Describing reduplication patterns in Tohono O'odham with language learners in mind

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ABSTRACT. Tohono O'odham (TO) has a complex reduplication system expressing number and aspect. However, there is no comprehensive explanation of TO reduplication patterns in the literature that is consistent with our data. Additionally, the only pedagogical grammar available for the language presents a single reduplication pattern, although several patterns are productive. Our study examines common reduplication processes, proposing that they conform to a limited and predictable set. We suggest that the prosodic weight of the reduplicant is dependent upon the weight of the base. Furthermore, we suggest that this generalization is useful for language learners to understand because it allows them access to a larger number of reduplication patterns in their endangered heritage language.

Keywords: Tohono O'odham, O'odham, reduplication, prosodic morphology, L2

1. INTRODUCTION. Tohono O'odham (hereafter, TO), an endangered Uto-Aztecan language spoken primarily in southern Arizona and northern Sonora, Mexico, has a complex reduplication system used for the expression of grammatical number (both plural and distributive) as well as the iterative aspect (Fitzgerald 2003). Although reduplication is a productive and highly salient morphological process in TO, the literature does not provide a comprehensive description or explanation of the language's reduplication patterns that is consistent with our data (e.g. Hill & Zepeda 1992; Fitzgerald 1999, 2003; Riggle 2006). Furthermore, the only pedagogical grammar available for the language (Zepeda 1983) exclusively describes a single reduplication process, which is only able to account for a subset of the reduplication patterns used in the language. Given the endangered status of TO, a presentation of common reduplication patterns would be beneficial to second language (L2) learners. At first glance, however, reduplication in TO may appear random and unpredictable to these learners. The aim of the present work is to present a unified framework that is able to account for more patterns of reduplication in TO than previously covered by the literature. Our account provides a straightforward explanation of many of the reduplication patterns and can be easily implemented in the classroom.

This study examines and describes the primary processes evident in the data we have collected for TO. We propose that reduplication conforms to a limited set of predictable patterns, and we rely on prosodic theory to provide a unified understanding of TO reduplication. Our analysis contrasts with the account given by Zepeda (1983:7) in which reduplication is described as 'CV-copying'. For example, ***go****ks*[1] 'dog' → ***go****goks* 'dogs' would be explained as the copying of the initial CV (i.e. **C**onsonant, **V**owel) in the singular form of the word (i.e. *go*). While the pattern of CV-copying was likely used by Zepeda for pedagogical purposes, this description does not account for other reduplication patterns in the language. There are other cases in which the reduplicant (the portion of the word that is reduplicated in the plural) either lengthens (***ba****n* 'coyote' → ***ba:****ban* 'coyotes') or shortens (***mi:****stoɻ* 'cat' → ***mi****mistoɻ* 'cats'). This study suggests that the length of the reduplicant can be understood in terms of a prosodic pattern, termed 'quantitative complementarity' (cf. §2.1) by McCarthy and Prince (1995:334–5). When this theory is considered within the context of TO, the reduplicant occurs in a prosodically light (monomoraic) form when paired with a heavy (polymoraic) base, and in a heavy form when

paired with a light base. The length of the reduplicant in turn causes structural changes in the base (e.g. compensatory lengthening, vowel reduction, syncope, etc. (cf. §§2.2 and 2.3)).

Our primary tasks in this paper are two-fold. First, we illustrate how McCarthy and Prince's (1995) theory of prosodic morphology accounts for many of the reduplication patterns in our data (§§2.2 and 2.3). Secondly, we briefly provide suggestions for how our theoretically based findings can be practically applied in the classroom (§3). In closing, we propose some avenues for future research (§4).

1.1. LANGUAGE BACKGROUND. The TO language belongs to the Uto-Aztecan family, whose languages are spoken from Oregon to Montana in the north, down into El Salvador. TO is a member of the Tepiman branch along with three indigenous languages spoken in Mexico: O'ob No'ok, Ódami, and O'dam.

TO is spoken on both sides of the US-Mexico border in the states of Arizona and Sonora. In the United States this variety of O'odham has previously been called Papago. TO, along with every other indigenous language of North America, is endangered, as intergenerational transmission has been disrupted and the majority of speakers are older than forty (Fitzgerald 2010 citing Madsen 2004).

1.2. METHODOLOGY. The data in this paper are from Mr. Robert Cruz's Ko:kolo:di dialect, spoken in the Cukuḍ Kuk district (also known as Tecolote) in the southernmost region of Arizona, along the national border between the United States and Mexico. These data are drawn from a corpus which has been developed and recorded over the course of two years, supplemented by targeted elicitation. In many cases, previous works on TO (Fitzgerald 1999, 2003, 2010; Hill and Zepeda 1998; Saxton & Saxton 1969; Saxton et al. 1983; Zepeda 1983) provided ideas for elicitation, as well as consultation with Mr. Cruz.

2. DATA PRESENTATION: VOWEL PROCESSES IN TO REDUPLICATION. As stated, TO utilizes the reduplicative process to express plural nouns (***mi****:stoɻ* 'cat' → ***mi****mistoɻ* 'cats') and plural verbs. In the latter case, the reduplicative pattern reflects a plural subject (***ko:ʂ*** 'sleeping.SG.SUB'[2] → ***ko:****kʂ* 'sleeping.PL.SUB'), plural objects, or an iterative action (***hi****:nak* 'barking.PUNCT' → ***hi****hinak* 'barking.ITER'). For the discussion at hand, our data are solely comprised of nouns. Fitzgerald (2003:65) has also found a geminate formation in the reduplicated, derived (i.e. plural) word to express the distributive (*ta:tam*.SG 'tooth.' → *ta:****tt****am* 'teeth.DIST'). However, this formation is not present in Mr. Cruz's speech.

Two primary reduplicative processes are present in TO. The first is LENGTHENING OF THE VOWEL in the reduplicant (the reduplicated portion of the word). In these cases, the initial CV in the singular base lengthens to CVV in the reduplicant of the plural form (***ba****n* 'coyote' → ***ba:****ban* 'coyotes'). The second pattern is SHORTENING OF A LONG VOWEL appearing in the initial syllable of the singular base. That is, a CVV becomes CV, as in ***má:****kai* 'medicine man' → ***má****makai* 'medicine men').

There are also cases where the CV reduplicant remains unchanged from the singular to the plural as in ***ʤú****ɖum* 'bear' → ***ʤú****ʤəɖum* 'bears' and (***hu****ʤit* 'lizard' → ***hu****huʤit* 'lizards'). While this appears to be the most straightforward pattern, it is not the default in our data. This issue will be revisited in §2.3.

In the context of both lengthening and shortening processes, we've observed other alterations in the reduplicated forms, which will be further discussed in §2.2 and §2.3.

We propose that McCarthy and Prince's (1995) PROSODIC MORPHOLOGY HYPOTHESIS provides a possible explanation for many of the patterns that we have observed in our data (cf. §2.1). Detailed analyses and discussion of our data are given in §§2.2 and 2.3.

2.1. MCCARTHY AND PRINCE'S PROSODIC MORPHOLOGY HYPOTHESIS. McCarthy and Prince's (1995) theory of prosodic morphology provides an explanation for the various lengthening and shortening processes in TO reduplication. The PROSODIC MORPHOLOGY HYPOTHESIS suggests that PROSODIC UNITS—moras, syllables, feet, etc.—comprise the shape of 'templatic' morphemes, reduplicated segments in this case, in relation to the prosodic makeup of the base (McCarthy & Prince 1995:318–319). Templates 'must respect the well-formedness requirements of prosody' (McCarthy & Prince 1995:318). While we take the view that speakers of languages and language usage determine linguistic forms, McCarthy and Prince nonetheless offer a useful method for describing the patterns noted in TO reduplication. Their view is a departure from the assumption that specific constituents are copied in languages, for example, 'copy CV or CVC'. In regards to reduplication, our data suggest that TO functions in terms of a QUANTITATIVE COMPLEMENTARITY in which light reduplicants generally appear with heavy bases and vice versa (McCarthy & Prince 1995:334).

Before setting out to demonstrate how TO adheres to this system, an explanation of how heavy and light syllables are defined in TO is necessary. In languages such as TO, moras are prosodic units, which contribute weight to a given a syllable. Traditionally in studies of prosody, a CV segment is always treated as a light, monomoraic syllable, whereas CVV and CVC are regarded as heavy syllables with bimoraic feet. In this case, the coda consonant carries moraic weight. TO does not, however, follow this pattern. According to Hayes (1989:255), in languages in which a distinction between CV and CVV syllables exists, CVC syllables pattern as light rather than heavy (also see Tranel 1991 for a related discussion). In other words, the final consonant of the CVC structure does not contribute moraic weight. For example, *ban* 'coyote', which has a CVC structure is light rather than heavy in TO. Such languages 'differ in their rules for assigning moraic structure' (Hayes 1989:255). This explanation accounts for many of the reduplicative patterns seen in our data. The following sections aim to demonstrate how the prosodic morphology hypothesis applies to reduplication in TO.

2.2. LENGTHENING PROCESSES IN TO REDUPLICATION. Long vowel reduplication refers to the process of lengthening the vowel in the reduplicant when the initial vowel in the singular base is short. Within the context of reduplication, we hypothesize that reduplicants with long vowels can be understood as being quantitatively complementary, as suggested in McCarthy and Prince (1995) (cf. §2.1), to singular bases that are light in O'odham.[3] This current section describes vowel lengthening reduplication patterns in our data.

MONOSYLLABIC LIGHT BASES. In the data collected from Mr. Cruz's speech, reduplicants with long vowels (CVV) only occur when the singular base form is light (CVC). This pattern can be described in terms of McCarthy and Prince's (1995) principle of quantitative complementarity, where light reduplicants occur with heavy bases and heavy reduplicants with light bases. In the cases presented in Table 1, all of the singular base forms exhibit monosyllabic CVC structures and the vowel in the reduplicant is long. The vowel lengthening in the reduplicant demonstrates that the CVC base syllable patterns as light (e.g. ***ba**n* → 'coyote' ****ba**ban* 'coyotes'), and therefore occurs with a complementary heavy reduplicant. In the cases of vowel lengthening in

the reduplicant where the singular base is monosyllabic, the resulting form is a heavy-light syllable, which is argued to be the most common pattern in TO (Hill & Zepeda 1998, Fitzgerald 2003).

Base (singular)	Reduplicated (plural)	Gloss
bán	**bá:**ban	coyote
mád	**má:**mad	child (of woman)
ʈ́ád	**ʈ́á:**ʈ́ad	foot
ɲɨ́m	**ɲɨ́:**ɲɨm	liver
ʤɨ́g	**ʤɨ́:**ʤɨg	hole

TABLE 1. Vowel lengthening in the reduplicants.

LESS FREQUENT LENGTHENING PROCESSES. Two additional lengthening patterns are found in the data. These patterns are less frequent in our data set and likely more restricted in distribution. Nevertheless, the data in this section still exemplify patterns relevant to quantitative complementarity as described in the prosodic morphology hypothesis (McCarthy & Prince 1995). Due to the complexity of these two patterns, they will not be discussed in the APPLICATIONS IN THE L2 CLASSROOM section (§3) of this paper.

Base (singular)	Reduplicated (plural)	Gloss
nówĭ	**nó:**nhoĭ	hand
báhĭ	**bá:**bhaĭ	tail
wúhĭ	**wú:**puĭ[4]	eye

TABLE 2. Lengthening with extra-short vowels and metathesis.

In Table 2, the initial vowel in the singular base is short, while the vowel in the reduplicant form is long. The lengthening in the reduplicant in these examples suggests that the extra-short vowel word-finally, denoted by the breve, does not contribute weight to the singular base (see Hill & Zepeda 1998:357-358 on extra-short vowels). Again, the vowel in the reduplicant lengthens, complementing the light CVC base. Hill and Zepeda (1992:374) recognize the second observable phenomenon shown in the data included in Table 2 as metathesis. For example, the plural form of *bahĭ* 'tail' might be expected to be ***ba:b**__**ah**__**ĭ**, however, the form appears to be affected by a process of metathesis and appears as *ba:b***ha**__**ĭ**. The process of metathesis prevents the occurrence of laryngeal codas, a violation of TO phonotactics.[5] In some cases, as in the plural forms for 'hand' and 'tail', the process of metathesis leads to a resyllabification of the initial onset consonant in the singular base to act as a coda in the reduplicant of the plural form.

The other reduplicant lengthening pattern that occurred less frequently in the data collected from Mr. Cruz is illustrated in Table 3. At first glance, these data do not appear to follow the pattern of quantitative complementarity for reduplication. The singular base forms should be treated as heavy because they are assigned at least two moras, yet the vowel in the reduplicant exhibits vowel lengthening. One important difference between the data shown in Table 3 and those in Tables 1 and 2 is that all data tokens in Table 3 show processes of reduction and syncope (i.e. segment deletion) in the plural, reduplicated forms. For instance, in the reduplicated form of ***dóʔag*** 'mountain' both the first vowel occurring in the base and the

following glottal stop are absent in the plural form (**dodoʔag*).

Base (singular)	Reduplicated (plural)	Gloss
dóʔag	**dó:**dag	mountain
báʔamad	**bá:**bəmad	daughter's child
móʔo	**mó:**mĭ̥	head
ʤɟ́iʔɨ̆	**ʤɟ́:**ʤ	mother

TABLE 3. Compensatory vowel lengthening.

We hypothesize that the lengthening of the vowel in the reduplicant is compensatory lengthening as a result of the loss of segments (cf. Hayes 1989). In cases like those shown in Table 3, historically, the reduplicants may have been light because the singular bases are heavy. We hypothesize that as processes of reduction in the plural bases occurred, the vowel in the reduplicant lengthened, adding more prominence to the stressed syllable. In future research, we wish to investigate the diachronic sources of the data type shown in Table 3.

2.3. REDUCTION PROCESSES IN TO REDUPLICATION. The previous section demonstrated how vowel lengthening in the reduplicant occurs in circumstances in which the base is light (CVC). This section will show how the reduplicant patterns when the base is heavy (i.e. greater than CVC), and how such patterns can be understood in terms of quantitative complementarity as described by McCarthy and Prince (1995). We will also briefly address some additional reduction changes which affect the plural forms of the bases, which are likely related to common processes of language change found cross-linguistically.

POLYSYLLABIC HEAVY BASES. The reduction process most relevant to McCarthy and Prince's (1995) theory of prosodic morphology affects the structure of the reduplicant as was the case in the data sets described in §2.2. However, in these instances, if the singular form of the word has a long vowel in the initial syllable (CVV) and the base is heavy (e.g. CVCV, CVVCV, etc), then it will frequently shorten to CV in the reduplicant as show in Table 4. Of less significance to the theory of prosodic morphology, but a pervasive pattern nonetheless, the data show that the same long vowel shortens in the plural base (e.g. *tó**to**bĭ*, not **tó**to:**bĭ*) due to the phonotactics of TO, which rarely allow long vowels word internally.

Base (singular)	Reduplicated (plural)	Gloss
tó:bĭ	**tó**tobĭ	rabbit/cottontail
sí:kĭ	**sí**sikĭ	white tail deer
má:kai	**má**makai	medicine man
mí:stoɻ	**mí**mistoɻ	cat
ɻɻ́:wa	**ɻɻ́**ɻiwa	jacket (Sp)[6]

TABLE 4. Vowel shortening in the reduplicant.

The outcome of vowel shortening is a light syllable occurring with a heavy polysyllabic base, as noted in other languages that demonstrate quantitatively complementary reduplication (McCarthy & Prince 1995:334).

In cases in which the vowel in the initial syllable of the singular base is already short, no

change ensues in the reduplicant (e.g. ***ʧi****mit* 'tortilla' → ***ʧiʧə****mit* 'tortillas' and ***ho****daĭ* 'rock/stone' → ***ho****hodaĭ* 'rocks/stones'). While this is essentially CV-copying, the most straightforward reduplication pattern, the motivation behind this in terms of quantitative complementarity is that a change does not take place because the initial syllables are already light (CV), maintaining a complementary prosodic relationship with the heavy bases (see Tables 5 and 8 below for more examples).

REDUCTION PROCESSES AFFECTING THE PLURAL BASE. We have noted a couple of additional reduction processes that affect the plural forms of the bases in the context of words that are prosodically heavy. While noting these patterns is not necessary for pedagogical purposes, they pose some interesting suggestions regarding how TO may be evolving. Furthermore, despite these alterations in the plural bases, the data are still consistent with quantitatively complementary reduplication.

In the first reduction process, the initial syllable of the base centralizes to a schwa (bolded in the data set) in the plural forms of the bases as exemplified in Tables 5 and 6. In terms of complementarity, Table 5 shows reduplicants that are identical to the initial CV forms of the singular bases, while Table 6 includes reduplicants that shorten. Both patterns transpire in order to maintain a complementary relationship of light reduplicants with heavy bases.

Base (singular)	**Reduplicated (plural)**	**Gloss**
ʤúɖum	ʤúʤəɖum	bear
ʧɨ́mit	ʧɨ́ʧəmit	tortilla
náwaʂ	nánəwaʂ	pocket knife (Sp)
kámiʂ	kákəmiʂ	shirt (Sp)

TABLE 5. Reduction of full vowels to a schwa in the plural base.

Base (singular)	**Reduplicated (plural)**	**Gloss**
kú:ɻaɲ	kúkəɻaɲ	medicine
má:wit	máməwit	lion
wɨ́:nag	wɨ́pənag	sibling
má:kai	mámək$\bar{a}$ĭ	medicine man
má:gina	mámə̲gina	car/machine (Sp)
ká:ɻit	kák$\underline{ə}$ɻit (wagon)	wagon (Sp)

TABLE 6. Reduction of full vowels to a schwa and shortened vowels in the reduplicant.

Previous literature does not mention the presence of the centralized vowel in the context of reduplication (cf. Fitzgerald 1999, Haugen 2009, Riggle 2006—on Pima, a mutually intelligible dialect, Zepeda 1983, Hill and Zepeda 1998). Instead, such reduplicated forms are presented with full syncope, that is, the loss of a word internal sound (discussion on syncope to follow). However, the contrast between words with reduction and syncope is unambiguously evident in Mr. Cruz's speech and is likely due to processes of language change, a topic which is given further treatment at the end of this section.

The final reduction process noted in our data also affects the plural form of the base, where the initial CV syllable in the singular base undergoes syncope (i.e. the vowel is absent), as

has been noted by others (e.g. Fitzgerald 1999, 2003; Riggle 2006—on Pima). This process additionally results in resyllabification leading to a closed initial syllable in the reduplicated form of the word (Fitzgerald 1999, 2003). In other words, initial consonants appearing in the base become the coda of the syllable comprising the reduplicant as represented in Table 7 (codas are bolded and '_' denotes syncope).

Base (singular)	**Reduplicated (plural)**	**Gloss**
gáso	gá**k**_so	fox
ʧ̆úso	ʧú**ʧ**_so	chipmunk
kótoɲ	kó**k**_toɲ	shirts (Sp)
wísiɻo	wí**p**_siɻo	calf

TABLE 7. Vowel syncope in the reduplicated base.

In regards to the prosodic morphology hypothesis (McCarthy & Prince 1995), each derived (i.e. plural) word consists of a light reduplicant occurring with modified plural bases which do not necessarily pattern as heavy, however, the original singular forms of the bases do. The resyllabified plural bases are likely driven by principles of language change.

Syncope as well as the appearance of the schwa is presumably a result of the pervasive tendency in TO for strong, word-initial primary stress. In general, primary stress is also cross-linguistically known to lead to developments such as vowel reduction and possibly syncope in adjacent unstressed syllables (e.g. Bybee et al. 1998:274). Finally, the evolution towards syncope can also lead to the creation of an enhanced prominently stressed syllable (Fitzgerald 2003). Syncope would not occur, however, if the process would run counter to the phonotactics of the language. For example, laryngeal codas rarely (if ever) occur in TO as illustrated in Table 8 (unattested codas are bolded). As in the other cases, quantitatively complementary reduplication is maintained throughout the data set below (light reduplicants with heavy bases).

Base (singular)	**Reduplicated (plural)**	**Unattested**	**Gloss**
hódaĭ	hóhodaĭ	*hó**h**_dai	rock/stone
húʤit	húhuʤit	*hú**h**_ʤit	lizard
hóʔi	hóhoʔi	*hó**h**_ʔi	thorn
ha:waɲ	háhawaɲ	*ha**h**_waɲ	raven/crow
ha:ʂaɲ	háhaʂaɲ	*há**h**_ʂaɲ	saguaro cactus

TABLE 8. Reduplication in the context of laryngeal onsets.

From a diachronic perspective, we hypothesize that as a result of prominently stressed word-initial syllables in TO, a potentially large set of words in the language are evolving from full vowels towards syncope with the centralization of vowels as an intermediary phase. This also leads to the resyllabification of plural bases noted in reference to examples of syncope shown in Table 7. We intend to further investigate this topic in a future study.

3. APPLICATIONS IN THE L2 CLASSROOM. In the previous sections, we demonstrated how McCarthy and Prince's (1995:334) quantitative complementarity principle is helpful in explaining a greater number of patterns found in plural reduplicative forms in TO than the syllable-copying account. The latter is the description used in the only teaching grammar

available in the language (Zepeda 1983). In TO, our data illustrate that in many cases of plural reduplication, light bases occur with heavy reduplicants and heavy bases occur with light reduplicants. Given that TO is an endangered language, having a unified description that explains a greater number of reduplication patterns is particularly useful in teaching TO to L2 learners. Although the principle of quantitative complementarity cannot account for every instance of reduplication in TO, presenting students with a way of understanding more types of reduplication patterns makes their knowledge of the language more complete. Additionally, it allows them to produce correct forms more frequently. We briefly describe how our analysis of TO reduplication processes can be applied in the classroom.

In order to teach students to apply the principles of quantitative complementarity in reduplicative plural forms, they would first need to learn the following fundamental concepts:

1. the difference between consonants and vowel sounds
2. light versus heavy syllables
3. light versus heavy reduplicants
4. long versus short vowels

Once students have learned to identify consonants and vowels and have become familiar with syllable structures and principles of weight in TO, they will have gained the knowledge they need to understand the general concepts behind quantitative complementarity (i.e. applying light reduplicants to heavy bases and vice versa) without necessarily using the formal linguistic terms associated with the theory in lesson plans. Students could be introduced to the concepts associated with quantitative complementarity with a worksheet that includes several different types of basic paradigms of singular and plural forms. Below is an abbreviated example of the possible contents of a worksheet.

PLURAL PATTERNS IN TOHONO O'ODHAM (SAMPLE WORKSHEET)[7]
Based on the data below, answer questions 1–4.

1. Compare the singular and plural forms for group (A). How is the plural formed? Can you fill in what you think the plural form would be for *makai* 'doctor'?

(A) SINGULAR	PLURAL	ENGLISH TRANSLATION
nakʃɨɻ	nanakʃɨɻ	*scorpion*
ʧeodʒ	ʧeʧeodʒ	*boy/man*
ʔuwi	ʔuʔuwi	*woman*
makai	_____	*doctor*

2. Are there any differences in the way the plural is formed in (B) below compared to (A) above? What do you think the plural form would be for *ʈad* 'foot'?

(B) SINGULAR	PLURAL	ENGLISH TRANSLATION
ban	ba:ban	*coyote*
mad	ma:mad	*child (of a woman)*
ʤɨg	ʤɨ:ʤɨg	*hole*
ʈad	_____	*foot*

3. Again, look at the singular and plural forms. Do you note any differences in the patterns in (C) compared to (A) and (B) above? Try to fill in the answer for *mi:stoɻ* 'cat'.

(C) SINGULAR	PLURAL	ENGLISH TRANSLATION
ma:kai	mamakai	*medicine man*
ɻi:wa	ɻiɻiwa	*jacket*
ma:wit	mamawit[8]	*lions*
mi:stoɻ	_____	*cat*

4. Revisit groups (A)–(C) above and the observations you noted about the parts of the words that are repeated to create the plural. Can you come up with possible explanations for the different patterns?

The leading questions in the worksheet encourage the students to try and familiarize themselves with the plural formations and to identify the plural patterns in TO as if they were a puzzle to be solved without explicitly being told what the patterns are.

As a follow-up listening exercise to the worksheet, a teacher could create a version of Bingo as one possible activity to reinforce reduplication patterns in TO.[9] In short, students would receive cards with pictures of objects (as opposed to numbers in the traditional format of the game), possibly depicting some of the words in the worksheet proposed above. A portion of the pictures would show singular objects, for example, one *ɻi:wa* 'jacket' and others would display plural objects, such as two (or more) *ɻiɻiwa* 'jackets'. Such an activity would familiarize the students with new vocabulary items and with a basic understanding that the plural in TO is formed by reduplication. If teachers wanted to go further and have their students identify when short versus long reduplicants are used, they might want to ask students to write down what they think the reduplicated form looks like based on the structure of the singular form as each word is called out. If the class is at a very introductory level, the teacher might want to provide a list of the relevant words in the singular forms, so the students could refer to the list for assistance in determining if a short or long vowel should be used in the reduplicant. If a student believes that s/he has won the game, the teacher could ask the student to recite each of the relevant items on the person's card, practicing the production of various singular and plural forms.

Finally, there are dialectal variants of TO that do not necessarily adhere to all of the forms shown in the worksheets. As this issue arises in this classroom, this would be an opportunity to discuss with students concepts related to language and dialectal variation, emphasizing that no form is more correct than another. For example, we have heard the following variations in reduplication among various TO speakers:

místoɻ → mí**mi**stoɻ OR mí**m_**stoɻ

4. CONCLUSIONS AND FUTURE RESEARCH. The only pedagogical grammar on TO (Zepeda 1983) conflates multiple reduplication processes into a single pattern—CV-copying—likely in an effort to maintain pedagogical simplicity for a complex process. However, our application of McCarthy and Prince's (1995:334) theory of quantitative complementarity augments the reduplication patterns that can be explained in a straightforward manner in an L2 setting. In sum, the shape of the reduplicant is largely contingent on the weight of the base. CVV reduplicants appear when the base is light (CVC) and CV reduplicants occur when the base is heavy (e.g. CVCV, CVVCV, etc.). In some cases, this results in lengthening or shortening of the reduplicant in order to maintain a complementary weighted relationship with the base.

The concept of quantitative complementarity, although theoretical in nature, is useful in teaching practice. A practical application of the concepts makes it possible to teach L2 learners of TO a larger number of reduplication patterns while maintaining pedagogical simplicity and efficacy. It also enhances recall and adds explanatory power to the description of the data by providing an explanation for why the reduplicants have the forms that they do.

In future research, we wish to examine other varieties of TO in order to see whether quantitative complementarity is generally applicable across varieties. Also, we hypothesize that the reduction process observed in plural bases (cf. Tables 6 and 7) is a prominence enhancement phenomenon, which is driven by TO's strong, word-initial primary stress. Based upon our preliminary observations, we expect that different dialects will be at various stages in the reduction process affecting plural base forms. Cross-dialectal data showing plural bases at

different stages of reduction could in turn inform us on how these processes of language change affect syllable structure and possibly even the shape of the reduplicant (i.e. heavy or light). Finally, future research might shed light on the ramifications of language endangerment on reduplication processes (as well as on other patterns in the language) especially among younger speakers who may not have the opportunity to fully acquire the language or do not use TO on a regular basis.

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NOTES

[1] All TO examples are given in IPA.
[2] DIST=distributive, ITER=interative, PUNCT=punctual, SG=singular, PL=plural, SUB=subject,
[3] For alternative analyses of long vowel reduplication, see Hill and Zepeda (1992, 1998), Fitzgerald (2003)
[4] The word-initial /w/ has been historically reconstructed as /p/ within the Uto-Aztecan family. In TO, the voiceless bilabial stop does not occur word-initially but is permitted word-medially (cf. Stubbs 1995).
[5] Word-final short vowels are voiceless unless followed by a voiced segment.
[6] Sp=Spanish
[7] The example worksheet is given in IPA instead of TO orthography for consistency with the rest of the paper.
[8] In §2.3 the plural for this word was shown with the schwa, but the schwa is present due to phonological processes and not because it is a part of the phonemic inventory. Such detail is unnecessary for pedagogical purposes.
[9] Various rules for how to play Bingo can be found at: http://www.wikihow.com/Play-Bingo