

Inflectional tone in Hñähñu (Mezquital Otomi)¹

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Abstract: This paper is the first thorough description of inflectional tone changes in the verb stem in Hñähñu. Verbs in Hñähñu (Otomanguean > Otopamean > Otomi) can be classified into four conjugations according to the distribution of consonant stem alternations in their paradigm, and into two classes according to the distribution of tonal stem alternations. This paper describes the formation and distribution of tonal stem alternations in this language. Hñähñu is also described in the light of the most recent typologies of inflectional tone (Palancar 2016; Rolle 2018); conversely, the parameters in these typologies are assessed in the light of the data from Hñähñu.

Keywords: Oto-Manguean, Oto-Pamean, morphology, typology, inflectional classes.

Introduction

Hñähñu (also called Mezquital Otomi) is the most widely spoken among Otomi languages (Mexico; Otomanguean > Otopamean). This language is spoken in Valle del Mezquital (Mezquital Valley, Central Mexico) by about 88500 people (Simons & Fennig 2017). Like in other Otomanguean languages, verbs in Hñähñu present stem alternants in their inflection. For example, the 3rd person present verb form of *pà* ‘go’ in (1a) has initial /p/ and low tone, while the 3rd person past verb form in (1b) has initial /m/ and rising tone.

- (1)a. **pà** ngù=gá nsàdi²
 [3.PRS]go house=of study³
 ‘S/he goes to school.’

¹ This research was funded by CONACyT via CIESAS, under the project “Cross-referencing of arguments in the verb morphology of three Otomi languages”. I would like to thank two anonymous reviewers, who certainly helped me improve the original manuscript. My sincere gratitude goes also to my consultants EG, PMS, and CSC, as well as to their children EGM and AZ. All shortcomings remain my own.

² Orthography of Hñähñu (when divergent from IPA symbols): <ä> = [ã], <ë> = [ẽ], <e> = [ɛ], <f> = [p^h, f], <h> = [h, h^h], <?> = [ʔ, ʔ], <i> = [ĩ], <j> = [k^h, x], <ñ> = [ɲ], <ɔ> = [ɔ], <r> = [r], <u> = [u, w, w^w], <ü> = [ũ], <u> = [i], <x> = [ʃ], <y> = [j].

³ Abbreviations: CL = class; DEP = dependent; IMPRF = imperfect tense; IPFV = imperfective stem; IRR = irrealis mood; NAS = nasal secondary stem; OBJ = object; PFV = perfective stem; PL = plural; POSS = possessor; PRF = perfect tense; PRS = present tense; PST = past tense; SUB = subordinator.

- b. bi=**mă** ngù=gá nsàdi
 [3.]PST=NAS.PFV\go house=of study
 ‘S/he went to school.’

Consonant stem alternations in Hñähñu have been largely described (Arroyo & Wallis 1955; Wallis 1956; Bartholomew 2010), but the inflectional function of tone in the verb stem is poorly understood. In this paper, I intend to describe the distribution of tonal stem alternants in verb paradigms in Hñähñu, and to propose an optimal analysis for them within the most recent typologies of inflectional tone (Palancar 2016; Rolle 2018).

The organization of this paper is as follows. Antecedents about Otomi conjugations and the relevant terminology are presented in §1. In §2 I introduce the basic grammatical features of the language that are relevant to the discussion, and in §3 I shortly describe the methodology used to obtain the data presented, as well as the theoretical framework of this investigation. In §4 I describe the formation and distribution of tonal stem alternants, and I present alternative analyses to account for them. The relation between the typology of inflectional tone and tonal stem alternations in Hñähñu is discussed in §5. General conclusions of this paper are given in §6.

1. Antecedents and theoretical framework

Verb inflection classes (or “conjugations”) of Otomi are mentioned in its very first grammatical descriptions back in the 16th century. Fray Pedro de Cárceres, who studied Otomi in a region very close to where Hñähñu is spoken nowadays, classified Old Otomi verbs into two conjugations: *tänä* and *tati* (Cárceres 1907[ca. 1580]: 69-87). This classification was based upon the allomorphs of the TAM/person formatives each verb selected (hence the labels “*tänä*” and “*tati*”); most classifications of Otomi verbs into conjugations have taken this same criterion ever since (Hernández-Green 2019; Lastra 1997; Palancar 2012a; Voigtlander & Echegoyen 1985).

Hñähñu is thought to have lost the allomorphy in TAM/person formatives (Palancar 2011b: 254), and the only systematic classification of verbs into conjugations published in the 20th century is rather based on the form and distribution of consonant stem alternants. Arroyo & Wallis (1955) group the verbs of Hñähñu into four conjugations: conjugation 1 has no stem alternants,

conjugation 2 has lenition of the initial consonant in some areas of the paradigm, conjugation 3 has palatalization of the initial consonant in some areas of the paradigm, and conjugation 4 alternates initial /p/ with /m/ in some areas of the paradigm (Arroyo & Wallis 1955: 19-26).

The present description is framed under a word-and-paradigm model of inflectional morphology (Blevins 2016). The terms I use the most in this paper come from Matthews (1991) and Stump (2016). *Stem alternants* refers to the different shapes a stem can have across the different word-forms of a given lexeme (Stump 2016: 67-77); such shapes can be either phonologically, morphosyntactically, or *morphomically* (Aronoff 1994) conditioned. Stems often co-occur with *formatives* that serve as *exponents* of *morphosyntactic features* in inflection (Matthews 1991: 40, 42, 175). *Inflection classes* are groups of lexemes that realize the same morpho-syntactic features with similar exponents, or that are distinguished by their patterns of stem formation and stem distribution (Stump 2016: 84, 95-102).

The typology of inflectional tone has been described in Rolle (2018) and Palancar (2016). Rolle (2018) focuses on *dominance effects*, which describes inflectional tone under an autosegmental-type model (Rolle 2018: 46-104); he briefly describes other types of inflectional tone, including *construct tunes* (*i.e.* distinct tonal melodies in distinct morphosyntactic contexts) and *paradigmatic grammatical tone* (*i.e.* morphomic distribution of grammatical melodies within paradigms; Rolle 2018: 104-110). Palancar (2016) in turn focuses on *morphological tone* and *tonal classes* (both roughly equivalent to Rolle's (2018) paradigmatic grammatical tone), and he further divides morphological tone into three types: a) morphological tone conditioned by phonological shape, b) morphological tone conditioned by inflection class, and c) morphological tone linked to the lexicon (Palancar 2016: 115-134).

2. Relevant grammatical features

Hñähñu is a tonal, head-marking language with several correlates of VO order. This language has three distinct tonemes (high H, low L, and rising R) that are contrastive in the stressed syllable (often the first one) of lexical roots; unstressed syllables only contrast H vs Ø.

Hñähñu verbs are inflected for grammatical person and tense-aspect-mood (TAM) morphosyntactic features (Bartholomew 2010: 503-506), among other morphosyntactic categories such as spatial deixis, which will not be dealt with in this paper. TAM/person categories are encoded in the “TAM/person (inflectional) formatives” (see Palancar 2011a), a set of *portmanteau* clitics that precede the verb stem and that are written separate from the verb stem in the practical orthography (INALI, 2014), as is shown in the examples in (2) with the verb *tsá'ni* ‘eat chicken’. The TAM/person inflectional formatives *dá*= ‘1.PST’, *gá*= ‘2.PST’, and *bi*= ‘PST’ encode past tense, perfective aspect, and realis mood. Unless they are relevant to the discussion, tones that are not marked in the original source are not marked here either.

- (2) **dá** ntsa'ni ‘I ate chicken’
gá ntsa'ni ‘you ate chicken’
bi ntsa'ni ‘s/he ate chicken’ (Bartholomew 2010: 498)

Table 1 lists the subset of TAM/person inflectional formatives that are relevant to the discussion of the inflectional morphology of Hñähñu in this paper. These formatives are arranged according to mood (realis, irrealis), tense/aspect (present, past, dependent past, perfect, imperfect), and grammatical person. The forms in the rows labeled as “(3rd)” do not specify grammatical person, although their typical interpretation is 3rd person (see Hernández-Green 2016: 43-44). Allomorphs are separated by a slash “/”.

	realis					irrealis
	<i>PRS</i>	<i>IMPRF</i>	<i>DEP.PST</i>	<i>PST</i>	<i>PRF</i>	
1 st	dí	ndí	ndá	dá	stá	ga
2 nd	gí	ngí	ngá	gá	xká	gi
(3 rd)	Ø/di/i	mí	mí	bi	xa	da

Table 1. Hñähñu TAM/person inflectional formatives; adapted from Bartholomew (2010) and INALI (2014)

The labels for the TAM categories in Table 1 are taken from Palancar’s (2009) analysis of the cognate TAM/person formatives in Querétaro Otomi, a language closely related to Hñähñu. Both the present and the imperfect encode imperfective aspect, and I group them under the label “imperfective TAM categories”. The imperfect also encodes past tense; the present does not encode tense *per se*, but it has present tense interpretations by default. The past, the dependent past, and the perfect encode perfective aspect, and I

label them collectively as “perfective TAM categories”. I have decided to group the irrealis among these because it patterns morphologically with the past and the perfect (see §4), and it seems to have perfective aspect in other Otomi languages (*Cf.* Hernández-Green 2018). The past and the perfect are interpreted as past tense by default, although it is not clear whether tense is specified in their semantics. The dependent past is used in subordinate temporal clauses, as is illustrated in (3).

- (3) [nú=**ndá** zó-'a=hu]_{SUB} mí='ótho=ma ts'èdi=se
 SUB=1.DEP.PST talk-2OBJ=PL [3.]IMPRF=be.absent=1POSS strength=alone
 ‘When I talked to you (pl), I had no strength.’ (WBT 2008: 1Cor 2:3)

Verb inflectional morphology in Hñähñu often involves consonant stem alternants, which are not motivated either phonologically, semantically, or syntactically. Verbs following different alternant patterns can be organized into the four conjugations summarized in Table 2. Conjugation I does not have consonant stem alternations. The other three conjugations have different distribution of stem alternants in the perfective (PFV) TAM categories; the form of the stem alternants consists of either lenition (LEN), nasalization (NAS), palatalization (PAL), or prenasalization (PNAS) of the initial consonant. The 3rd person present and 3rd person past are shown in the examples provided.

conjugation	distribution of stem alternants		processes				examples
	person	aspect	LEN	NAS	PAL	PNAS	
I	n/a	n/a					di hòdu, bi hòdu ‘faint’
II	3	PFV	✓	✓	✓	✓	tsùdi, bi zùdi ‘reach’
III	2, 3	PFV			✓		'àgi, bi 'yàgi ‘bury’
IV	1, 2, 3	PFV		✓	✓	✓	dì tì, bi ntì ‘be drunk’

Table 2. Revision of Arroyo & Wallis’ (1955) Hñähñu verb conjugations

Hñähñu has lost the old conjugation system based on allomorphy of TAM/person formatives, as it has “lost a large amount of the inflectional exponence present in the old language” (Palancar 2011b: 254). However, remnants of the old conjugation system can still be observed. Some lexemes tend to select the TAM/person formative *di=* in 3rd person present verb forms; these lexemes can be labeled “di-present verbs”. Di-present verbs have specific morphological and semantic profiles, listed in (4) and (5), respectively. Verbs with TAM/person formatives cognates with *di=* in other

Otomi languages tend to have the same morphological and semantic profiles (see Voigtlander & Echegoyen 1985).

- (4)a. middles derived from verbs
- b. transitives derived from verbs
- c. intransitives derived from other lexical classes
- d. Spanish loanwords
- (5)a. underived patientives
- b. underived medio-passives

In addition to consonant stem alternants, verb inflection in Hñähñu often involves tonal stem alternations. These alternations have not been described in the literature. The only reference I could find is one paragraph and a footnote in Wallis (1956). According to an unpublished manuscript by Isabel Sinclair mentioned in that article, Hñähñu has verb sub-classes that “are determined according to the change which occurs on the root syllable of the completive aspect” (Wallis 1956: 455).

3. Methodology

Unless an explicit citation is given, the data presented in this paper were gathered in El Alberto and El Mirador, two communities within the municipality of Ixmiquilpan (Hidalgo state, in Central Mexico) in the middle of Mezquital Valley. The main consultants in El Alberto, a small community of Hñähñu native speakers south of Ixmiquilpan, were EG and FMS, a married couple in their late 50s. While EG was born and raised in El Alberto, FMS was born and raised in El Dadhó, a Hñähñu community 1 km to the west of El Alberto in the municipality of Chilcuautla. In El Mirador, east of Ixmiquilpan, the main consultant was CSC, a native speaker in her late 40s.

Two types of data were collected between January and August 2018. On the one hand, 56 minutes of oral texts (33 narrative, 23 descriptive) were recorded from both EG and FMS, to obtain a small corpus with verb forms occurring in contexts as natural as possible. On the other hand, partial verb paradigms were elicited from all consultants, and recorded in written format; these elicited paradigms include only the singular (as opposed to dual and plural) verb forms corresponding to the morphosyntactic features shown in

Table 1 (§2). Additional data were obtained from 1533 verbal entries with relevant grammatical information in Hernández Cruz *et al.* (2010), as well as a translation of the New Testament (WBT 2008) with its corresponding audio version.

The texts recorded in the field were transcribed and translated using SIL’s Saymore,⁴ with the help of EG, FMS, and EGM, one of the couple’s sons who is a graduate student and a native speaker of Hñähñu. The texts were then glossed in SIL’s Fieldworks Language Explorer;⁵ elicited data were digitized and stored in a FLEx project as well. Queries in the entire corpus (collected both in the field and from published documents) were carried out using ELAN (Lausberg & Sloetjes 2009), FLEx, and AntConc (Anthony 2018).

4. Tonal stem alternants of Hñähñu verbs

Many Hñähñu verbs undergo previously undescribed tonal stem alternations in their inflection. Tone alternations occur almost exclusively in intransitive verbs; the only transitive verb with tonal stem alternants I have identified is *já* ‘experience’.⁶ The analysis I present in this section was made from a sample of 93 intransitive verbs plus *já* ‘experience’: 46 of these were elicited from consultants, and the other 48 were retrieved from the audio files available in the corpus (see §3). In the description that follows, I assume that the sample I have analyzed is representative of the phenomena that may be operating throughout all intransitive verbs in Hñähñu.

Verbs in Hñähñu can be classified into two inflection classes: “class 1”, containing verbs that do not have tonal stem alternants, and “class 2”, with verbs that have them. Class 1 contains both transitives and intransitives, while class 2 contains intransitives almost exclusively. These inflection classes are orthogonal to the conjugations mentioned in §2, as can be seen in Table 3, Table 4, Table 5, and Table 6. All lexemes represented in these paradigms are class 1 verbs, but they belong to different conjugations; cells where consonant stem alternants occur are shaded.

⁴ Webpage: <https://software.sil.org/saymore/>.

⁵ Webpage: <https://software.sil.org/fieldworks/>.

⁶ As in *té gí já?* ‘What happens to you?’ (Lit. ‘What are you experiencing?’).

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí hòdu	ndí hòdu	ndá hòdu	dá hòdu	stá hòdu	ga hòdu
2 nd	gí hòdu	ngí hòdu	ngá hòdu	gá hòdu	xká hòdu	gi hòdu
(3 rd)	di hòdu	mí hòdu	mí hòdu	bi hòdu	xa hòdu	da hòdu

Table 3. Class 1, conjugation I: hòdu (in.) ‘faint’

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí tsùdi	ndí tsùdi	ndá tsùdi	dá tsùdi	stá tsùdi	ga tsùdi
2 nd	gí tsùdi	ngí tsùdi	ngá tsùdi	gá tsùdi	xká tsùdi	gi tsùdi
(3 rd)	tsùdi	mí tsùdi	mí zùdi	bi zùdi	xa zùdi	da zùdi

Table 4. Class 1, conjugation II: tsùdi (tr.) ‘reach’

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí 'àgi	ndí 'àgi	ndá 'àgi	dá 'àgi	stá 'àgi	ga 'àgi
2 nd	gí 'àgi	ngí 'àgi	ngá 'yàgi	gá 'yàgi	xká 'yàgi	gi 'yàgi
(3 rd)	'àgi	mí 'àgi	mí 'yàgi	bi 'yàgi	xa 'yàgi	da 'yàgi

Table 5. Class 1, conjugation III: 'àgi (tr.) ‘bury’

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí tì	ndí tì	ndá ntì	dá ntì	stá ntì	ga ntì
2 nd	gí tì	ngí tì	ngá ntì	gá ntì	xká ntì	gi ntì
(3 rd)	di tì	mí tì	mí ntì	bi ntì	xa ntì	da ntì

Table 6. Class 1, conjugation IV: tì (in.) ‘be drunk’

Now we turn to tone-alternating verbs from class 2. The stems of class 2 verbs have one tone in the imperfective TAM categories (*i.e.* present and imperfect; see §2), and a different tone in the perfective TAM categories (*i.e.* past, perfect, and irrealis; see §2). From now on, I call these two stem alternants “imperfective stem” and “perfective stem”, respectively. I illustrate these tonal stem alternations with the paradigms of verbs from different conjugations in Table 7, Table 8, Table 9, and Table 10. The verb forms to the left of the dotted line (imperfective TAM categories) have high tone (H), and those to the right (perfective TAM categories) have rising tone (R).

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí núhu	ndí núhu	ndá nùhu	dá nùhu	stá nùhu	ga nùhu
2 nd	gí núhu	ngí núhu	ngá nùhu	gá nùhu	xká nùhu	gi nùhu
(3 rd)	núhu	mí núhu	mí nùhu	bi nùhu	xa nùhu	da nùhu

Table 7. Class 2, conjugation I: núhu (in.) ‘be awake’

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí 'áhä	ndí 'áhä	ndá 'ǎhä	dá 'áhä	stá 'áhä	ga 'áhä
2 nd	gí 'áhä	ngí 'áhä	ngá 'ǎhä	gá 'áhä	xká 'áhä	gi 'áhä
(3 rd)	'áhä	mí 'áhä	mí ñ'ǎhä	bi ñ'áhä	xa ñ'áhä	da ñ'áhä

Table 8. Class 2, conjugation II: 'áhä (in.) 'sleep'

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí húdi	ndí húdi	ndá húdi	dá húdi	stá húdi	ga húdi
2 nd	gí húdi	ngí húdi	ngá hñüdi	gá hñüdi	xká hñüdi	gi hñüdi
(3 rd)	húdi	mí húdi	mí hñüdi	bi hñüdi	xa hñüdi	da hñüdi

Table 9. Class 2, conjugation III: húdi (in.) 'sit'

	PRS	IMPRF	DEP.PST	PST	PRF	IRR
1 st	dí túhu	ndí túhu	ndá ntühu	dá ntühu	stá ntühu	ga ntühu
2 nd	gí túhu	ngí túhu	ngá ntühu	gá ntühu	xká ntühu	gi ntühu
(3 rd)	túhu	mí túhu	mí ntühu	bi ntühu	xa ntühu	da ntühu

Table 10. Class 2, conjugation IV: túhu (in.) 'sing'

The data in the tables above also show that tonal stem alternants are orthogonal to consonant stem alternants, in their formation as well as in their distribution. For instance, 3rd person forms in the perfective TAM categories of 'áhä 'sleep' have both prenasalization and rising tone. The pattern of tone alternation shown in Table 7, Table 8, Table 9, and Table 10 above, which I label "H:R", is the most common among the four patterns I have identified in the sample. These patterns are illustrated in (6). For each verb, I use the 3rd person present form to represent the imperfective stem, and the 3rd person past form to represent the perfective stem; whenever possible, I include one verb from each conjugation to illustrate each pattern.

	<i>imperfective</i>	<i>perfective</i>		
(6)a.	já	bi já	(I)	'experience' pattern H:R
	póni	bi bõni	(II)	'go out'
	húdi	bi hñüdi	(III)	'sit'
	túhu	bi ntühu	(IV)	'sing'
b.	níñä	bi níñä	(I)	'be full' pattern H:L
	kóhi	bi gòhi	(II)	'stay'
	zóni	bi nzòni	(IV)	'weep'
c.	mbátsi	bi mbátsi	(I)	'be a child' pattern L:H
	tsò	bi zó	(II)	'fall'
	'ò	bi 'yó	(III)	'be in'
	'ómbo	bi ñ'ómbo	(IV)	'be inside'

d.	ñǎ	bi ñǎ	(I)	‘talk’	pattern L:R
	zǒ	bi nzǒ	(II)	‘burn’	
	pà	bi mǎ	(IV)	‘go’	

The tone alternations exemplified in (6) are not phonologically motivated: compare the alternating intransitive verb *pà* ‘go’ (Cf. *pà* ‘s/he goes’, *bi mǎ* ‘s/he went’) in (6d) to the non-alternating transitive verb *pà* ‘sell’ (Cf. *di pà* ‘s/he sells it’, *bi pà* ‘s/he sold it’).⁷ Although most class 2 are intransitive, tonal stem alternations are not motivated by valency, as there is at least one transitive verb in the class (*jà* ‘experience’), and not all intransitives belong to it. Semantics does not seem to motivate the occurrence of these alternations either, as verbs with similar meanings like *tsò* ‘fall’ (class 2) and *tági* ‘fall’ (class 1) belong to different classes. One observable correlation involving tonal stem alternations is with grammatical aspect: one alternant in the imperfective, and the other in the perfective. In this sense, the distribution of tonal stem alternants seems to be grammatically (or morpho-syntactically) conditioned (see Stump 2016: 73-75). Another correlation is that all di-present verbs (see §2) lack tone alternations.

The figures in Table 11 below show the number of class 1 and class 2 verbs I found in my sample, as well as the conjugation they belong to; the number of class 2 verbs by tone alternation pattern is also included. All conjugations contain verbs from both class 1 and class 2, which shows that Hñähñu conjugations and inflection classes based on the distribution of tonal alternations (class 1 and class 2) are orthogonal to one another. The low number of conjugation III verbs in the sample is expected given the low number of intransitive verbs (n=9) it contains.

	Conj. I	Conj. II	Conj. III	Conj. IV	total:	
Class 1	31	9	1	5	=46	
	H:R	3	14	1	4	=22
Class 2	H:L	2	5		8	=15
	L:R	1	2		3	=6
	L:H	2	1	1	1	=5
total:	39	31	3	21	=94	

Table 11. Class 1 and class 2 verbs in the sample (n=94)

⁷ *Pà* ‘sell’ is a conjugation II alternating verb (*pà*, *bi mǎ*) for some speakers (Cf. Hernández Cruz *et al.* 2010).

Although conjugations and classes are orthogonal to each other, 76% of the verbs in the 94-lexeme sample either have both consonant and tonal stem alternants, or they have neither (see Table 12). This suggests that, in a sample with more lexemes, verbs with consonant stem alternants may be more likely to have tonal stem alternants, and vice versa; conversely, verbs without consonant stem alternants would tend to lack tonal stem alternants as well, and vice versa. These tendencies will only be confirmed or disproved once a larger sample is analyzed.

		consonant stem alternants	
		no	yes
tonal stem alternants	no	31	15
	yes	8	40

Table 12. Number of lexemes by presence/absence of stem alternants in the sample (n=94)

Apart from class 1 and class 2, which are based on the occurrence of tonal stem alternations, Hñähñu verbs can also be classified into five inflection classes according to the tone alternation pattern they present between the imperfective and the perfective stem: invariable (=class 1), H:R, H:L, L:R, and L:H.

In this section I have shown the distribution and form of tonal stem alternation in Hñähñu verbs. I have also shown that the membership of verbs to class 1 (non-alternating) or to class 2 (tone-alternating) is not motivated either phonologically, syntactically, or semantically. Alternative analyses of the form and distribution of tonal stem alternants of Hñähñu are presented in the next subsections.

4.1. Autosegmental accounts

In this section I present two alternative analyses to account for the stem alternants observed in verb inflection in Hñähñu. Both analyses involve the postulation of replacive-dominant grammatical tones (Rolle 2018) that override the stem's underlying, or lexical, tone.

The first analysis is akin to Palancar's morphosyntactic tone (Palancar 2016: 113-115), where one can propose that tone is indeed an exponent of aspect. Under this analysis, one needs to posit two or three floating-tone

allomorphs to encode aspect, plus a zero allomorph for non-alternating verbs; all these allomorphs would have to be lexically stipulated. This alternative is summarized in Table 13 below. In variation a., the underlying tone would correspond to that of the imperfective stem, and there would be four allomorphs of the perfective aspect marker; in variation b., there would be three allomorphs and the underlying tone would correspond to that of the perfective stem. Notice that the floating tones (encircled and in superscript) are docked to the stem in the surface forms, and the underlying tones are deleted.

	underlying tone	allomorphs	examples
a. IPFV stem		∅= ‘PFV’	/dá=∅=tě/ → dá tě ‘I lived’
		[⊕] = ‘PFV’	/dá= [⊕] =mbàtsi/ → dá mbàts’i ‘I was a child’
		[Ⓛ] = ‘PFV’	/dá= [Ⓛ] =kóhi/ → dá kóhi ‘I stayed’
		[Ⓡ] = ‘PFV’	/dá= [Ⓡ] =něi/ → dá něi ‘I danced’
b. PFV stem		∅= ‘IPFV’	/dí=∅=tě/ → dí tě ‘I live’
		[Ⓛ] = ‘IPFV’	/dí= [Ⓛ] =mbàtsi/ → dí mbàtsi ‘I’m a child’
		[⊕] = ‘IPFV’	/dí= [⊕] =kóhi/ → dí kóhi ‘I stay’
		[⊕] = ‘IPFV’	/dí= [⊕] =něi/ → dí něi ‘I dance’

Table 13. Morphological-tone analysis of Hñähñu tonal stem alternations

The two variations of the analysis presented above implies that aspect would be encoded by at least three allomorphs consisting in floating tones; in addition, they also imply that aspect would be encoded by extended exponency on both TAM/person formatives and morphosyntactic tone.

The second alternative analysis is to propose that TAM/person formatives corresponding to either the imperfective or the perfective TAM categories can bear replacive-dominant floating tones that override the underlying tone of the verb. The autosegmental representation of this type of inflectional tone is shown in (7). The floating tone on the TAM/person formative $dá^{\text{Ⓡ}}$ ‘1.PST’ in (7a) docks on the stressed syllable of the verb stem, and replaces the lexical low tone of the nasalized stem of the intransitive verb $pà$ ‘go’; in (7b), the allomorph $dá=$ ‘1.PST’ does not have any floating tones, and thus the lexical tone of the verb $pà$ ‘sell’ surfaces.

(7)a. /da=ma/ → dá mǎ ‘I went’

 H[Ⓡ] L

b. /da=pa/ → dá pà ‘I sold it’
 | |
 H L

Given the different tone alternation patterns observed in Hñähñu verb inflection, one variation of this analysis would require that every TAM/person formative with perfective aspect has at least four allomorphs (no floating tone, floating H, floating L, and floating R). A second variation would require three allomorphs (no floating tone, floating H, floating L) of every imperfective TAM/person formative. Yet another variation, involving the postulation of “indomitable” lexemes (*i.e.* those that reject the docking of inflectional tones; see Rolle 2018: 70) to account for class 1 (*i.e.* non-alternating) verbs, can lower the number of imperfective TAM/person formative allomorphs one step further (only floating H and floating L). All three variations require lexical stipulation of the allomorphs selected by each verb; moreover, the third variation requires the addition of lexically-stipulated indomitability. Table 14 summarizes the variations of the second alternative analysis that have been just outlined. It specifies the indomitable class, underlying tone, and allomorphs of the TAM/person formatives in each variation.

	indomitable class	underlying tone	allomorphs	examples
a.	none	IPFV stem	dá=	/dá=tě/ → dá tě ‘I lived’
			dá ^H =	/dá ^H =mbàtsi/ → dá mbàtsi ‘I was a child’
			dá ^L =	/dá ^L =kòhi/ → dá kòhi ‘I stayed’
			dá ^R =	/dá ^R =něi/ → dá něi ‘I danced’
b.	none	PFV stem	dí=	/dí=tě/ → dí tě ‘I live’
			dí ^L =	/dí ^L =mbàtsi/ → dí mbàtsi ‘I’m a child’
			dí ^H =	/dí ^H =kòhi/ → dí kòhi ‘I stay’
c.	class 1	PFV stem	dí ^L =	/dí ^L =tě _{CL1} / → dí tě ‘I live’
			dí ^L =	/dí ^L =mbàtsi _{CL2} / → dí mbàtsi ‘I’m a child’
			dí ^H =	/dí ^H =kòhi _{CL2} / → dí kòhi ‘I stay’
			dí ^H =	/dí ^H =něi _{CL2} / → dí něi ‘I dance’

Table 14. Autosegmental analysis of Hñähñu tonal stem alternations

The allomorphs included in Table 14 are only 1st person past (variation a.), or 1st person present (variations b. and c.). The real number of different TAM/person formatives in variation a. would be at least 48 (*i.e.* 4 × 3

persons \times 4 perfective TAM categories); in variations b. and c. it would be 18 (*i.e.* 3 \times 3 persons \times 2 imperfective TAM categories) and 12 (*i.e.* 2 \times 3 persons \times 2 imperfective TAM categories), respectively.

The two autosegmental analyses presented in this section require the existence of a lexical or underlying form of verbs corresponding to either the imperfective or the perfective stem, some degree of lexical stipulation of allomorph selection, and allomorphy involving floating tones. In some cases, these allomorphs are plain floating tones.

4.2. Paradigmatic accounts

Two alternative analyses based on paradigmatic distribution of stems are proposed in this section to account for the tone alternations in verb inflection in Hñähñu. These analyses only differ from each other in the postulation of underlying tones of verb lexemes.

The first alternative analysis involves what Rolle calls a “construct tune” (Rolle 2018: 105-109). In some languages, word-forms may surface with their underlying tone in certain grammatical contexts, and with a different tone (*i.e.* the construct tune) in other grammatical contexts. These tone alternations may even involve different patterns, as can be seen in the column “Construct tune” of the data from Ganza (Ethiopia; Omotic) in Table 15. For each pattern, the underlying tone surfaces in the citation form and in the plural, whereas the construct tune surfaces when the plural form is modified by a distal demonstrative.

	1	2	3	4	5	6	7
	Construct tune	Citation	Translation	Under- lying T	Construct tune	+Plural (Underlying)	+Pl distal dem. (Construct)
a.	1 H \rightarrow L	[gáŋá]	‘donkey’	gáŋá	gàŋà	gáŋá-gù	ʔùgù gàŋà-gù
	2 L \rightarrow L	[kʰùrù]	‘genet’	kùrù	kùrù	kùrù-gù	ʔùgù kùrù-gù
	3 H [Ⓣ] \rightarrow L	[tʰúlâ]	‘dikdik’	tʰúlâ [Ⓣ]	tʰùlà	tʰúlâ-gù	ʔùgù tʰùlà-gù
	4 LH \rightarrow L	[mímí]	‘mosquito’	mímí	mimi	mímí-gù	ʔùgù mimi-gù
	5 LH [Ⓣ] \rightarrow L	[kʰjâlâ]	‘colobus’	kjâlâ [Ⓣ]	kjâlâ	kjâlâ-gù	ʔùgù kjâlâ-gù
b.	6 HL \rightarrow HL	[pʰádâ]	‘deer’	pátʰà	pátʰà	pátʰà-gù	ʔùgù pátʰà-gù
	7 H [Ⓣ] H \rightarrow HL	[sáʰʔá]	‘goat’	sáʰʔá	sáʔà	sáʰʔá-gù	ʔùgù sáʔà-gù
c.	8 H [Ⓣ] \rightarrow H [Ⓣ]	[sásô]	‘monkey’	sásô [Ⓣ]	sásô [Ⓣ]	sásô-gù	ʔùgù sásô-gù
	9 L [Ⓣ] \rightarrow H [Ⓣ]	[wàŋà]	‘chicken’	wàŋà [Ⓣ]	wàŋá [Ⓣ]	wàŋà-gù	ʔùgù wàŋá-gù
	10 H [Ⓣ] H \rightarrow H [Ⓣ]	[kʰáʰná]	‘dog’	káʰná	káná [Ⓣ]	káʰná-gù	ʔùgù káná-gù

Table 15. Construct tune in Ganza nouns (Smolders, 2016, as cited in Rolle, 2018: 106)

Under one variation of this analysis, class 2 verbs in Hñähñu would surface with their underlying (or lexical) tone in the imperfective, but with the construct tune in the perfective, following one of five different construct tune patterns. This is shown in row a. of Table 16. Conversely, in a second variation of this analysis, in row b. of Table 16, the underlying tone would correspond to that of the perfective stem.

	underlying stem	construct tune	underlying tone		construct tune	
a. IPFV		none	tě _{IPFV}	=	tě _{PFV}	‘live’
		H→R	něi _{IPFV}	→	něi _{PFV}	‘dance’
		H→L	kóhi _{IPFV}	→	kòhi _{PFV}	‘stay’
		L→R	ñǎ _{IPFV}	→	ñǎ _{PFV}	‘speak’
		L→H	mbàtsi _{IPFV}	→	mbàtsi _{PFV}	‘be a child’
b. PFV		none	tě _{PFV}	=	tě _{IPFV}	‘live’
		R→H	něi _{PFV}	→	něi _{IPFV}	‘dance’
		L→H	kòhi _{PFV}	→	kóhi _{IPFV}	‘stay’
		R→L	ñǎ _{PFV}	→	ñǎ _{IPFV}	‘speak’
		H→L	mbàtsi _{PFV}	→	mbàtsii _{IPFV}	‘be a child’

Table 16. Construct-tune analysis of Hñähñu tonal stem alternations

The construct-tune analysis summarized in Table 16 does not require much allomorphy as the autosegmental analyses (see §4.1), but it still presupposes that every lexeme has an underlying tone. Lexical stipulation of the construct tune pattern is also required in this analysis, as it is in the last alternative analysis described in the following paragraphs.

Tonal stem alternations of Hñähñu can be analyzed as “morphological tone linked to the lexicon”, according to Palancar’s (2016) typology of inflectional tone. Morphological tone is a “type of inflectional tone used as a building block of the grammar of a language for the construction of forms in inflectional paradigms” (Palancar 2016: 110); in Hñähñu inflection, tone alternations are considered morphological tone in the sense that tonal contrasts are the crucial difference between the perfective and the imperfective stems in class 2 verbs. The morphological tone of Hñähñu is linked to the lexicon, as the occurrence and pattern of tone alternations is lexically idiosyncratic; I have already shown in §4 that these alternations are not phonologically motivated, and that they are orthogonal to inflection

classes based on consonant stem alternations.⁸ Moreover, different class 2 lexemes follow different tone alternation patterns. In this view, neither the imperfective stem nor the perfective stem is considered as underlyingly basic, but they are both at the same level. The analysis I advance here is different from Palancar’s (2016) view on morphological tone of in this regard: in his view, an underlying tone is stipulated for lexemes in all the cases of morphological tone. The analysis I propose is summarized in Table 17, where the imperfective and the perfective stems have been put between slashes / and separated by a colon ‘:’ to indicate that they are underlyingly at the same level.

tone alternation pattern	underlying (/IPFV : PFV/)	
none	/tě : tǎ/	‘live’
H:R	/néi : něi/	‘dance’
H:L	/kóhi : kòhi/	‘stay’
L:R	/ñǎ : ñǎ/	‘speak’
L:H	/mbàtsi : mbátsi/	‘be a child’

Table 17. Morphological-tone analysis of Hñähñu tonal stem alternants

Here I follow Smolders’ (2016) notation to represent both stems at the underlying level: he represents the underlying forms of Ganza nouns precisely by two underlying forms separated by a colon (Smolders 2016: 132-133). He seems to regard them as being at the same level too, *contra* Rolle’s (2018: 106) interpretation.

The analysis summarized in Table 17 does away with the uncertainty of which stem (perfective or imperfective) is at the underlying level that we encounter in the other analyses considered here and in §4.1. It also avoids the need to postulate numerous allomorphs of TAM/person formatives or aspect markers that only contrast in the floating tones they bear, and some of which are just plain floating tones. It still requires extensive lexical stipulation of the alternation pattern each verb follows; that is precisely the reason why I describe it as “morphological tone *linked to the lexicon*” in the first place.

⁸ See Palancar (2016: 117-123) about morphological tone motivated by phonology and by inflection class.

Because of the facts listed in the previous paragraph, I consider that the analysis of tonal stem alternations of Hñähñu as morphological tone linked to the lexicon is the optimal model among the four that I have outlined here and in §4.1. In the next section I further discuss the advantages of this last analysis, and I point out a new perspective that the study of tone alternations in Hñähñu can give to the typology of inflectional tone.

5. Hñähñu stem alternations and the typology of inflectional tone

In §4.1 and §4.2 I propose four alternative analyses (and their variations) for the tonal stem alternations of Hñähñu. I have considered that seeing them as morphological tone linked to the lexicon, without assuming one underlying tone for each lexeme, is optimal for a language like Hñähñu. This does not mean that autosegmental models, or models that imply the existence of a specific underlying form are inherently inferior to the analysis I follow here. Numerous examples in Rolle (2018) prove that they are undeniably adequate for describing inflectional tone in many languages. It means simply that they are not optimal for Hñähñu, for the reasons I list in the following paragraph.

On the one hand, all the alternative analyses other than the morphological-tone analysis in §4.1 and §4.2 require the postulation of an underlying form with an underlying tone for each lexeme; underlying stems are assumed even in all the cases of morphological tone Palancar (2016) presents. The problem with proposing one underlying tone for each alternating lexeme in Hñähñu is that verbs in Otomi languages always occur as inflected word-forms, as they lack non-finite verb forms (Palancar 2012b; 2016: 112). Choosing either the tone of the imperfective stem or the perfective stem to be the lexical tone would be arbitrary, to say the least. On the other hand, a model based on paradigmatic distribution of stem alternants makes more sense in a language where tone alternations correlate with two distinct areas in the paradigm: the imperfective TAM categories and the perfective TAM categories. Trying to use an autosegmental model to describe such a system where TAM/person categories are encoded by means of inflectional formatives results in otherwise unjustified allomorphy, which (in the best-case scenario) doubles the number of the different TAM/person formatives speakers must know and master. Tone alternations are clearly

linked to specific areas of the paradigm, and not to specific TAM/person formatives.

For both Palancar (2016) and Rolle (2018), the indeterminacy of the lexical or underlying stem occurs in inflection systems with “great degree of tonal allomorphy in the realization of morphosyntactic values” (Palancar 2016: 128), or where tone alternations have a rather morphomic distribution, namely tonal classes (Palancar 2016: 128-134) and paradigmatic grammatical tone (Rolle 2018: 109); in contrast, in the rest of the types they describe, including morphological tone, they assume an underlying stem tone for each lexeme, on which further morphological processes operate. Tone alternations in Hñähñu present a different picture, one that lies outside both typologies: these alternations have a clear morphosyntactic distribution (imperfective *vs* perfective), they are lexically-stipulated, and yet no underlying stem can be assumed for tone-alternating lexemes without doing it arbitrarily. Both authors seem to have good reasons for assuming underlying stems in their examples; in some cases, there is no doubt about the underlying status they attribute to stems. Hñähñu verb stems are not among such cases, as we have no justification for assuming either the imperfective or the perfective stem as the underlying one; construct tones in Ganza nouns, as presented by Smolders (2016), seem to be a similar case. Moreover, even if further research demonstrated that every tone-alternating lexeme in Hñähñu does indeed have an underlying tone, the question would remain open as to whether it can be demonstrated that lexemes of all languages with similar inflection systems have one as well.

In this light, I propose that the parameter *underlying-stem (in)determinacy* be added to the relevant parameters in the typology of inflectional tone. With this new parameter in place, inflection system types based on paradigm distribution of tone alternants would vary in terms of whether an underlying stem tone can be assumed for lexemes; underlying-stem (in)determinacy may even be found to vary across the lexicon in certain inflection systems, in which case an underlying stem tone may be assumed only for some lexemes. It is possible that this parameter would only apply to morphological tone (Palancar 2016) and construct tones (Rolle, 2018); autosegmental accounts are very unlikely to require it, as they rely heavily on underlying representations. Palancar’s (2016) tonal classes and Rolle’s

(2018) paradigmatic grammatical tone may not require it at all either, given the morphomic nature of such inflectional systems. Whether this new parameter results to be relevant in a wider, cross-linguistic perspective remains an open question for the time being.

6. Conclusions

Verbs in Hñähñu can be classified into inflection classes according to the formation of stem alternants and their distribution across the paradigm. The formation of stem alternants is generally morpho-lexical, with no synchronic motivations at the phonological, syntactic, or semantic levels; it includes consonant and tone alternations. The classification of Hñähñu verbs according to tonal stem alternants is orthogonal to those that are based on consonant stem alternants. Tonal stem alternants can be characterized as morpho-lexical, because whether they occur (class 2) or not (class 1) is lexically specified. Although this type of stem alternants is found almost exclusively in intransitive verbs, not all intransitives necessarily have them. Tone alternations are distributed in the verb paradigm of tone-alternating lexemes according to aspect: a stem with one tone occurs in imperfective TAM categories, while a stem with a different tone occurs in perfective TAM categories. The tone (H, L, R) on either the imperfective or the perfective stem is subject to four different, lexically-stipulated tone alternation patterns.

Hñähñu stem alternants seem to be a case of morphological tone linked to the lexicon (Palancar 2016) where an underlying stem tone cannot be assumed for lexemes. This suggests that the typologies outlined by Palancar (2016) and by Rolle (2018) may be lacking a parameter that considers whether underlying stems can be assumed in the inflection systems being described. For this reason, I propose the inclusion of a parameter I call underlying-stem (in)determinacy in the typology of inflectional tone.

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