Probing phonological structure in play language: Speaking backwards in Zenzontepec Chatino

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Play languages (also known as language games or *ludlings*) represent a special type of language use that is well known to shed useful light on linguistic structure. This paper explores a syllable transposition play language in Zenzontepec Chatino that provides evidence for the segmental inventory, syllable structure, the limits of the phonological word, the prosodic status of inflectional formatives, and the autonomy of tone, all of which aligns with independent phonological evidence in the language. While recent theoretical and cross-linguistic studies have questioned the nature, and even the validity, of constituents such as the phonological word, the syllable, and the onset, this study provides an example of a language with strongly manifested phonological constituents. Following the International Year of Indigenous Languages, the study also highlights the importance of in-depth analysis of less-studied languages for linguistic theory, typology, and language maintenance or reclamation for communities.

Keywords: phonological word; syllable; morphology; play language; tone

1   Introduction

Linguists have questioned the cross-linguistic comparability, or even the existence in some languages, of phonological constituents such as the syllable (Hyman 1985), the onset (Clements & Keyser 1983: 15; Hayes 1989), and the phonological word (Schiering et al. 2010). Evidence from linguistic play (Conklin 1959) is often brought to bear on the issue because play languages shed light on language users' knowledge about the existence, structure, and limits of such constituents in their languages (Sherzer 1970; Hombert 1986; Blevins 1995; *inter alia*). Laycock (1972: 61) defines play languages, or *ludlings*, as people's application of regular transformations to "ordinary language text, with the intent of altering the form but not the content of the original message, for purposes of concealment or comic effect." Take for example the best-known English-based play language, Pig Latin, in which speakers transpose a word's initial onset to the end of the word and then add <ay> [eɪ]:

(1)   Pig Latin, English
        pig   →   igpay
        flower   →   owerflay
        sprinkle →   inklespray
        banana   →   ananabay

Pig Latin makes reference to the onset and the (phonological) word, and thus provides some evidence for the existence and boundaries of the onset and the word as phonological constituents in English. Play languages in a wide range of other languages also make reference to the onset, informing theories of syllable structure (Treiman 1983; Bagemihl 1989; Davis 1993; Pierrehumbert & Nair 1995; Botne & Davis 2000), which has been a topic of significant debate (Fudge 1969; Hooper 1972; Clements & Keyser 1983; Hyman 1985; Treiman 1989; Blevins 1995).

Like Pig Latin, the Siak Malay play language *Warasa* refers to the onset and the word, but it also refers to a third phonological constituent: the foot. In *Warasa* (2), speakers "replace the first onset of the final foot [of the word] and anything preceding it with *war*" (Gil 2002).

(2)　　Warasa, Siak Malay (Austronesian) (Gil 2002)
　　　　bahaso　　→　waraso　　'language'
　　　　jerawat　　→　warawat　　'pimple'
　　　　mintak　　→　warintak　　'request'
　　　　enam　　　→　warenam　　'six'

The present paper explores a Zenzontepec Chatino (Otomanguean, Mexico, ISO 639-3 czn) play language, $\widehat{ntʃ}$-akʷiʔ $\widehat{tsu}ʔ$ ntīlú 'speaking backwards', in which speakers transpose the first syllable of the phonological word to the end of the word (3),[1] providing useful evidence for the existence and structure of the syllable and word as constituents in the language.

(3)　　Basic examples
　　　　t͡saka　　→　kát͡sa　　'one'
　　　　ʃĭkʷā̰　　→　kʷáʃĭ　　'sunlight'
　　　　kʷilīʃĭ　　→　līʃĭkʷi　　'butterfly'
　　　　sūʔwá　　→　ʔwásu　　'his/her stuff'
　　　　tijeʔ　　→　jéʔti　　'sour'

This paper examines the evidence that the play language provides about the phonological and morphological structure of Zenzontepec Chatino, how that evidence lines up with other sound patterns in the language, and how the findings contribute to broader studies of phonological constituency. After presenting some general information about Zenzontepec Chatino (§2), and the play language (§3), it is shown that the play language sheds useful light on most of the questions and challenges in the analysis of Zenzontepec Chatino phonology: syllable structure and the segmental inventory, including the phonological status of laryngeals (§4); the nature and limits of the phonological word as a constituent and the prosodic status of inflectional formatives (§5); and the nature of tone (§6). The conclusions (§7) highlight that this study provides a(nother) striking example of the utility of play language as a tool for linguistic analysis, and offers an example of a language in which phonological constituents such as the syllable and the phonological word are strongly manifested, even if such constituents may be cross-linguistically intractable (Schiering et al. 2010; Hildebrandt 2015). Finally, in the spirit of the International Year of Indigenous Languages, the study highlights the importance of incorporating creative language use and verbal art into linguistic research for providing culturally relevant material for use by language communities (Fitzgerald 2017).

2　Language background

Zenzontepec Chatino is spoken by about 8,000 people in mountainous southwestern Oaxaca State, Mexico, and in emigrant communities in other parts of Mexico and the United States. It is one of about 17 Chatino

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[1] This is a relatively common type of play language, and the same basic process applies in the Kuna (Chibchan) play language *sorsik sunmakke* 'talking backwards' (Sherzer 1970), as well as variants of Central Arrernte (Pama-Nyungan) *Rabbit Talk* (Henderson 2002), French *Verlan* (Lefkowitz 1989: 316), and Tagalog (Austronesian) play languages (Conklin 1956: 137), among others.

varieties (Cruz & Woodbury 2014: 265), which comprise at least three extant languages: Zenzontepec; Tataltepec (cta); and the Eastern Chatino group (ctz, ctp, cya, cly) (Ezéquiel Vásquez, in Boas 1913; Campbell 2013a; Sullivant 2016). Chatino is closely related to Zapotec, a larger and more diversified language group, and the two together make up the Zapotecan group of the Otomanguean language family (Mechling 1912; Rensch 1976; Kaufman 1988).

The basic constituent order of Zenzontepec Chatino is VSO, and its morphology is strongly head-marking, moderately synthetic, and mildly fusional. It is a fairly typical Otomanguean language (Kaufman 2006; Campbell 2017) with nasal vowels, laryngeal articulations, and complex verbal inflection that involves tone (Campbell 2016, 2019). It displays other typical Mesoamerican features, such as a vigesimal numeral system and body part terms used as relational nouns (Campbell et al. 1986), as well as widespread Mesoamerican calques (Smith Stark 1994) and pied-piping with inversion in content questions (Smith Stark 2002a).

The Zenzontepec Chatino consonant inventory is presented in Table 1. Labial consonants and the tap are infrequent. There are two series of coronal consonants – plain and palatalized – and three velar stops. Voicing is not contrastive: obstruents are voiceless and sonorants are voiced.

Table 1: Consonant inventory

	Labial	Coronal		Dorsal			Glottal
		plain	pal.	pal.	plain	lab.	
Plosive	p	t	tʲ	kʲ	k	kʷ	ʔ
Affricate		t͡s	t͡ʃ				
Fricative		s	ʃ				h
Lateral		l	lʲ				
Nasal	m	n	nʲ				
Approximant	β̞		j			w	
Tap		ɾ					

The Zenzontepec Chatino vowels are presented in Table 2. There are five oral vowels, and five corresponding nasal vowels <Ṽ>. Vowel nasality is only contrastive in word-final syllables, and it is neutralized by nasal spreading from a preceding nasal consonant, even across an intervening laryngeal consonant. The contrast between the two nasal front vowels is marginal, and so is the contrast between the two nasal back vowels.

Table 2: Vowel inventory

	Front	Central	Back
High	i, į		u, ų
Mid	e, ę		o, ǫ
Low		a, ą	

Vowel length is marginally contrastive,[2] but like vowel nasality, the contrast only occurs in word-final syllables. The language is tonal. The TBU is the mora, and a mora may be specified for high tone (H), mid tone (M), or no tone (Ø) (as distinct from a L tone; see Campbell 2014, 2016).[3]

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[2] Most function words and particles are monomoraic. Most words of lexical classes are bimoraic, but the length contrast is found in a couple of minimal pairs (i).

(i) ke   'head'   hlʲaʔ   'cold'
     kee   'stone'   hlʲaaʔ   'bitter'

[3] The orthography used to represent Zenzontepec Chatino data in this work follows the IPA with the following modifications: <Ṽ> = nasal vowel; <VV> = long vowel; <V́> = High tone; <V̄> = Mid tone; <V> = no tone.

3　Basics of the play language

According to community member Tranquilino Cavero Ramírez, and corroborated by Guillermo Cavero Gutiérrez, in the late 1950s or 1960s a man from San Pedro del Río, a village of the Santa Cruz Zenzontepec municipality, created the play language referred to as *nt͡ʃ-akʷiʔ t͡sū́ʔ ntīlú* 'speaking backwards' (Spanish *hablar al revés*). They report that adults and youth, male and female, regularly used it for some years, for fun and playful secrecy. After the creator of the play language moved away to the coast for work, as many people from the community do, the play language fell more and more out of use. The community members report that only a few speakers in San Pedro del Río still use it for entertainment.

　　Since the play language is not widely practiced, a few issues should be borne in mind regarding the data presented in this study. First, the data were mostly provided by one speaker, a Chatino-Spanish bilingual adult male.[4] Second, the data are not naturalistic: they were offered by the speaker, and in a few cases, they were even elicited. Third, since the play language is not frequently used, some degree of "brushing up" was necessary, making the data even less spontaneous. However, despite these limitations, fairly consistent patterns emerge from the data that likely reflect genuine aspects of Zenzontepec Chatino structure – at least the variety spoken by the primary speaker involved in the study. Furthermore, it is important to document and describe special genres of language use and verbal art, while it is possible and appropriate to do so, as they may be particularly prone to falling out of use in language shift.

　　The most common word shape in Zenzontepec Chatino basic vocabulary is a disyllabic form with single (non-long) vowels in each syllable. Medial consonants syllabify as onsets with the following vowel. In the play language, speakers produce the two syllables in reverse order (4); tone is addressed below in §6.

(4)　　Disyllabic forms

kátī	→	tí**ka**	'seven'
kʷela	→	lá**kʷe**	'fish'
kʷetǫ	→	tǫ́**kʷe**	'bee'
nakʷę	→	kʷę́**na**	'say', 'said'
suwa	→	wá**su**	'vulva of'
tukʷi	→	kʷí**tu**	'which', 'who'
t͡súna	→	ná**t͡su**	'three'
t͡ʃiwū	→	wút͡**ʃi**	'goat'
ʃījáʔ	→	jáʔ**ʃi**	'small'
juwaʔ	→	wáʔ**ju**	'*Piper auritum* (hierba santa)'

　　Trisyllabic forms are less frequent than disyllabic forms in the lexicon. They make it evident that speakers transpose the initial syllable of the form to the end, rather than transposing the last syllable to the beginning or simply reversing the order of all syllables (5).

(5)　　Trisyllabic forms

kutunu	→	tūnú**ku**	'large crayfish'
kūnáʔa	→	náʔa**ku**	'woman'
kʷilīʃǐ	→	līʃǐ**kʷi**	'butterfly'
kilituʔ	→	līt̬úʔ**ki**	'navel of'
kʷitīʔjú	→	t̬īʔjú**kʷi**	'lightning'

　　Another basic word shape is a trimoraic disyllabic form with a single vowel in the initial syllable and a long vowel in the final syllable. These are much less frequent in the lexicon than bimoraic disyllables.[5]

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[4] The data were recorded in San Pedro del Río, Oaxaca, Mexico in 2011 and in Oaxaca City in 2013 with Tranquilino Cavero Ramírez.

[5] In most cases, trimoraic forms, either tri- or disyllabic, were historically morphologically complex.

The play language examples in (6) illustrate that vowel length is not maintained after syllable transposition, while vowel nasality is maintained – see also the example *ʃĩkʷą̄ → kʷą́ʃì* 'sunlight' in (3).

(6)   Trimoraic disyllabic forms
   kʷise͞eʔ   →   séʔ**kʷi**   'raccoon'
   kʷitee ʔ   →   tʲéʔ**kʷi**   'ant'
   nihjaą   →   hjá**ni**   'comes'
   nikaą   →   ká**ni**   'penis of'

Monosyllabic words of lexical classes tend to have long vowels, reflecting the language's preference for bimoraic words. These are handled in two different ways in the play language. First, long vowels may be interrupted by a glottal stop (or less frequently, a glottal fricative), breaking them into two syllables that may then undergo transposition (7). Second, monosyllabic forms that are part of compounds typically do not undergo any modification, as shown in (8), while in compounds consisting of two disyllabic forms, both of the component stems tend to undergo transposition (9).

(7)   Vowel splitting in monosyllabic forms with long vowels
   lʲáà   →   **ʔál**ʲa   'possum'
   ntáà   →   **ʔán**ta   'beans'
   tíi   →   **ʔí**ti   'ten'
   nkā́á   →   **hán**ka   'nine'

(8)   Unaltered monosyllabic forms in compounds
   nt͡seę tunu   →   **nt͡seę** nútu   'orange'
   nt͡seę tijeʔ   →   **nt͡seę** jéʔti   'lime'
   hú͞ų kijāʔ   →   **hú͞ų** jáʔki   'commercial thread'
   tí t͡saka   →   **tí** kát͡sa   'eleven'

(9)   Compounds consisting of two disyllabic forms
   kā́lá nkaʔjū   →   lá**ka** ʔjú**nka**   'twenty-five'
   ʃiti ʔ kūnáʔa   →   tíʔ**ʃi** náʔa**ku**   'mother's milk'

Function words and adverbs are typically not affected. As shown in the simple utterance in (10), the adjectival predicate *tīkéʔ* 'hot' undergoes transposition while the adverb *lé͞e* 'very' does not.

(10)   lé͞e **tī**kéʔ   →   lé͞e kéʔ**ti**   'It's very hot out.'

The longer utterance in (11) illustrates the basics of the play language just outlined.[6] The disyllabic interrogative pronoun ***tuk*ʷi** and the perfective form of the verb ***nak*ʷę** 'say' undergo transposition. The monosyllabic vocative *t͡ʃo͞o* 'friend' undergoes vowel splitting and transposition. Two forms remain unaltered: the dative flagging device *hiʔį́* (Campbell, to appear) – which in this instance bears 2SG tonal inflection (Campbell 2016) – and the adverbial proform *laʔā*.

(11)   kʷí**tu**   kʷę́**na**   hiʔį́   laʔā   ʔót͡ʃo
        /**tu**kʷi   **na**kʷę   hiʔį́   laʔā   t͡ʃo͞o/
        who   PFV.say   DAT.2SG   like.so   friend.VOC
        'Who told you that, friend?'

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[6] The spoken play language utterance is represented in the first line. The corresponding unaltered form of the utterance is shown in the second line, with its interlinear glossing and free translation provided in the third and fourth lines, respectively. Examples with interlinear glossed text may have a tag after the translation that can be used to find the recorded audio in the Endangered Languages Archive (Campbell 2013b).

The two unaltered forms in (11) avoid transposition because one is a function word and the other is an adverb, respectively, and not because they might be monosyllabic. They are in fact disyllabic: the medial glottal stop is a consonant and not a feature of a single syllable nucleus, as will be discussed in §4.1.

While the play language data are largely internally consistent as well as consistent with sound patterns in the language in general, some forms that were offered or elicited show unexpected outcomes, such as the numeral 'eight' in (12), which has an extra syllable *nku* unexpectedly inserted and transposed.[7] Other irregular forms display total syllable reversal in a trisyllabic form (13) or unexpected vowel and/or consonant changes (14). It is important to note that most of the exceptional play language forms are Spanish loans that already diverge in some way from native sound patterns.

(12) Added syllable
      hnuʔ   →   hnúʔ**nku**   'eight'

(13) Reversing of all syllables
      santarū   →   rūntása   'soldier'   (< Span. *soldado*)

(14) Exceptional vowel and/or consonant change
      ntakʷą   →   kʷą́ntu   'sandal'
      tuminkū   →   lātúmi ~ nkúmi   'Sunday'   (< Span. *domingo*)
      bjernē   →   mébi   'Friday'   (< Span. *viernes*)
      serlī   →   rléʃi   'traditional pants'   (< Span. *zaragüelles*)

Finally, some forms in the data display variation, like 'Sunday' in (14), but just like any natural language, play languages are known to display sometimes significant inter- and intra-speaker variation (see e.g. Sherzer 1970 for the Kuna play language *sorsik sunmakke*; Alidou 1997 for several Nigerian play languages; and Barlow 2001; Vaux 2011: 725 for Pig Latin).

4   Laryngealization, syllable structure, and the segmental inventory

The play language sheds useful light on questions involving the phonemic inventory and phonotactics of Zenzontepec Chatino, particularly the status of laryngealization (§4.1) and the analysis of syllable structure (§4.2).

4.1   The phonological status of laryngealization

Laryngeal articulations may pose challenges for phonological analysis because they often pattern in some ways like segments and in other ways like suprasegmental features (England 1983; Gerfen 1996; Macaulay & Salmons 1995; Stenzel 2007). Languages of the Zapotecan group, to which Chatino belongs, display considerable diversity in the phonological status of laryngeals. Some varieties of Zapotec are analyzed as having contrastive laryngealized nuclei but no glottal stop consonant (Antonio Ramos 2015; Beam de Azcona 2004; López Nicolás 2016), in some cases with two degrees of contrastive laryngealization (Arellanes 2009; Smith Stark 2002b). Other varieties of Zapotec are analyzed as having only a glottal stop consonant (Foreman 2006: 38) or both a glottal stop and laryngeal nuclei (Avelino Becerra 2004). Chatino languages, on the other hand, are uniformly described as having glottal stop but no contrastive laryngeal-ization (Campbell 2014; Cruz 2011; McIntosh 2015; Pride 2004; Sullivant 2015; Villard 2015).

The play language provides evidence that Zenzontepec Chatino forms of the shape (C)CVʔV contain a medial glottal stop consonant and not a laryngealized long vowel as the nucleus of a single bimoraic syllable. First, as seen earlier in (7), a glottal stop may be inserted to break long vowels of monosyllabic

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[7] Note that this is one of the relatively few monomoraic lexical words, which may explain why it does not undergo the expected long-vowel splitting.

forms into two syllables so that the forms may undergo syllable transposition. Second, lexical words of the shape (C)CVʔV undergo transposition, just like forms with any other medial consonant:[8]

(15)　Forms with the shape (C)CVʔV
　　　t͡soʔō　　→　　ʔót͡so　　'good'
　　　nkoʔo　　→　　ʔónko　　'banana'
　　　kʷeʔę̄　　→　　ʔę́kʷę　　'wind'
　　　n-tʲaʔą　　→　　ʔą́ntʲą　　'goes around'
　　　tʲáʔā　　→　　ʔátʲa　　'relative of'
　　　nʲáʔa　　→　　ʔánʲa　　'mother of'
　　　t͡ʃaha　　→　　hát͡ʃa　　'tortilla'
　　　tóhō　　→　　hóto　　'squash vine'

4.2　Consonant clusters and syllabification

Zenzontepec Chatino phonotactics permit two types of consonant clusters in native vocabulary: a laryngeal consonant followed by a sonorant (§4.2.1), and a nasal consonant followed by an obstruent (§4.2.2). While alternate analyses may be entertained for both, evidence from contractions and prefixal morphology suggest that they are both in fact consonant clusters and not unitary laryngealized sonorants and prenasalized obstruents, respectively. Less-common consonant clusters that occur only in Spanish loanwords follow a similar pattern to the native consonant clusters (§4.2.3). The manner in which all of these types of consonant clusters are handled in the play language provides evidence that the language prefers complex onsets over codas in its syllabification.

4.2.1　Laryngeal-sonorant clusters

Upson and Longacre (1965: 313) analyze the Zenzontepec Chatino sequences [hj] and [hw] as unitary laryngeal phonemes with secondary articulations: /hʲ/ and /hʷ/, respectively. However, the fricative /h/ (just like /ʔ/) exists as a consonant on its own, as shown in the minimal triplet in (16), and the semivowels /j/ and /w/ are also segments (17). The extra laryngeal phonemes with secondary articulations would be superfluous additions to the inventory, unless otherwise justified by phonological evidence, of which there is none, and other evidence supports the cluster analysis.

(16)　/h/ and /ʔ/ as phonemes
　　　la**h**a　　'among'
　　　la**ʔ**a　　'broken'
　　　laka　　'guilty

(17)　/j/ and /w/ as phonemes
　　　jáʔā　　'raw'
　　　waʔā　　'Madras thorn' (*Pithecellobium dulce*)
　　　sáʔā　　'lover of'

　　　The glottal stop /ʔ/ and the glottal fricative /h/ pattern together as a class of laryngeal consonants. One of their shared patterns is that they may immediately precede a sonorant consonant (18). In native vocabulary, no other consonant besides laryngeals may immediately precede a sonorant, and no consonant besides sonorants may immediately follow a laryngeal within a single form.

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[8] Note that translaryngeal nasality spreading that occurs in forms like 'wind' is reflected in the permuted forms.

(18)   Laryngeal-sonorant clusters

Initial position		Medial position	
hleʔ	'tortilla of'	lē**hl**í	'circular'
hnʲaa	'very spicy hot'	tʲú+**hm**é	'cocoon'
hjánā	'one year ago'	nku-**hw**ī	'got'
ʔne	'will do'	kū**ʔw**í	'drunk'
		nkʷé**ʔβ̥**ē	'sea shrimp'

Some independent evidence supports the cluster analysis as opposed to Upson & Longacre's complex laryngeal segment analysis or an analysis as voiceless and glottalized sonorants. Contractions of the Object marker *hiʔī̠* with enclitic pronouns yield secondary /ʔj/ and /ʔw/ clusters, and the contractions may further reduce in rapid speech to yield /hj/ and /hw/ clusters (19).

(19)   Contractions yielding /ʔj/ and /ʔw/ clusters, sometimes reduced to /hj/ and /hw/ clusters

Basic	→	contracted	→	reduced	gloss
/hiʔī̠=ju/		[hī̠.**ʔj**u]		[**hj**ū]	'him'
/hiʔī̠=ja/		[hī̠.**ʔj**a]		[**hj**ā]	'us (excl.)'
/hiʔī̠=wą/		[hī̠.**ʔw**ã]		[**hw**ã̄]	'you (pl.)'

Independent pronouns, demonstratives, articles,[9] and some particles that begin with other sonorant consonants may undergo the same type of contraction with the Object marker, as illustrated with the 2sg independent pronoun *nuʔu* in (20). Thus, laryngeal-sonorant sequences occur as both primary as well as secondary clusters, and they are therefore not complex segments.

(20)   [ŋgʷet͡sāʔ tī nā̠á̠ʔ **hnũʔṹ**]
        /nkʷi-et͡sāʔ   tī   nāáʔ   **hiʔī̠**   nuʔu/
        PFV-inform   TPLZ   1SG   OBJ   2SG
        'I informed you.'[muchacha ixtayutla 7:38]

Examining the treatment of word-medial laryngeal-sonorant clusters in the play language sheds light on preferred syllable structure in Zenzontepec Chatino. When forms with these clusters in medial position undergo transposition, the consonants remain together as complex onsets (21).

(21)   Word-medial laryngeal-sonorant clusters

kí**ʔj**ū	→	**ʔj**úki	'male'	(not *júkiʔ)
kā**ʔj**ú	→	**ʔj**úka	'five'	(not *júkaʔ)
sū**ʔw**á	→	**ʔw**ásu	'stuff of'	(not *wásuʔ)
sū**ʔw**é	→	**ʔw**ésu	'Teojomulco'	(not *wésuʔ)
ni**hj**aą	→	**hj**ą́ni	'is coming'	(not *ją́nih)
lí**hj**ā	→	**hj**áli	'sugar cane'	(not *jálih)
kʷi**hn**ʲaʔ	→	**hn**ʲáʔkʷi	'mouse'	(not *nʲáʔkʷih)

While glottal stop is the only consonant that may occur in coda position in the language, the forms in (21) suggest that the language prefers complex onsets over a simple coda followed by a simple onset; that is, a word like *kíʔjū* 'male' syllabifies as [kí.ʔjū], and not as *[kíʔ.jū]. If the latter were the case, the result in the play language would be the unattested *júkiʔ*.

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[9] The textual examples later in (29), (38), and (43) illustrate the contracted Object marker with *na*, the definite article: *hiʔī̠ na → h-nā*.

4.2.2   Nasal-obstruent clusters

Zenzontepec Chatino obstruent stops and affricates contrast with a parallel series of stops and affricates that are preceded by a homorganic nasal feature, as illustrated in the following (near-)minimal pairs:

(22)   [**p**ii]   'female turkey'   [**mb**ii]   'small toad species'
      [**t**ana]   'broody'   [**nd**ana]   'soot'
      [**t**ʲāʔ]   'since'   [**ɲd**ʲaʔ]   'ground cuckoo'
      [**t͡s**eeʔ]   'type of tree lizard'   [**nd͡z**eēʔ]   'tantrumy'
      [**t͡ʃ**inʲaʔ]   'tortilla basket   [**ɲd͡ʒ**iʔnʲa]   'lip of'
      [**k**oʔō̜]   'deaf'   [**ŋg**oʔo]   'banana
      [**k**ʲālá]   'sleepiness'   [**ŋg**ʲālá]   'melted'
      [**k**ʷesǫʔ]   'termite'   [**ŋg**ʷesǫʔ]   'scab'

    The obstruents with preceding nasal feature could reflect three different structures: i) syllabic nasals followed by obstruent onsets of following syllables; ii) a series of prenasalized stop phonemes, as in the typical analysis of [ⁿd] in neighboring Mixtec languages (Longacre 1957; Macaulay 1996); or iii) tauto-syllabic homorganic clusters of nasal consonants followed by obstruents, as will be argued here.

    If initial nasal elements were syllabic nasals, they would be moraic and could then bear tone, but they never do (Campbell 2014: 192). Evidence from the play language agrees. If the initial nasals were syllabic, they should transpose alone to the end of the word. However, they do not: they transpose along with the following obstruent and the rest of the initial syllable, as shown in (23).

(23)   Initial nasal-obstruent sequences in the play language
      ntakʷą   →   kʷá**nta**   'sandal'   (not *t**ák**ʷ**ą**n)
      nt͡sukʷāʔ   →   kʷáʔ**nt͡s**u   'shelled corn'   (not *t͡s**úk**ʷa**ʔn**)
      nt͡sutę̜ʔ   →   té̜ʔ**nt͡s**u   'guava'   (not *t͡s**utę̜ʔn**)
      nkolō   →   ló**nk**o   'turkey'   (not *k**ólo**n)
      nkūsúʔ   →   súʔ**nk**u   'old'   (not *k**ūsúʔn**)
      mpeleʔ   →   léʔ**mp**e   'thick tortilla' (not *p**eleʔm**)

    Having ruled out the syllabic nasal analysis, two possible analyses remain: unitary prenasalized phonemes or consonant clusters. Some morphological evidence points to the consonant cluster analysis. A Stative Aspect verbal prefix *n-* attached to an obstruent-initial verb stem yields the same type of nasal-obstruent onset found in morphologically simple words, as shown in (24). On the cluster analysis, the Stative Aspect forms with the prefix *n-* are explained phonologically, while a complex segment analysis would entail positing an unnecessary morpho-phonological process of consonant fusion or mutation.

(24)   Some inflections of the verb *-tūkʷá* 'be sitting'
      Progressive Aspect   nte-tūkʷá   [nde**t**ūkʷá]   'is sitting'
      Stative Aspect   n-tūkʷá   [**nd**ūkʷá]   'is seated'

    On the other hand, a possible argument for considering nasal-obstruent sequences to be unitary prenasalized obstruents is that this would entail a simpler syllable structure. However, this would require the addition of nine prenasalized obstruents to the phonemic inventory, yielding 30 consonants instead of 21; a simpler syllable structure entails a more complex inventory. In any case, the phonotactics remain relatively simple even with the cluster analysis, as the permissible consonant clusters in native vocabulary can be captured with two succinct generalizations: consonant clusters in native vocabulary are limited to nasal plus obstruent and laryngeal plus sonorant.

    Examining the nasal-obstruent clusters in word-medial position in the play language sheds further light on syllabification preferences. After syllable transposition in the play language, word-medial nasal-obstruent sequences remain adjacent (25), just as the laryngeal-sonorant clusters do.

(25)　Nasal-obstruent sequences in medial position
　　　man͡tseʔ　　→　　**n͡tsé**ʔma　'tapir'　　(not *ˆtsé**ʔman**)
　　　ʃĩ**nk**áʔ　　→　　**nk**áʔʃi　'snot of'　　(not *káʔʃi**n**)
　　　lʲú**nkʷ**i　　→　　**nkʷ**ílʲu　'firefly'　　(not *kʷílʲu**n**)

The play language illustrates that both types of native consonant clusters syllabify as complex onsets, and not heterosyllabically, and the only coda consonant permitted in the language is the word-final glottal stop. The complex onset preference is also observed in non-native consonant clusters found in Spanish loanwords.

4.2.3　Clusters found only in Spanish loanwords

Zenzontepec Chatino has been adopting Spanish loanwords for the last several hundred years. Recent Spanish loanwords are easily identifiable. Older and more natively adapted loanwords may bear less resemblance to their Spanish sources, but they often display suspiciously non-native phonological properties – namely, rare or non-native phonemes, or non-native consonant clusters.[10] The play language demonstrates that non-native clusters in medial position pattern like native consonant clusters: complex onsets are preferred over a simple coda followed by a simple onset (26).

(26)　Spanish loanwords with non-native consonant clusters
　　　wi**sk**ā　　→　　**sk**áwi　'minister'　　(not *káwi**s**)　　(< Sp. *fiscal*)
　　　li**wr**ū　　→　　**wr**úli　'book'　　(not *rúli**w**)　　(< Sp. *libro*)
　　　bje**rn**e　　→　　**rn**ébi　'Friday'　　(not *nébje**r**)　　(< Sp. *viernes*)

5　Phonological words and the prosodic status of inflectional formatives

The discussion up to this point has referred to the *word* as the domain in which the play language operates, but so far only minimal independent evidence for the existence of such a constituent in Zenzontepec Chatino has been mentioned, namely, the distributional patterns in which contrastive vowel nasality, vowel length, and coda glottal stop occur only in *word*-final syllables. Following a brief discussion of the problematic notion of *word* as a cross-linguistic concept (§5.1), this section presents phonological and morphological evidence independent of the play language that refers to and defines the phonological word as a constituent in Zenzontepec Chatino (§5.2) and then presents corroborating play language evidence in support of the analysis (§5.3), shedding useful light on the prosodic status of morphological formatives.

5.1　The word

In his introduction to the *Handbook of American Languages*, Boas (1911: 28) defines the word as "a phonetic group which, owing to its permanence of form, clearness of significance, and phonetic independence, is readily separated from the whole sentence." He acknowledges the problematic nature of his definition, because it presupposes other notions that require their own definitions, such as "phonetic group", "phonetic independence", and "sentence," and he points to some challenges to the notion of *word* that arise when examining the great diversity in structures of American Indigenous languages. Another issue is that Boas' definition appeals to morphology, semantics, phonology, and syntax. More recently, linguists have argued that the nature of a word depends on the type of criteria that are used to define it, and that a language may have a morphosyntactic word constituent as well as a distinct – and often non-isomorphic – phonological (or prosodic) word constituent (Dixon & Aikhenvald 2002; Evans et al. 2008).

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[10] The source words of old Spanish loans may no longer exist in regular local Spanish usage. For example, *serlī* 'traditional canvas pants', shown earlier in (14), is an adaptation of Spanish *zaragüelles* 'baggy pants', itself borrowed from Hispano-Arabic *saráwil*. The presence of the tap consonant and the non-native cluster /ɾl/ are clues that the word is not of Chatino origin.

The *phonological* word has been defined as a unit equal to or larger than the syllable (or foot) that serves as the domain or target of a set of phonological rules and/or phonotactic patterns (Nespor & Vogel 1986; Hall 1999), and which may correspond roughly to a basic form-meaning pairing in a language that could perhaps be uttered on its own. However, the cross-linguistic validity of the phonological word has recently been challenged as some languages have no constituent – and other languages have multiple constituents – that might satisfy the usual definitions (Schiering et al. 2010; Bickel & Zúñiga 2017). Less controversially, if a language does in fact have a phonological word constituent, then it will be defined with language-internal evidence, and the following discussion shows that Zenzontepec Chatino has a strongly manifested phonological word.

5.2　The phonological word in Zenzontepec Chatino

Evidence from phonological processes, phonotactics, and morphology converge to define the Zenzontepec Chatino phonological word. For example, there is a process in which the non-sibilant, non-rhotic coronal consonants /t/, /n/, /l/ palatalize ([tʲ], [nʲ], [lʲ]) when preceded by [i]. Alternations occur in verbal TAM inflectional paradigms, for example the verb *-nāá* 'get cleared (field)' in which the initial /n/ of the stem palatalizes only when following aspect-mood prefixes that end in /i/ (27).

(27)　Aspect/mood inflection for the verb *-nāá* 'get cleared (field)'

Potential Mood	/k**i**-nāá/	[kīn̪ʲ ̃ā ̃ǎ]	'will get cleared'
Habitual Aspect	/nt**i**-nāá/	[ndīn̪ʲ ̃ā ̃ǎ]	'gets cleared'
Progressive Aspect	/nte-nāá/	[ndēn ̃ā ̃ǎ]	'is getting cleared'
Perfective Aspect	/nku-nāá/	[ŋgūn ̃ā ̃ǎ]	'got cleared'

An Iterative prefix *i-* may occur between a verb stem and its aspect/mood prefix, and this prefix also triggers palatalization of a stem-initial coronal. The transitive verb 'close, cover' displays no palatalization in its non-iterative form in (28), but the /t/ of the stem is palatalized by the Iterative prefix *i-* in (29).

(28)　**nte-t-ākǫ́ʔ**=wą　　　　　　　niʔi=V́　　　　hiʔī̜=ja
　　　PRG-(CAUS)TRN-close=2PL　　house=DIST　　OBJ=1EXCL
　　　'You (pl.) are closing our house there.'　　[amigo borracho 2:44]

(29)　**nkʷ-i-tʲ-ākǫ́ʔ**　　　　tī　　　na　　　kūʔwí=V́ʔ　　　h-nā　　　tuʔwa　　　na　　　lometā=V́ʔ
　　　PFV-ITER-TRN-close　　TPLZ　DEF　　drunk=ANA　　OBJ-DEF　　mouth　　DEF　　bottle=ANA
　　　'The drunk closed the opening of the bottle again.'　　[amigo borracho 5:02]

Palatalization of coronals after /i/ does not occur between a stem and a bound person marker (30), nor does it occur across component stems within a compound lexeme (31). These examples show that these junctures (enclitic and compound boundary) are different in nature than the juncture between inflectional or derivational prefix and stem.

(30)　[ŋgaʃitʲi**n**ā]　　　　(not *[ŋgaʃitʲi**nʲ**ā])
　　　/nka-ʃiti=**n**a/
　　　PFV-laugh=1INCL
　　　'we (incl.) laughed'

(31)　[kátī kʲee ŋgaʔ**nītē**ʔế́hnáʔ]　　　　(not *[kátī kʲee ŋgaʔ**nītʲē**ʔế́hnáʔ])
　　　kátī　　kee　　nka-ʔ**ni**+t**ē**ʔế́=hnáʔ
　　　seven　stone　PFV-hit+TRN.be.located=forcefully(.3)
　　　'seven stones he forcefully threw'　　[no hay brujos 1:19]

Vowel hiatus is not permitted within a phonological word. When a sequence of vowels would arise at a prefix-stem boundary, one vowel elides (Campbell 2011), as illustrated in (32), in which the /a/ of the stem *-akʷiʔ* 'speak' elides in contact with the vowel /i/ of the Potential Mood and Habitual Aspect prefixes.

(32)　Aspect/mood inflection for the verb *-akʷiʔ* 'speak'
　　　Potential Mood　　　/k**i-a**kʷiʔ/　　[k**i**-kʷiʔ]　　'will speak'
　　　Habitual Aspect　　　/nt**i-a**kʷiʔ/　　[nd**i**-kʷiʔ]　　'speaks'
　　　Progressive Aspect　/nt͡ʃ-akʷiʔ/　　[nd͡ʒakʷiʔ]　　'is speaking'
　　　Perfective Aspect　　/j-akʷiʔ/　　　[jakʷiʔ]　　　'spoke'

Just like palatalization, vowel elision does not occur between a stem vowel and a person marker vowel (33), nor does it apply between two words (34).

(33)　[nde.ʔnẽ.**ṹ̃ʔ**]
　　　/nte-ʔn**e=ū**ʔ/
　　　PRG-do=3PL
　　　'They do (it).'

(34)　[t͡súnã͏ ī͡tsáʔ]　　(not *[t͡súnã t͡sáʔ], *[t͡sún ī͡tsáʔ])
　　　/t͡súna　　ī͡tsáʔ/
　　　'three things'

As for phonotactic evidence for the phonological word, as already discussed, contrastive nasal vowels, long vowels, and coda glottal stop only occur in the final syllable of a stem with its prefixes (i.e. a word); they never occur contrastively in prefixes or other non-final syllables. Other static distributional constraints that refer to the same domain of a simple (non-compound) stem and its prefixes are H tone culminativity (maximum one high tone), maximum one glottal stop, and a ban on unlike vowels across a glottal consonant due to translaryngeal vowel harmony (Campbell 2014). None of these constraints apply between two words, between two stems in a compound, or between a stem and a bound person marker attached to it. Finally, the domain of a simple stem and its prefixes is the domain of tone melody organization, and grammatical tone that marks 2sg person inflection involves tonal overwriting only on the final single-root stem or adverbial enclitic of the inflected lexeme (see §6 and Campbell 2016).

In sum, a significant number of phonological processes and phonotactic constraints refer to a domain that includes a simple stem and any prefixes attached to it, while excluding any material such as a second stem in a compound, bound person markers, or any separate words or clitics that follow the initial stem. This domain of a simple stem and any prefixes attached to it is the Zenzontepec Chatino phonological word.[11]

5.3　Play language and the phonological word

As the preceding discussion argued, prefixes make up a phonological word with the simple stem to which they attach. Evidence from the play language concurs: syllable transposition applies to the constituent that includes a simple stem and any prefixes attached to it, as illustrated by the TAM-inflected verbs in (35). Note that morphological boundaries are not always isomorphic with syllable boundaries.

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[11] See Campbell (2014: 232) for a more complete treatment of the evidence that defines the phonological word.

(35)   Verbs with aspect/mood prefixes in the play language

nka-ʃíti	→	ʃītí**nka**	'laughed'
nte-lákʷi	→	lākʷí**nte**	'is boiling'
nkaj-ūná	→	jūná**nka**	'cried'
nt͡ʃ-ūná	→	ná**nt͡ʃu**	'is crying'
k-aku	→	kú**ka**	'will eat'
j-aku	→	kú**ja**	'ate'
nti-hoʔ	→	hóʔ**nti**	'stings', 'pokes'
j-ohoʔ	→	hóʔ**jo**	'stung'
ntʲatę	→	tę́**nt**ʲa	'sleeps'

     There is only one set of bound pronouns in the language. They are enclitics, and their syntactic function is expressed by their position and the category of their host. As shown earlier, phonological processes such as coronal consonant palatalization and vowel elision operate within the domain that includes a stem and its prefixes but excludes any bound enclitic pronoun. That is, the dependent pronouns – and clitics in general – fall outside the phonological word that contains their host. Again, the play language provides independent evidence for this analysis. Example (36) shows a bare inalienably possessed noun in the play language and the same noun with the 2pl enclitic pronoun expressing (inalienable) possessor. This example and the additional examples in (37) show that the initial syllable of the stem first transposes to the end of the stem, and only after that do the pronominal enclitics attach to the modified host.

(36)   Inalienably possessed noun, bare and with enclitic person marker

sateʔ	→	téʔ**sa**	'clothes of'
sateʔ=wą	→	téʔ**sa**=wą	'your (pl.) clothes'

(37)   Inalienably possessed nouns with enclitic person markers

huti=ą̄ʔ	→	tí**hu**=ą̄ʔ	'my father'
nʲá**ʔ**a=na	→	ʔán**ʲa**=na	'our (incl.) mother'

     Verbs obligatorily inflect for aspect/mood, and they may also host enclitic pronouns that express subjects. In the play language, the initial syllable of the stem with any prefixes first undergoes transposition, and after that the subject pronoun encliticizes to the end of the verb, as in the utterance in (38). The examples in (39) show the same pattern with a range of different subject pronouns on various verbs inflected for aspect/mood.

(38)
h-nā	náhwa=á	jākʷá	náʔa**nka**=ą̄ʔ
/hiʔį̄.nā	hwánā=V́	jākʷá	**nka**-náʔā=ą̄ʔ/
OBJ-DEF	Juana	there	PFV-see=1SG

'I saw Juana there.'   [speaking in reverse 1:35]

(39)   Play language forms of verbs with TAM prefixes and enclitic person markers

nkā-sāʔą́=ju	→	sāʔą́**nka**=ju	'he wrote'
nka-ʃíti=t͡ʃū ʔ	→	ʃītí**nka**=t͡ʃū ʔ	'she laughed'
nka-ʃíti=ja	→	ʃītí**nka**=ja	'we (excl.) laughed'
j-aku=wą	→	kú**ja**=wą	'you (pl.) ate'
k-aku=ū ʔ	→	kú**ka**=ū ʔ	'they will eat'
nkaj-ūná=ū ʔ	→	jūná**nka**=ū ʔ	'they cried'
nkaj-ūná=ą̄ʔ	→	jūná**nka**=ą̄ʔ	'I cried'
nku-wiʔi=ą̄ʔ	→	wīʔí**nku**=ą̄ʔ	'I got skinny'

     Enclitics are bound forms, but as the play language suggests, they behave as separate phonological words apart from their hosts, or at least they are prosodically adjoined to the phonological word. There are other phonological and morpho-phonological processes that are unique to the host-enclitic juncture. First,

there is a tonal process in which a Mid tone of a monomoraic enclitic is replaced by a High tone if and only if the host bears only a single Mid tone on its final mora (Campbell 2016). Second, while vowel hiatus is not tolerated within a phonological word, vowel hiatus is tolerated between a host-final vowel and enclitic-initial /u/, as illustrated earlier in (33), and a special process of vowel fusion occurs between host-final vowels and enclitic-initial /a/, as illustrated in (40).

(40)   Vowel fusion at host=enclitic juncture
      /nku-hwī̄=ą̄ʔ/   [ŋgu.hɸ**ē̄ē̄**ʔ] ~ [ŋgu.hɸ**ĩ̄ĩ̄**ʔ]   'I got (it)'
      /ki-is**u**=ą/   [kis**ȭȭ**] ~ [kis**ũ̄ũ̄**]   'we (incl.) will pay'

Some demonstrative adjectives have enclitic forms, and like pronominal enclitics, in the play language they attach only after syllable transposition has occurred, as in the utterance-final form in (41).[12]

(41)   léē   ʔjúki   ʔne   tī   na   sú**ʔkʷe=é**
      /léē   kíʔjū   ʔne   tī   na   **kʷēsúʔ=V́**/
      very   male   HAB.do   TPLZ   DEF   little.man=DIST
      'The little dear guy behaves very well.'

As previewed in §3, in compounds that consist of two disyllabic stems, both stems tend to undergo transposition. The same is illustrated by the compound verb 'sing' in (42). Other phonological processes that occur within the phonological word domain do not occur between two component stems (§5.2), and therefore, the play language provides further evidence that each component stem of a compound makes up its own, separate phonological word.

(42)   lá**ntʃu**+ʔwá**tu**   lóʔō   na   strúma=á
      /**ntʃ**-ūlá+**tu**ʔwa   lóʔō   na   mastrū=V́/
      PRG-make.music+mouth[.3]   with   DEF   musician=DIST
      'He is singing with the musicians.'

However, in the compound verb at the end of the example in (43), the first stem with its aspect prefix does not undergo syllable transposition. Therefore, there appears to be some variability in the handling of compounds.

(43)   la   t͡sɛ́ki   náʔanka=ą̄ʔ   h-nā   náhwa=aʔ   **nte-ʔne**+ʔjúki
      /la   kitsɛ   nka-náʔā=ą̄ʔ   hiʔį̄.nā   hwanā=Vʔ   **nte-ʔne**+kíʔjū/
      up.to   village   PFV-see=1SG   OBJ-DEF   Juana=ANA   PRG-do+male
      'I saw Juana in the village flirting...'   [speaking in reverse 2:23]

The discussion and references in this section illustrate that Zenzontepec Chatino has a well-defined phonological word that is supported by multiple lines of independent evidence. TAM and derivational prefixes parse into the same phonological word as the initial, simple stem to which they attach. Dependent enclitic pronouns and other enclitics display very different phonological behavior from prefixes, and they constitute separate phonological words from their hosts. Separate component stems of compounds behave as separate phonological words. Verbs are the locus of most of the morphology in the language, and a complex verb may consist of several phonological words. Thus, evidence from the play language aligns with other phonological evidence to elucidate the nature of the phonological word and the prosodic status of morphological formatives.

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    [12] The demonstrative =V́ is the enclitic form of the distal demonstrative *wá*. The representation V́ indicates that the enclitic consists of a mora and a H tone, but the quality of the vowel is unspecified and is copied from the preceding vowel in the host. The same enclitic can be seen in the utterances in (28), (38), (41), and (42). Another demonstrative enclitic, the anaphoric demonstrative =Vʔ (from *wiʔ*), occurs in (29) and (43).

6　Tone

Play languages have been useful for probing the nature of tone. Hombert (1973) documents a Mokpwe (or Bakwiri, Bantu) play language in which speakers transpose the initial syllable of a word to the end of the word, just as in *nt͡ʃ-ak͡ʷiʔ t͡sūʔ ntīlú*. However, while segmental material undergoes transposition, tones do not: tones remain in their original positions with respect to the word (44).

(44)　Mokpwe (Bantu, Cameroon) (Hombert 1973: 232)

mɔ̀kɔ̀	→	kɔ̀mɔ̀	'plantain'
mɔ̀kɔ́	→	kɔ̀mɔ́	'person'
kʷélí	→	líkʷé	'death'
kʷélì	→	líkʷè	'falling'

In a later study, Hombert (1986) experiments with syllable-transposition play languages in several African and Asian tone languages. In the additional African languages, the results match what he found for Mokpwe, where tones remain in situ with respect to the word. In the Asian languages, however, tones tend to remain with the syllables that initially bear them (45).

(45)　Languages of East Asia (Hombert 1986)

Thai	pʰu ˅ jiŋ ˧˥	→	jiŋ ˧˥ pʰu ˅	'woman'
Cantonese	fɔŋ ˧˥ pin ˧	→	pin ˧ fɔŋ ˧˥	'convenient
Mandarin	tɕ'i ˧˥ ma ˨˩˦	→	ma ˨˩˦ tɕ'i ˧˥	'at least'

Hombert's findings reflect, on the one hand, the suprasegmental nature of tone in many African tone languages (Leben 1973; Goldsmith 1976), while his findings in the Asian tone languages, on the other hand, may reflect the closer (synchronic and diachronic) link between tone and segments in many Asian tone languages (Haudricourt 1954; Hombert et al. 1979; Kingston 2011).

Up to the moment, little work in this area has been carried out on tone languages of the Americas. In Zenzontepec Chatino (Campbell 2014, 2016), the tone bearing unit (TBU) is the mora, and a mora may be specified for high tone (H), mid tone (M), or no tone (Ø). H tone spreads through subsequent toneless moras until it hits another tone or until it reaches the end of the Intonational Unit. H tone causes a subsequent H or M tone to downstep. These features fit the profile of a three-level, privative (Stevick 1969), register tone system (Pike 1948), quite similar to the tone system of the Bantu language Kishambaa (Odden 1982).

Bimoraic, morphologically simple words bear one of five basic tone melodies: ØØ, ØM, MH, HM, and HØ.[13] Interestingly, in the play language, the five basic tone melodies are all neutralized as HØ, which is the least frequent of the basic tone melodies in the lexicon (46). Since tone is neutralized, tonal minimal pairs become homophonous in the play language (47).

(46)　Zenzontepec Chatino tone neutralization in the play language

Ø	→	HØ	kit͡sę	→	t͡sę́ki	'village'
ØM	→	HØ	kiʃę̄ʔ	→	ʃę́ʔki	'herbaceous plant'
MH	→	HØ	kāʔjú	→	ʔjúka	'five'
HM	→	HØ	líhjā	→	hjáli	'sugar cane'
HØ	→	HØ	súkʷa	→	kʷásu	'six'

(47)　Neutralization of tonal minimal pairs

　　a.　| kʷit͡ʃī | → | t͡ʃíkʷi | 'rabbit' |
|---|---|---|---|
| kʷīt͡ʃi | → | t͡ʃíkʷi | 'jaguar' |

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[13] In trimoraic words, the basic tone melodies align to the final two morae, and the tone of the antepenultimate mora is predictable (Campbell 2016).

　　　b.　lisū　　→　súli　'avocado'
　　　　　lísū　　→　súli　'vulture'

　　　Thus, tone in Zenzontepec Chatino does not behave the same as it does in either the African or the Asian tone languages in Hombert's play language experiments. However, it is not the only known case in which tone is neutralized in a play language. In one of the many Hausa play languages, or *Baches*, that Alidou (1997) analyzes, a syllable of the shape *grV̀* is inserted after each non-final syllable of a word, where *V* is a copy of the vowel in the preceding syllable. The tonal melody of the original word is overwritten, and the play language forms invariantly have alternating H and L tones, with each syllable of the original word bearing H tone and each inserted *grV̀* syllable bearing L tone (48).

(48)　Hausa (Chadic/Afro-Asiatic, West Africa) (Alidou 1997: 215–216)
　　　kálmàa　　　　　→　kál**grà**má　　　　　'word'
　　　gírmáa　　　　　→　gír**grì**má　　　　　'be able'
　　　ʔázùrháa　　　　→　ʔá**grà**zúr**grù**há　　　'silver'
　　　ʔàlmákàshíi　　→　ʔál**grà**má**grà**ká**grà**shí　'scissors'

　　　But what about grammatical tone? The two main functions of grammatical tone in Zenzontepec Chatino are (i) as a partial – but crucial – exponent of TAM inflection, and (ii) as the entire and only exponent of second person singular pronominal inflection. As for tone in TAM inflection, since TAM inflection falls within the phonological word that includes the main stem and its prefixes, these grammatical tones are all neutralized in the play language as (M)HØ (see e.g. the examples in (35) and (39)).

　　　Second person singular pronominal inflection (subject, possessor, etc.) is not expressed by an enclitic like the other dependent personal pronouns; it is always encoded by one of two specialized 2SG TONE MELODIES: (Ø)ØH or (M)MM. Uninflected forms with the (Ø)ØM basic tone melody change to (Ø)ØH with 2sg inflection, and uninflected forms with any of the other basic tone melodies are overwritten with a M tone on each mora of the final phonological word of the stem to mark 2sg inflection (Campbell 2016). In the play language, just as all tonal melodies in uninflected forms are neutralized, 2sg tone melodies are also neutralized: all 2sg forms in the play language bear a (M)HM tonal melody, as illustrated with inalienably possessed nouns in (49) and verbs with their TAM inflection in (50). The timing of this is consistent with person markers being external to the phonological word: the 2sg tone behaves like an enclitic in this respect. However, this process is distinct from the 2sg tonal ablaut inflection in the regular language.

(49)　2SG tonal inflection on inalienably possessed nouns

Basic form		Play language		**2sg play language**	Gloss
ʃikǭ	→	kóʃĭ	→	kóʃī̆	'your arm'
huti	→	tíhu	→	tíhū	'your father'
ʃĭnkáʔ	→	nkáʔʃĭ	→	nkáʔʃī̆	'your snot'
nʲáʔa	→	ʔánʲa	→	ʔánʲā	'your mother'
tʲáʔà	→	ʔátʲa	→	ʔátʲā	'your companion'

(50)　2SG tonal inflection on verbs

Basic form		Play language		**2sg play language**	Gloss
ntʲatę	→	tę́ntʲa	→	tę́ntʲā	'you slept'
nka-ʃiti	→	ʃĭtínka	→	ʃĭtínkā	'you laughed'
nka-sukʷi	→	sūkʷínka	→	sūkʷínkā	'you sucked'
nku-taʔą	→	tāʔą́nku	→	tāʔą́nkū	'you went around'
nku-suʃīi	→	sūʃínku	→	sūʃínkū	'you began the day'
ta **j-a**ku t͡ʃaha	→	ta kúja hát͡ʃa	→	ta kújā hát͡ʃa	'you ate tortillas'

The play language shows that Zenzontepec Chatino tone behaves differently than tone in similar syllable-transposition play languages in both African and Asian tone languages reported by Hombert (1986). It differs from the Asian languages in not maintaining tones with their original syllables after transposition, and it differs from most of the African languages in not maintaining the tonal melodies with respect to the word. Instead, similar to the Hausa Bache reported by Alidou (1997), tones are overwritten and neutralized. Play language forms not inflected for 2sg person bear the same tonal melody: (M)HØ. For 2sg pronominal inflection, a single M tone is added to the end of the play language modified form: (M)HM.

7　Discussion and conclusions

In the Zenzontepec Chatino play language *nt͡ʃ-akʷiʔ t͡sūʔ ntīlú* 'speaking backwards', speakers transpose the initial syllable of a word to the end of the word. Since the process targets the syllable and operates on the domain of the word, it provides a window into speakers' knowledge about the existence, boundaries, and structure of these constituents. The non-play language phonology and morphology provide substantial evidence for defining the phonological word, the prosodic status of morphological formatives, and different juncture types – namely, that prefixes fall into the same phonological word as the simple stem to which they attach, and anything that follows that stem (viz. another stem in a compound, an enclitic, or a separate free word) pertains to a separate phonological word. In all cases, the play language provides independent, corroborating evidence that reinforces the analysis.

The play language also sheds light on the other analytical challenges in the phonology of the language: the phonological status of the glottal stop as a segment, the preference for complex onsets over simple codas, and the nature of tone as a suprasegmental layer that operates independently of the segmental tier. Hombert (1973) found that Bakwiri vowel length, like tone, is independent of vowel quality, because it remains in place with respect to the word in the play language, suggesting that vowel length is perhaps suprasegmental like tone in the language (see also Leben 1973: 36). In Zenzontepec Chatino, vowel length only contrasts in word-final syllables, and in the play language it is not preserved either with respect to position in the word or with the original vowel. The play language is structure-preserving in this respect. Vowel nasality, on the other hand, behaves suprasegmentally in terms of spreading in Zenzontepec Chatino (Campbell 2014), as shown in (15), but it also displays a close association with vowels as it remains associated with the original vowel after syllable transposition in the play language. The play language is thus non-structure-preserving with respect to the distribution of vowel nasality, and likewise with respect to word-medial glottal stop, which may precede obstruents in transposed forms – see e.g. (8) and (25) – but may never do so within a phonological word in non-play language.

Linguists have demonstrated that patterns and processes in phonology may operate in, or target, different domains from those that are relevant for syntax (Dixon & Aikhenvald 2002; Evans et al. 2008; Bickel & Zúñiga 2017). Moreover, just as there is scant evidence for a cross-linguistic notion of morphosyntactic word that would clearly separate morphology from syntax (Haspelmath 2011), individual languages may not display any single constituent on which multiple criteria unambiguously converge to define the phonological word (Schiering et al. 2010). Zenzontepec Chatino, however, presents a case in which a phonological word constituent – in addition to the syllable and onset constituents – is strongly manifested in the regular phonology of the language, and the play language provides additional compelling and congruent evidence for its nature and limits. While this does not resolve the issue of the cross-linguistic (in)comparability of the *word*, it adds a useful piece to the picture and reminds us that play languages may be useful tools for linguistic analysis and field experimentation.

In at least one case, a play language form has crossed over and lexicalized in the language. Chatino personal names are mostly of Spanish origin, but in most cases, the sources of these borrowings are Spanish hypocoristic forms (Lipski 1995). One of several Zenzontepec Chatino names for 'Lorenzo' is *nchúle*, and another is *lenchū*. A common Spanish hypocoristic form of Lorenzo is Lencho, which was adapted into Zenzontepec Chatino as *lenchū*. The play language form of this would be *nchúle*, which is one of the now

basic forms that can be used to refer to a man named Lorenzo. This type of insight about word origins is often intriguing to community members that are interested in the history of the community and the language.

Written in 2019, the Year of Indigenous Languages, this study highlights the importance of less-studied languages for linguistic theory and the importance of incorporating special types of language use, such as play language, into the documentation and analysis of language. As Fitzgerald (2017: 115) states, "[T]he record and analysis of a community's linguistic practices, especially those relevant to phonology and pronunciation, provide invaluable tools in understanding the language and in revitalizing it." On top of all of this, play languages are fun, and they bring to light cultural and playful dimensions of language that community members can appreciate and engage with. While this research has not led to an increase in the use of the play language in the Zenzontepec community, it has brought it out of its relative dormancy for the community member collaborators involved in or aware of this study. It has also been shared in annual workshops on Otomanguean languages in Oaxaca City, where it has helped inspire youth from other communities to explore play language and tongue twisters in their own languages as part of their own linguistic and language activism initiatives.

Abbreviations

Grammatical abbreviations used in this paper that diverge from or which are not included in the Leipzig Glossing Rules are the following: ANA = anaphoric demonstrative, HAB = Habitual Aspect, ITER = iterative, PRG = Progressive Aspect, TPLZ = topicalizer, TRN transitiv(izer), VOC = vocative.

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