled road that runs through the region which connects villages such as Limol, Malam, Wim, Wipim, and Oriomo. While it is possible to travel this road by truck, the uneven terrain, washed out portions of the road, and humanmade bridges make for slow and unreliable travel. There are also very few vehicles in the area, one of note being the truck belonging to the health center at Wipim, which is sometimes used to transport patients. Roads and smaller paths can also be traveled by bicycles, which are ridden almost exclusively by men. Young men, especially, spend a lot of time maintaining and tending to their bicycles, which can be used to transport both people and goods, as well as small children if they can hold on well enough.

The two main types of water transportation are dinghies, fitted with outboard motors, and canoes, which come in various sizes, including larger vessels that have outriggers and can carry many people. Canoes are used locally for fishing, traveling to water-adjacent gardens and camping spots, and going to school in other villages. The larger outrigger canoes can also take people to Daru and are often used as housing while staying in the town. Canoes take time and effort to make, while dinghies and their motors are expensive both to buy and maintain and require petrol. The canoes are also more adept at navigating the narrow channels that connect Limol's canoe spot to the larger Bituri River—places where taking a dinghy means slow going and a lot of pushing.

The Bituri River connects Limol to several other villages, including Upiara and Zanor, and opens out into the Fly River, the formidable body of water after which the region is named (South Fly). People from Limol can travel along this river to Daru, which is a trip that requires some semi-open water travel as well.

Air travel via bush planes is less commonly used, because it is more expensive and requires communication with an agency reachable mostly by telephone. Bush planes in this region are operated by MAF, the Missionary Aviation Fellowship, which operates out of Mt. Hagen. They carry passengers and their cargo for a fee and do some emergency transports as well. Villages near Limol that have airstrips include Upiara, Kapal, and Malam, though only the former two are kept in usable condition. Because the airstrips are grass, they must be kept trimmed and well maintained for the pilots to land, which can cause complications to air travel.

B.23 Law and order

In Limol, there are many official positions named in the community to help keep law and order. Most important are the magistrates, who hold court, counsel defendants and prosecutors, arrange punitive measures, and arrange transport to higher courts in Daru, Morehead, or Port Moresby, if necessary (M. Bodog, 2018). Police officers are also assigned in Daru and help the magistrates maintain order. These two positions replaced an older officer position called *mamos*, which was a position of high prestige doled out by some of the first Australian patrols in the area in the 1940s and '50s. These positions are supposed to be paid positions by the government, but issues in getting money into the accounts, and getting money from the accounts in Daru, means that these positions are rarely funded, which has led to general unrest. Elders, pastors, and other community leaders also play a significant role in keeping law and order within the community.

Common disputes and crimes include land disputes, exchange and marriage disputes, arson, theft, damage to property (A. Nama, 2018), sorcery-related charges, domestic assault (Sarbi Kurupel, 2018b #127-128), and sexual assault.

Typical punishments for crimes include monetary fines (*e.g.*, 10 kina per assault as witnessed paid in 2017) or girl retribution (*i.e.*, giving a young girl to another clan for use in sister exchange).

Appendix C: Historical profile of Ende

C.1 Origins and ancestral life

When Ende speakers discuss ancestral life or *masarmasaraba wa kakakaba ttam giddoll* ‘the life and way of living of our grandfathers and grandmothers’, speakers are typically referring to the time before foreign occupation, religious missionization, and general government interventions in the area. For many speakers, this is indeed the time of the grandfathers and grandmothers as the first reports of missionaries came in the 1930s, the first reports of government patrols came in the 1940s, and the “old way” of living persisted until at least the 1970s (W. Geser, W. Kurupel (Suwede), p.c., 2018). Many aspects of ancestral life and contemporary life are similar, in that most of the community that resides outside of the townships still engage in traditional agricultural, hunting, transportation, and other cultural practices. In 2018, the participants of an eight-week technology class produced a documentary film that depicts traditional ways of life before the Christian gospel came to the Ende tribe (T. (Tonzah) Warama, Lindsey, & The Ende Language Committee, 2018). Some of the most salient differences reported in the film between the “old ways” and the “new ways” were the advent of manufactured clothing, metal tools, raised houses, Western medicine, and schooling. The following descriptions come from conversations with and memories of elders living in Limol, the collaborative documentary, and an informational book written by Warama Kurupel (Suwede) (Kurupel (Suwede), 2016).

C.1.1 Origin story of the Ende language

As told with permission of story-owners D. Kollowam (2015) *and J. Ben Danipa* (2017b)

This is the origin of Ende language.[66] The Ende language began in a place called Boze. In Boze, there were two *tawe* palm trees. One was *gogo* (green) and the other was *pall* (red). These two palms were twinned and their trunks intertwined. At the base of the two palms

[66] At first, these words were sacred and kept secret. This story I’m telling right now was not told to everyone, but only to those who were owners. Only they knew this story, to whom the language was given, who was present at the origin (D. Kollowam and J. Ben Danipa, p.c.).

were two conch shells. These conch shells were word wombs and held the first words of the language. The *gogo* palm's conch shell held the first Ende words and the *pall* palm's conch shell held the first Agob words. Near the base of the *gogo* palm was the owner of the Ende language. His name was Ginarang. Near the base of the *pall* palm was the owner of the Agob language. His name was Umbuzag. From the bark of the *gogo* palm, Ginarang fashioned a bullroarer.[67] Umbuzag fashioned a bullroarer from the bark of the *pall* palm. In this setting, the language came out in multiple ways. First, the words of each respective language came out of their conch shell. Second, the words came out when the bullroarers were swung. Third, the words came out from the trunks of the palms as they rubbed on one another. Out of the *gogo* palm's rubbing came the Ende words "Ende, Endeya, Endan." From the rubbing of the *pall* palm came the Agob words "Agde, Agob, Agde." Finally, the two language owners used these words meaning 'what' to speak to each other, when they could not understand the other. From these words come the names of the two languages and in this way the language began to come out. The languages were built up and became big. The words joined and joined and, in this way, the Ende language and the Agob language were formed.

C.1.2 Ancestral life

There are many practices and ways of life that were practiced by the Ende community before the significant cultural shift of the 1970s that are still practiced today. However, this section lists just a few practices that are no longer as widely practiced as before, if at all.

Before the 1970s, when the cultural effects of missionization and governing bodies had an impact on Ende daily life, the Ende community did not live in large villages of about 300 people but in small family- or clan-based settlements of about 10-15 people that moved throughout the year depending on the season and the agricultural activity. Houses were not built on stilts as they are now, but from plant material on the ground surrounded by concentric fencing for protection. During these times, men were very strong. They lived in

[67] The bullroarer (*waglla* /wagɾ̪a/) is a sacred and powerful instrument made from the bark of trees, especially the *tawe* palm. When swung over one's head, it can be heard for miles. The bullroarer originally belonged to the woman and swung from her vagina. Man was jealous and stole the original bullroarer from the woman by ripping it from her, taking her power and starting her suffering, including her monthly bleeding. (D. Kollowam and J. Ben Danipa, p.c.).

separate houses from women and children and did not eat fatty or greasy foods like *porma* until they were already old (Kurupel (Suwede), 2016). Both men and women wore woven grass skirts, cane bands on their arms and legs, and flowers or bones in their pierced ears and noses. Nose and ear piercing was done at a very young age, possibly 1-3 years old, with the wing bones of fruit bats (D. Kurupel, 2018b #38; Zakae, 2016d). Just like piercing, most daily activities that today involve the use of plastic or metal tools were once done with plant-based materials, including fetching and storing water, shooting prey, chopping trees, and building houses (Kurupel (Suwede), 2016).

Another major cultural difference between pre-colonial times and the present is the prevalence and practice of *omäg* /oməɡ/ 'magic and sorcery'. *Omäg* was (and perhaps still is) very common in the Pahoturi River area and the southern New Guinea region. Running from sorcery is one of the primary reasons cited for migrations to Limol (*e.g.,* Sowati Kurupel, 2018e #152-153) and is still brought up in court hearings and rumors around the village.

There are at least three types of *omäg*: *mawa*, *midi*, and *obe*. An *omägag* 'sorcerer' that practices *mawa* will disappear from his present location, appear in another village as a pig or a snake, murder someone, and then reappear back in his own village (W. Geser, p.c., 2018). To practice *midi*, an *omägag* must collect some food crumbs, hair, a thread of their clothing, or even the excrement of a person, whom they wish to curse. With this artifact in hand, the sorcerer will tie it, mix it with other things, put it on the fire or in some hiding place, and say some *meyameya* /mejameja/ 'curse or magic word'. This person will then get sick and if the personal artifacts are not found the person will die. Therefore, people take care to properly dispose of and/or put away all personal belongings and not to sleep in such a way in which their belongings or their hair might be stolen. An *omägag* that practices *obe* will go inside or transform into a bird, eagle, or flying fox and fly to where people are gardening or making sago, then talk to the people he's angry with. Some sorcerers use magic to *kmakme* 'heal' people. See the 2018 documentary to watch a reenactment of a magical healing of someone suffering from *tɨke* /tɪke/, an illness when a bone or tooth, usually from a pig or crocodile, is stuck inside someone (T. (Tonzah) Warama, Lindsey, & The Ende Language Committee, 2018).

When Ende people first observed WWII planes, Australian surveyors, and later missionaries from western countries, there was a great deal of fear. Children, especially young girls, were hidden in the bush (Koe, 2018; Sarbi Kurupel, 2018b). Although the word for 'white person', *gabma* likely a shortened form of *gabman* 'government', is innocuous enough, words for clothing, *iddpo* and *kaptte* are derived from the word for devil or evil spirits. During this time, there was a belief that white people were ghosts or spirits of recently deceased people. Although this belief is currently scoffed at in the community, there is still a desire to name visiting white researchers after beloved, deceased relatives, with which the researcher shares some similarities, such as body type, nose shape, fondness for reading, personality, etc. If the visitor accepts this name, they would then assume their namesake's position in the kinship system, instantly a mother, grandmother, and great grandmother to many.

C.2 Missionary activity

First reports of missionaries in the area came to Limol in the early 1930s.[68] These missionaries came to Madiri in 1931, then crossed the Fly river to Washua, and finally settled in Balimo, a Gogodala speaking village. This became the main missionary base for the region. A bible school was founded there and many Balimo residents studied to become pastors and missionaries themselves.

The first missionaries to come to the Ende tribe were three Gogodala missionaries in 1961 (Sobam, 2018b #94): Bagiya and Butumi came to Limol (Kibobma) and Baruma came to Malam. They preached in Motu and Kidarga Nakllae and Joanang translated for the village. After this, two Ende men from Malam, Diwa and Dipa Nägäm, went to Balimo to study at the bible school. Diwa completed his training in Balimo, but Dipa transferred to the new bible school in Upiara. A bible school and primary school were opened in Upiara in 1965. Like in Balimo, the Upiara bible school was taught in Gogodala language, here by Abilo Danaeya.

[68] All the information in this section including dates and names came from unrecorded conversations with Wagiba Geser and Warama Kurupel Suwede in 2018. Events prior to 1970 were related to them from their elders, however the couple was directly involved in the events that followed, having assumed positions of pastors, translators, and hosts for visiting missionaries and researchers.

In the 1960s and 1970s, many missionaries came through the area on visits including Mr. Dis, Mr. Horn, Mr. Schnoden, Mr. Kergan (all based in Balimo), and Mr. Merriweather (based in Washua). They founded a store with small goods in Upiara to support the missionaries and pastors, called *Pasuwe* ‘for the pastors’.

In 1977, missionaries Sandy and Coralyn Brown came to Upiara. They restarted the bible school which had since closed, this time in English. Two waves of bible students from Limol went to Upiara to study. In the first wave were Paine and Asika Kurupel, Karea Mado and Naimäll Kurupel, Kwale Geser, Manggeya Nama and Duiya Sobam , and Semi. In the second wave were Wagiba Geser and Warama Kurupel (Suwede). The Browns stayed in Upiara for many years. Three men in Limol are named Matthew after the Browns’ oldest son.

In 1980, a team of researchers from Mount Hagen came to stay with the Browns in Upiara for one month. They conducted a linguistic survey by sending a call out for representatives of all the language groups in the area to come to Upiara. They recorded songs and stories. One of the researchers was named Debra, and she came to visit Limol (Kibobma). She is remembered fondly and was given the name Mund, because she reminded those in Limol of one of Kurupel Suwede’s oldest daughters, who had passed away.

In 1982, Patty Thomas, an American, came to Upiara. She came to Limol (Kibobma) with the Browns to teach Sunday School lessons. She is also remembered fondly in Limol and Warama wonders whether she married that pilot and if she remembers the sago plane that he built for her. After Patty Thomas’ visit came a woman named Robin, who after staying in Upiara and visiting Limol (Kibobma) went home, married a man named Tom Coleman, and together they went to Dimsisi. Finally, in 1987, Jeff Dial and Rob Lewis came to Upiara and visited.

In 2003, Korean Shim Jae Wook and his wife founded a Bible Translation Center in Lewada. That year they surveyed the area and asked interested churches to apply to send representatives to the center to translate the Book of Mark into their languages. The seven languages chosen included three Pahoturi River languages (Ende, Kawam, and Taeme[69]), three Anim languages (Bitur, Kiunum or Waradai,[70] and Makayam), and Baramura. The Ende language was represented by Warama Kurupel (Suwede) and Wagiba Geser (Limol village), Kawam by Nukmi Yowade (Wim village), and Kiunum by Dewara village. These language groups worked at the center from 2004-2011, developing orthographies, storybooks, and bible translations, with additional help from Australian Wycliffe translators. Since then, the bible translation center has closed and is now a bible school.

C.3 Education and government activity

The Australian patrols came through first in the 1940s and 1950s. They were surveying the places, marking district lines, getting population numbers, and giving work to make roads. As they patrolled, the officers assigned *mamos* /mamos/ positions to heads of tribes (P. Kurupel, 2018d). They wore special uniforms and were awarded medals. These people brought criminals to Morehead for trial (K. Kidarga, 2018b).

The surveyers didn't bring any infrastructure or services to the communities in the South Fly. It was the missionaries who helped establish schools, aid posts, and stores. After World War II, many men were solicited to travel to Port Moresby to help expand the capital. Some of the oldest men in Limol (K. Nakllae, B. Kangge) did this work, and in doing so brought back knowledge of Motu and English to Limol (Kangge, 2018).

In 1975, Papua New Guinea became an independent country, which was a significant cause for celebration in Limol (K. Dobola, 2018b). Independence Day is still celebrated annually on September 16 with a big feast, sports, and games.

C.4 Mining and other commercial activity

There is a fair amount of mining and other commercial activity that takes place in Western Province and the general region of the Fly River. The Ok Tedi Mine, an open-pit copper and gold mine in northern Western Province near the headwaters of the Ok Tedi River,

[69] The Taeme group did not finish their translation work due to transportation problems.

[70] Kinum is a new endonym for the language previously known as Waradai. *Waradai* may come from English *well done*, a phrase reportedly picked up from praises of the first Europeans in Dewara village (Kurupel (Suwede), p.c.).

which feeds into the Fly River. The Ok Tedi Mine is the largest industry in the province and has caused widespread environmental and social harm to the more than 100 villages that are located downstream. Released chemicals from mining processes have killed and contaminated fish, which has harmed the entire ecosystem, including peoples living in the area. Moreover, dumping of the mine into the river has caused flooding in agricultural areas, contaminating important crops and ancient sago groves, and raised the floor of the river, preventing water transport from navigating the shallow waters. Though the Ende tribe has been negatively affected by the Ok Tedi Mine but has not received any reparations, like those tribes who live closer to the Fly River.

In the 1970s, agricultural scientists from Daru came to Wipim, Malam, and Limol to plant rubber trees (W. Geser, p.c., 2018). These industrialists brought the seeds and the villagers made nurseries, then moved the trees into plantations. Malam had one and Limol had two rubber plantation blocks. These trees are massive now, but the rubber had to be carried on foot to Wipim, and the effort was not worth the pay. So, the rubber plantations fell into disuse.

Because of this, there is much distrust for these types of industries among people in Limol, whose relationships with these companies have been mostly exploitative. Sightings of pipes are talked about in hushed tones and have an air of conspiracy, which makes it hard to gauge what activity has taken place in the area and how much communication there has been between the parties involved.

Appendix D: The Ende language project

D.1 Development

All the Ende data used for the descriptions and analyses presented in this dissertation were collected as part of the Ende Language Project, a multi-year project hosted in Limol village, Western Province and headed by Warama Kurupel (Suwede).

The Ende Language Project refers to all the organized efforts conducted by members of the Ende-speaking villages of Limol and Malam to promote literacy of the Ende language and preserve their linguistic and cultural heritage. These efforts originated in 2003 when the Ende tribe received an invitation from the Lewada Bible Translation Center in the nearby village of Lewada on the south bank of the Fly River. The village was asked to send several volunteers up the Bituri River to spend several years in Lewada translating the biblical book of Mark into Ende. Pastors Warama Kurupel (Suwede) and Wagiba Geser, married and recent bible school graduates, answered this call and moved to Lewada with several family members including their son Tonny (Tonzah) Warama.

While at the Lewada Bible Translation Center, the family worked with Shim Jae-Wook (SIL) to establish an orthography for Ende and produce a short Ende reader to test it. In 2007, they finished translating the Book of Mark into Ende, which is now a great source of pride among the Ende tribe. The family then returned to Limol village to train others to read and write the Ende language.

In 2013, Warama traveled to Bimadbn with his sons Tonny and Matthew to meet with linguist Nicholas Evans, who was in Bimadbn on fieldwork. They made an official request for a linguist to come to Limol and help continue the work they had started. In 2015, this video was sent to me when I reached out to Nick for contacts in the area. I had first become acquainted with the Pahoturi River language family as a student at the Linguistic Society of America's 2011 Summer Institute, where Nick Evans and Idi-speaker Wasang Baiio led the field-methods course on the Idi language. I responded to Warama's invitation, which initiated my involvement in the Ende Language Project.

My first trip to Limol village in 2015 was financially supported by the Firebird Foundation, a fieldwork grant through the Stanford Linguistics department, and a Braden

Storytelling Grant. I traveled with Grace Maher and in three weeks, we collected 25 hours of audio recordings, jumpstarted the Ende dictionary project by collecting 3000 words for the Ende-English lexicon (Lindsey & The Ende Language Committee, 2015), and produced a short radio segment about the project (Lindsey, 2016a). This rapid word collection was facilitated by using the semantic domains list provided in the software program Fieldworks Language Explorer (FLEx) and local dictionaries including Nen (Evans, 2019a) and Idi (Schokkin & The Idi Language Committee, 2019).

My second trip to Limol village in 2016 was financially supported by the Firebird Foundation and Stanford University's Community Engagement Grant. I traveled with Grace Maher, Catherine Scanlon (Oxford), Gwynn Lyons (Stanford), Elizabeth Conlan, and Diana Johnson. In seven weeks, we collected nearly 20 hours of audio, mostly stories and songs, and assisted in three Ende books for the elementary school (D. Johnson, Lindsey, Karao, Kurupel, & The Ende Language Committee, 2016; D. Johnson, Lindsey, & The Ende Language Committee, 2016a, 2016b).

My third trip to Limol village in 2017 was financially supported by the Firebird Foundation, the American Philosophical Society (Lewis and Clark Exploration Grant), Stanford University's Vice Provost for Graduate Education (Diversity Research Opportunity) and the School of Humanities and Sciences (Graduate Research Opportunity). I traveled with Grace Maher and Lauren Reed (Australian National University). In seven weeks, we collected just over 15 hours of audio and helped with three more Ende books for the elementary school (Lindsey, Warama, Kaoga (Dobola), & The Ende Language Committee, 2017; Reed, Lindsey, & The Ende Language Committee, 2017a, 2017b).

My fourth and fifth trips to Limol village in 2018 were also financially supported by the Firebird Foundation. In five months, I collected nearly 55 hours of audio and video recordings, including a large sociolinguistic corpus of interviews with 73 Limol residents. I also helped produce a hymnal of Ende songs for the church (Lindsey, Kurupel (Suwede), Warama, & The Ende Language Committee, 2018) and taught an eight-week technology class, through which the community produced a documentary about a signiicant period in their history (T. (Tonzah) Warama, Lindsey, & The Ende Language Committee, 2018). Grace Maher visited for seven weeks during this year, and in that time, she continued her health training with community members and assisted in opening the first medical aid post in Limol village.

Throughout all these trips, my team was housed and fed primarily by Wagiba Geser and her family with help from many other families in the village. All supporters of the Ende Language Project were compensated for their time and effort.

Needless to say, the Ende Language Corpus and this dissertation would not be what they are today without all the granting agencies that contributed to the necessary travel and equipment costs incurred and allowed us to generously compensate Ende speakers in a way that our student stipends would not have made possible. A list is included below, and my gratitude is also expressed in the Acknowledgements.

Table 110: Funding agencies for the Ende Language Project

Funding agency	Award	Year	Grantee(s)
Firebird Foundation for Anthropological Research	Firebird Fellowship for the Collection of Oral Literature and Traditional Ecological Knowledge	2015 2016 2017 2018	K. Lindsey K. Lindsey, E. Conlan, & D. Johnson L. Reed K. Lindsey
Stanford Storytelling Project	Braden Storytelling Grant	2015	K. Lindsey & G. Maher
Stanford Linguistics Department	Fieldwork Grant	2015	K. Lindsey
School of Humanities and Sciences & the Vice Provost for Graduate Education, Stanford University	Stanford Community Engagement Grant	2016	K. Lindsey
University College Oxford	Academic Opportunity Fund	2016	C. Scanlon
Stanford University	Undergraduate Advising and Research Major Grant	2016	G. Lyons
American Philosophical Society	Lewis and Clark Exploration Grant	2017	K. Lindsey
Vice Provost for Graduate Education, Stanford University	Diversity Dissertation Research Opportunity	2017	K. Lindsey
School of Humanities and Sciences, Stanford University	Graduate Research Opportunity Funds	2017	K. Lindsey

D.2 Methods

Ende language data were collected in three locations: the town of Daru, and the villages of Limol and Malam. All participants, whether they were involved in the data collection or data annotation, understood that their participation was voluntary and could be made anonymous. Discussions of privacy and ownership came up for three main topics. Sacred stories, also called *pepeb*, especially when told by speakers who do not own those stories should be kept secret and not recorded or shared. Similarly, discussions on language that are not one's own should not be recorded or shared. Finally, some speakers requested that video recordings containing their image, but not audio recordings, be kept private. These requests have been honored in the corpus and are not referenced in this dissertation. A video recording of one of these community discussions is accessible through the archive (T. (Tonzah) Warama, Lindsey, Nakllae, et al., 2018).

D.2.1 Equipment

Most of the audio recordings from 2015-2016 were made using a Zoom H4N audio recorder with a hand-held or lavalier microphone. In 2017, recordings were made using a Zoom H4N or a Zoom H5 audio recorder and exclusively head-mounted microphones. In 2018, all recordings were made with a Zoom Q8 video camera and head-mounted microphones.

D.2.2 Types of data

The types of language data collected can be categorized into three basic types: spontaneous, prompted, and elicited. Spontaneous recordings were initiated by an Ende speaker and typically included narratives, conversations, and songs. Prompted recordings were typically initiated by a researcher but the speaker had a choice in how to respond to the request. For example, a prompt for a prompted session could be: *Tell me about a time when you killed a crocodile*, or *What are some words you might say to someone who you just met*. Finally, elicited sessions were much more controlled, and speakers were typically asked to translate a passage, read something out loud, repeat something that they said earlier, or answer precise grammatical questions.

In terms of genre, the language data can be categorized into five basic types: elicitation, narrative, song, formulaic discourse, and interactive discourse. Elicitation sessions are typically focused on linguistic questions having to do with the grammar or the lexicon. Narrative sessions contain stories and are typically told by one person without a natural audience in front of them. Song sessions include spontaneously recorded singing, community-wide performances, and a collection of religious songs recorded for posterity. Formulaic and interactive discourse sessions are the most natural session types. Formulaic discourse is typically told by one person in front of a natural audience. Such sessions include speeches, announcements, and sermons. Interactive discourse sessions typically include two or more speakers having a conversation.

Finally, the language data can be classified in terms of mode of delivery. There are three types: spoken, read, and written. Spoken sessions do not involve any reading or reference to written material. Read sessions are audio/video recordings of a speaker reading a prepared text out loud. Written sessions are texts written by a native speaker and often edited by multiple speakers.

Based on these criteria, each session has a seven-digit ID that can be decoded as shown in the key in Table 111. For example, the session SE_SN001 will include a recording of Spoken Ende of type Spontaneous Narrative, along with accompanying metadata and annotation files.

Table 111: Session ID Key

Mode	Language	Spontaneity	Genre
S (spoken)	E (Ende)	S (spontaneous)	E (elicitation)
R (read)	A (Agob)	P (prompted)	N (narrative)
W (written)	I (Idi)	E (elicited)	S (song)
O (overheard)	K (Kawam)		F (formulaic discourse)
	M (Em)		I (interactive discourse)
	T (Taeme)		

The following table gives a quick summary as to the contents of the corpus.

Table 112: Session types

	Session Type	Number of Sessions	Duration (mins)
	Total	757	5495.2 (91.6 hrs)
Mode	S (spoken)	593	4964.2
	R (read)	78	531.0
	W (written)	86	0
Language	E (Ende)	690	5071.8
	A (Agob)	15	130.9
	I (Idi)	3	60.7
	K (Kawam)	9	54.8
	M (Em)	4	46.5
	T (Taeme)	9	65.1
Spontaneity	S (spontaneous)	407	1393.0
	P (prompted)	193	2445.2
	E (elicited)	157	1548.1
Genre	E (elicitation)	75	1254.0
	N (narrative)	267	916.2
	S (song)	224	493.2
	F (formulaic discourse)	35	226.7
	I (interactive discourse)	144	2601

Methods of data collection

The recordings and accompanying annotations and metadata were all collected in places where the Ende language is commonly spoken. That is, we recorded primarily in the villages of Limol and Malam and also in the nearby township of Daru. As the project was initiated by the Ende Language Committee, based in Limol, this committee had a major influence on the types of data to be collected and the methods of collection. Approximately half of the data sessions were spontaneously initiated by Ende speakers. Story owners, historians, pastors, and community leaders came with texts and stories to contribute to the Ende Language Corpus. These texts were collected for the corpus in multiple ways. First, I asked the speakers to deliver a spontaneous version of the text (whether they had it prepared already or not) ideally in front of a live audience. Then, once the story was written down, a team of authors worked together to edit the text for publication. Finally, the edited story was read out loud by the original author or one of the editors. These texts are codes as *narratives* in the corpus.

Another method of data collection involved elicitation methods used by variationist fieldworkers in The Wellsprings of Linguistic Diversity, a five-year Laureate project awarded by the Australian Research Council to Nicholas Evans, seeking to address fundamental questions of linguistic diversity and disparity through an analysis of linguistic variation and change. The Ende Language Corpus includes “coconut interviews”, a type of interview that takes place near a coconut tree and involves a solicited autobiography of the owner of the coconut tree and a short narrative about the coconut tree itself (see W. Bewag & Warama, 2017; W. Geser, 2017e; G. Jerry & Kaoga (Dobola), 2017; R. Kurupel & Kurupel (Suwede), 2017). The corpus also includes five trials of the Family Problems Picture Task, the primary elicitation tool in the Social Cognition Parallax Interview Corpus (SCOPIC; Barth & Evans, 2017). Each of the five trials of the task includes four video-recorded sessions, the first of each are referenced here (E. Baewa & Kidarga, 2018; K. Baewa & Kesama, 2018; W. Geser & Rind, 2018; T. (Kwalde) Jerry & Sowati, 2018; Sobam & Dareda, 2018). Another elicitation tool that I used was the Yamfinder Lexical Database survey, which is a wordlist tailored specifically to the Southern New Guinea region and has been used broadly across the area (Carroll et al., 2016). I also made good use of MelaTAMP storyboards developed by K. von Prince in 2017 and Totem Field Storyboards developed by the Totem Field Storyboards Working Group in 2011 (TFS Working Group, 2011; K. von Prince, 2017). The last major elicitation tool that I used was a Sociolinguistic Questionnaire based on similar interview surveys conducted in the region by C. Döhler and D. Schokkin. This questionnaire was then administered in a monolingual interview format to 73 Ende speakers in Limol and Malam across multiple age groups and clan groups. These interviews can be found in the corpus in sessions SE_PI045-SE_PI118, and the questions are copied below.

Sociolinguistic Questionnaire

Questions on the Sociolinguistic Questionnaire conducted in 2018. Questions were translated into Ende by Warama Kurupel (Suwede) and Wagiba Geser.

1. *Bäne bin a ainen?* (What is your name?)
2. *Bäne bin di ddob lla da alla ingollang ttaem erallo?* (What other names do people call you?)
3. *Bongo erame gozeg?* (Where were you born?)
4. *Bongo era pazi mi gozeg?* (In which year were you born?)
5. *Ainen bäne mälläll a?* (Who is your size?)

6. *Bongo erame ulle gog?* (Where did you grow up?)
7. *Aeya bam ulle dagän?* (Who raised you?)
8. *Bongo dalle skul i?* (Did you go to school?)
9. *Angde?* (When?)
10. *Erowe?* (Where?)
11. *E eka walle de skul gogne?* (Which language(s) was school in?)
12. *Aoli pazi bongo skul gog?* (How many years did you go to school?)
13. *Era eka walle bäne nagnag aba peyang skul mi eka gontemenyne?* (Which language(s) did you talk to your friends with in school?)
14. *Bongo ako ttongo ttängäm me dagirne?* (Have you lived anywhere else?)
15. *Sisri bongo erame giddollnen alle?* (Where do you live right now?)
16. *Aoli lla da bäne ma me giddollnen eran?* (How many people live in your house?)
17. *Ubi ami dag?* (Who are they?)
18. *Bongo e bin dan Llimoll me?* (What position(s) do you have in Limol?)
19. *Bäne mabun a endan?* (Which clan are you a member of?)
20. *Ere eka de bongo panynen anggalle o bäne umllang dan?* (Which language(s) do you speak or do you know?)
21. *Bongo erem eka de ttänganen anggalle wa darbänen anggalle?* (Which language(s) do you read and write in?)
22. *Erem eka de bongo panynen anggalle ge ere ddob lla da ddone ttättle bägaeyo?* (Which languages do you speak and feel no one will correct you?)
23. *Ere eka walle bongo bäne ma me ekalle?* (Which language(s) do you speak at home?)
24. *Bäne baba bo bin a ainen?* (What is your father’s name?)
25. *Bogo era ttängäm att dan?* (Where is he from?)
26. *Obo eka abal a eran?* (What is his language?)
27. *Ere eka walle bongo obo pate ekalle?* (Which language(s) do you speak with him?)
28. *Ngämlle nɨllɨt bäne baba alla ingoll dan/daeya?* (Tell me, what is/was your father like?)
29. *Bäne yae bo bin a ainen?* (What is your mother’s name?)
30. *Bogo era ttängäm att dan?* (Where is she from?)
31. *Obo eka abal a eran?* (What is her language?)
32. *Obo mabun a endan?* (What clan is she a member of?)
33. *Era eka walle bongo obo pate ekalle?* (Which language(s) do you speak with her?)
34. *Ngämlle nɨllɨt bäne yae alla ingoll dan/daeya?* (Tell me, what is/was your mother like?)
35. *Era eka walle bäne masamasar a bäne pate ekanggan/eka gognegnän?* (In which language(s) did your grandparents speak to you?)
36. *Era eka walle bäne mosenmosen wa mänyanmänyan aba peyang eka tameny alle?* (Which language(s) do you use to speak to your siblings?)
37. *Era eka walle bongo mɨnyi kame lla de o sisor lla de eka nantameny, da nangerängg nyongo me?* (Which language(s) will you use if you meet someone on the road?)

38. *Bäne mälla da daden?* (Do you have a wife?) *Bäne gullbe da daden?* (Do you have a husband?)
39. *Obo bin a ainen?* (What is their name?)
40. *Obo mabun a endan?* (What clan are they a member of?)
41. *Obo eka abal a eran? (*What is their language?)
42. *Bogo era ttängäm att dan?* (Where are they from?)
43. *Era eka walle bongo obo pate ekalle/eka gogne?* (Which language(s) do you use with them?)
44. *Ngämlle nɨllɨt bäne mälla alla ingoll dan/daeya?* (Tell me, what is/was your wife like?)
45. *Ngämlle nɨllɨt bäne gullbe alla ingoll dan/daeya?* (Tell me, what is/was your husband like?)
46. *Bäne llɨg a daden?* (Do you have children?)
47. *Era eka walle bongo bäne llɨgaba pate ekalle?* (Which language(s) do you use with them?)
48. *Bäne kokok a daden?* (Do you have grandchildren?)
49. *Era eka walle bongo bäne kokok aba pate ekalle?* (Which language(s) do you use with them?)
50. *Era eka walle bongo za ttänganen anggalle?* (Which language(s) do you use to count?)
51. *Era eka walle bongo ngonomeny alle wa yon inu alle?* (Which language do you think and dream in?)
52. *Bäne mokowang eka da era ingguimeny me?* (Which language(s) do you like to joke in?)
53. *Bäne eka da endan?* (What is your language?)
54. *Aoli lla da bäne eka de panypeny erallo?* (How many people speak your language?)
55. *Erame?* (Where?)
56. *Tämamae lla da Llimoll me Ende eka de panypeny erallo?* (Does everyone in Limol speak Ende?)
57. Ematta? (Why?)
58. *Ddob lla da Ende eka de kolloekolloe panypeny erallo?* (Do some people mix language when they speak Ende?)
59. *Ematta?* (Why?)
60. *Bongo alla ingollang ngonomeny alle ami Ende eka de ddone panypeny erallo Llimoll me o kolloekolloe panypeny erallo?* (What do you think about people who do not speak or mix Ende?)
61. *Bongo ere eka de ngonomeny alle ada mer abal eka dan?* (Which language(s) do you think are beautiful?)
62. *Eran mäzi abal bina eka da eran mokowang a?* (Which language(s) do you think are useful?)
63. *Erem bongo ngonomeny alle ada bäne llɨg mɨnyi ge eka de mokowang bägaeyo?* (Which languages do you think your children need to know?)

Methods of data annotation

Annotation of sessions began almost immediately after recording. All recordings were uploaded into Saymore, a database program for organizing data, annotations, and metadata files within folders called sessions. Basic metadata for each session, including mode, language, spontaneity, genre, speaker, speaker characteristics, location, and a brief description were recorded for each session. In 2015 and 2016, recorded sessions were transcribed in linguist-speaker pairs, in which typically one linguist and one to three speakers assisted in listening to a recording and writing it down accurately. Once the text was written down, these linguist-speaker pairs went back through the text to gloss each word or phrase and translate the text into English. This was all done by hand and input into an ELAN/FLEx workflow ex-situ. In 2017 and 2018, Tonny (Tonzah) Warama and Warama Kurupel (Suwede) began to transcribe recordings independently. These were handwritten into notebooks by Tonny and Warama, typed and aligned in ELAN by me, then glossed and translated in FLEx.

In total, the annotated Ende Language Corpus includes 206,401 words, of which 11,803 are unique.

We had many community meetings to discuss how the language should be represented in writing. The orthography is based on the orthography developed by the Ende Language Committee in collaboration with SIL in 2007. Ongoing discussions include whether case enclitics or auxiliary verbs should be written as separate words from their lexical hosts.

Methods of data preservation

The Language Corpus of Ende and other Pahoturi River Languages (AKA the Ende Language Corpus) has been archived through the Firebird Foundation for Anthropological Research since 2015 and through PARADISEC (collection LSNG08) since 2017 (Lindsey, 2015). As of March 2018, the corpus consists of 757 sessions, consisting of audio, video, or written material, see Table 112.

D.2.3 Positionality statement

I am including here a statement about my positionality as a researcher so that the reader may be able to make an informed judgment as to what extent my background, beliefs, and experiences may have influenced my research process, interpretation, and understanding.

My intended research is centered on the investigation and celebration of the diversity of linguistic structure, especially of languages that are understudied or are underrepresented in the academic literature. My interest in minority language communities and linguistic diversity was stimulated by my upbringing on and near the traditional lands of the Wiyot, Yurok, Karuk, and Hupa peoples of northern California, where my great grandparents settled coming from Boston in 1944. As an inheritor to the privileges won by the disturbing legacy of settler violence on indigenous peoples, cultures, and languages in my hometown, I approach my work with other minority language communities with a sense of responsibility for wrongs that have not and cannot be corrected.

My interest in languages began when I was young and throughout my education, I've spent time analyzing and/or learning the following languages: Amharic, Arabic (classical), Chuvash, Czech, Ende, English, French, Idi, Malayalam, Picard, Russian, Tamazight, Thai, and Turkish. The structures of these languages may have biased my language learning and understanding of Ende.

The present investigation into the phonological structure of the Ende language was heavily influenced by my advisors. In 2015, Nicholas Evans introduced me to Warama Kurupel, the director of the Ende Language Committee, which established this dissertation research. Warama Kurupel (Suwede) and the Ende Language Committee initiated this project by inviting me to Papua New Guinea. I had very limited relations to and experience in Papua New Guinea before beginning this project. As the project was community-initiated, I felt very strongly that members of the Ende Language Committee be involved in the project as much as they desired. Each visit to Limol, I taught daily classes in lexicography, transcription, audio/video recording, and filmmaking. This allowed the community to play a very active role in the development and management of the Ende Language Corpus. In terms of outcomes, I attempted to prioritize products that would benefit the community as well as those that would satisfy my progress through my doctoral program. These included a dictionary, schoolbooks, a hymnal, a documentary, as well as a published archive, articles and conference papers, and this dissertation. Because community engagement was a priority for me, I made sure to budget for the personnel, resources, and training to involve the community in the project.

Incidentally, I learned field methods from Nick and his co-instructor Wasang Baiio, an Idi speaker, at the LSA Institute in 2011. This course also influenced my methodologies while I was working in Papua New Guinea. My choice of topic, ghost elements in Ende phonology, arose organically from exciting patterns that I observed while processing the data. But one could also say that I was primed to notice these patterns given my training in phonological theory and analysis by my advisors at Stanford: Arto Anttila and Paul Kiparsky. Indeed, their instruction and influence are also evidenced in my chosen theoretical framework, Optimality Theory, within which they have both played vital developmental roles.

The types of Ende language that I was able to observe and then collect was also influenced by my identity and experience. My race, age, gender, nationality, and class afforded me access to certain types of data. As a white person and as an American, I felt that I was immediately privileged in most contexts in Papua New Guinea. During my eleven months in the village, I was treated as a guest of honor and was given access to everything I asked for, whether that be space, information, assistance, other resources, etc. However, the color of my skin and my foreignness were extremely uncommon in the area and because of this, I feel like the usual issue of the observer's paradox was amplified in my situation. The 'naturalness' of my recordings may not be optimal, but they are at least controlled since I was present for nearly every recording. As Ende speakers became more comfortable with the recording technology, more sessions were led by Ende speakers without my supervision.

Outsiders in Limol are often connected with medical or governmental services and women are generally burdened with the emotional and physical labor of caring for others. Because of this, much of my time in the field was spent fulfilling requests for medical and social services. In extreme cases, this meant I was unable to do linguistic work for several days as I and/or my team tended to acutely ill patients, assisted in community projects like toilet digging, or performed manual labor, like hauling food from the gardens and water from the wells for ourselves and our neighbors.

I was, however, privileged in my status as a young woman. Although I am married, I am childless and was considered a single woman in the village. This afforded me the expectation that I would still be cared for by surrogate parents. If I were older than I was, if my partner had traveled with me, or if I had children, I may have been expected to learn how to garden, cook, and clean for myself and my family. I witnessed how older female researchers were expected to do this in other field sites. Because it was socially acceptable for me to accept (and compensate) the gardening, hunting, and cooking of others, I was able to spend much more time investigating the language.

D.3 Language experts and collaborators

This dissertation is based on the data collected in the Ende Language Corpus and the Ende Language Corpus would not be what it is without the hard work of Ende language experts and my team of collaborators who came to Limol with me between 2015 and 2018. Although nearly 150 individuals contributed to the Ende Language Corpus in these years, for reasons of space, I will only list those with more than the average of 16 recorded contributions here.

Language experts

Warama Kurupel (Suwede) is the founder of the Ende Language Project and a champion for literacy. Warama contributed many genres of speech including odes, ancestral stories, songs, and descriptions of culture. He has also transcribed, translated, and rewritten many texts in the corpus and coordinated linguist visits.

Wagiba Geser contributed so much more than her 88 contributions to the corpus, including stories, historical descriptions, and linguistic elicitations. Wagiba told countless stories over delicious meals that remain in our heads and hearts. Incredibly kind and generous, Wagiba committed herself to this project every single day.

Tonny (Tonzah) Warama has a fantastic mind for languages and the kind of work ethic that even 500 verbal paradigms could not tire. Tonny’s expertise in writing, reading, and typing, made him one of this project’s most significant assets, and he was sorely missed when he was away. Tonny contributed many stories, elicitations, and instructional texts.

Language experts

Jerry (Jeks) Dareda and his contagious laughter were always welcome at the language house. Although his duties as Limol's current chief kept him very busy, he still made time to contribute stories, songs and dances, historical descriptions, and elicitations. My favorite recording of his was a lively reenactment of a hunting trip (J. (Jeks) Dareda, 2016c).

Saly Goge and **Rhoda Kukuwang** are cultural gemstones, always ready to sing, dance, or tell a story. As the head of the Malam culture and dancing group, Saly, Rhoda and their group of singers and dancers kept Diana Johnson up until the early hours performing their vast inventory of songs.

Kidarga Nakllae is the oldest person in Limol and enjoys telling stories about and creating games for his crocodile clan family. He has contributed many stories, songs, and knowledge about ancestral times.

Kaoga Dobola and **Manaleato Kolea** also contributed to the corpus in many ways. As the elementary school teacher, Kaoga shared a wealth of knowledge about the education system and early literacy programs. Manaleato is a special friend and an angel in the village. Always the first to offer help to anyone, she inspires many.

Alex Giniya is one of the youngest contributors to the extensive collection of traditional songs and dances in the Ende Language Corpus. He plays multiple instruments, has an incredible memory, and is leading the next generation in preserving Ende culture.

Geoff (Gäbag) Rowak serves a vital role in Limol as the village recorder and general planner of village life and discussion. He assists in community planning such as harvest and feast scheduling, settling disputes, and facilitating discussions on topics that affect the entire community. He is also a skilled hunter and contributed many stories about his hunting trips to the Ende Language Corpus.

Dukes (Dugal) Karea is a vibrant member of the Limol community. As secretary and one of the worship leaders of the Limol church, he can always be found preaching, praying, singing, playing the guitar, or taking care of his family. He contributed many of the songs in the corpus and often had a good hunting story to tell.

Language experts

Kagär Kidarga always shows a friendly face to anyone passing her house on their way into Karama corner or walking down to Karama swamp. Her large family keeps her busy, but she always made time to contribute to the Ende Language Corpus, especially by answering elicitation tasks. She is also very active in the Limol church and the Women's Fellowship Committee.

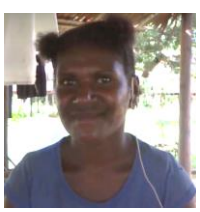
Duiya Sobam is a pastor in Limol church and a very animated speaker. He is very interested in Limol's culture and history and shared much useful information with the Ende Language Project team.

Jugu (Mado) Karea is an important member of the Ende Language Committee, volunteering not only to tell stories, but also to edit, annotate, and translate texts from Ende into English. Although he had an unfortunate run-in with a wild pig in 2016, he spent his healing time with the Ende Language Project team and quickly became an indispensable member.

Warani Pewe's contributions to the Ende Language Corpus were mostly in the form of songs and information about historical traditions and culture. His wonderful wife **Pentae Narma** cared greatly for the Ende Language Project team and her absence in 2017 and 2018 while she cared for her brother in Port Moresby was sorely felt.

Winson Warama is an avid learner and one of the community volunteer health workers. He contributed many original stories to the corpus, helped enormously with transcription and editing, and gathered many words for the dictionary. Besides this, he was a wonderful host on the Ende Language Committee, preparing a working space for everyone on the project and even presenting the 2015 team with a record number of fish after a successful diving trip!

Joshua Ben Danipa was one of the first contributors to the Ende Language Project and spearheaded the dictionary efforts in 2015. A careful, patient man, Joshua improved the collection and shared a fascinating story about the origins of Ende language.



Maryanne Sowati (Kurupel) was an incredible asset to the Ende Language Project. When she was not caring for her parents and siblings or studying to become Limol's next volunteer health worker, she was always willing to share a story or answer any question about Ende language.

Language experts

Pingam Wäziag is an extraordinary woman in Limol with the energy and enthusiasm of a twenty-year-old, but the knowledge and wisdom of one of the oldest women in the village. She contributed many stories, songs, dances, and even a reenactment of a traditional women's initiation ceremony.

Donae Kurupel, famous for the number of crocodiles she has killed single-handedly, also contributed many stories about life in Limol and the traditions surrounding the yam harvest. Our closest neighbor, she spoiled us with bananas and coconut dishes.

Musato Giwo was our first friend in Daru in 2015 when she jumped in our boat as our translator. She helped us understand so much about Ende life and culture in our first two years and stubbornly insisted we speak Ende as much as possible. She also contributed many stories and elicitations.

Gidu Jerry is not only another one of Limol's promising young men, also studying to be a volunteer health worker, he also assisted the language project in many ways by editing stories, aiding translations, and by announcing all our requests and meetings throughout the village day and night. His unique announcing style also made its way into the corpus.

Non-local collaborators

Grace Maher has devoted herself to Limol by coordinating many vital projects, including a women's ethnography in 2015, a toilet and hand-washing project in 2016, and the development of a community health workers program in 2017 and 2018 resulting in better health outcomes and a greater understanding of Limol culture.

Dineke Schokkin (left) is currently a post-doctoral researcher at Australian National University and the foremost expert on the Idi language. Discussions with Dineke about Pahoturi River languages have enriched my understanding of Ende in countless ways and I am incredibly grateful for her insight and companionship.

Elizabeth Conlan is currently a researcher and plant scientist based in California. She came to Limol on our 2016 trip with support from the Firebird Fellowship to illuminate the hundreds of plant terms already in the lexicon and explore their use in daily life and oral literature.

Diana Johnson is currently a nurse working in the emergency ward of the pediatrics hospital in Washington. In 2016, she recorded 113 stories and songs and coordinated three beautifully illustrated books. She is fondly remembered for stitching up Jugu (Mado) Karea's hands after a terrible incident with a pig (J. (Mado) Karea, 2016).

Catherine Scanlon is currently a graduate student in linguistics at UC, Santa Barbara. In 2016, she transcribed and translated many texts, spearheading the first analysis of the nominal derivational morphology, and recording the first interactional texts for the corpus. She remains very involved in the project and the community.

Gwynn Lyons recently graduated from Stanford University with her BA in Linguistics. She is currently teaching English in France. She also joined our 2016 trip, leading an exploration of color terminology in Ende, contributing to our first attempt at an Ende grammar sketch, and sharing her flute playing.

Lauren Reed is currently a Masters student in Linguistics at ANU and came to Limol on our 2017 trip. Not only did she transcribe and translate many stories, but she also illuminated the fascinating directional and associated motion system and coordinated two beautiful books on hunting and fishing stories for the local elementary school.

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Language index

Name index