

Tonal patterns and their restrictions in Santiago Laxopa Zapotec

Mykel Brinkerhoff, John Duff, Maya Wax Cavallaro
University of California, Santa Cruz
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UNIVERSITY OF CALIFORNIA
SANTA CRUZ

Outline

Upshot: Our description of tone in SLZ lends support to a nascent hypothesis that “word tone” patterns are derived, and languages do not specify a lexicon of tonal combinations directly.

- Background
 - Santiago Laxopa Zapotec (SLZ)
 - Methodology
- Tone in SLZ
 - Tonal typology
 - Three tonal registers
 - Restricted patterns in bimoraic nouns
- Analysis
 - Optimality Theoretic constraints can account for patterns
- Discussion
 - Comparison to other Zapotecan languages

Santiago Laxopa Zapotec

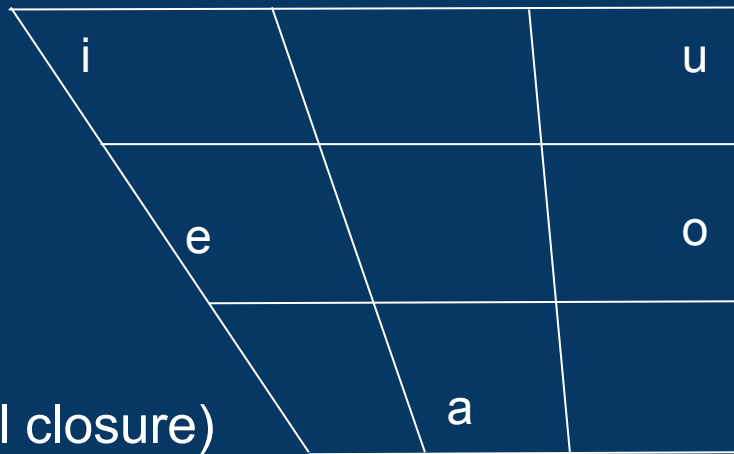
- Spoken by ~1000 mainly in Santiago Laxopa, Ixtlán, Oaxaca, Mexico
- Oto-Manguean, Northern Zapotec (Sierra Norte)
- Most speakers bilingual Spanish-SLZ



The Vowel in SLZ

4 phonation types

- Modal V
- Checked V' (abrupt glottal closure)
- Laryngealized V'V (creaky and/or rearticulated)
- Breathy Vh



(cf. Yalálag Zapotec, Avelino 2010; Zochina Zapotec, Lopez Nicolas 2016; Quiavini Zapotec, Chávez Peón 2010)

Methodology

Remote and in-person fieldwork beginning in 2020

- 5 consultants (3 female, 2 male)
- Meeting weekly with 2 consultants
- Word list, carrier sentences, humming/whistling
- Learned to hear tones before ever consulting Praat/acoustic measures

Began with Pike's (1948) method

- Sorting disyllabic nouns into groups by tone patterns

Snider (2014) - building tone database, looking for patterns

- Comparing different types of carrier sentences

Tone in SLZ

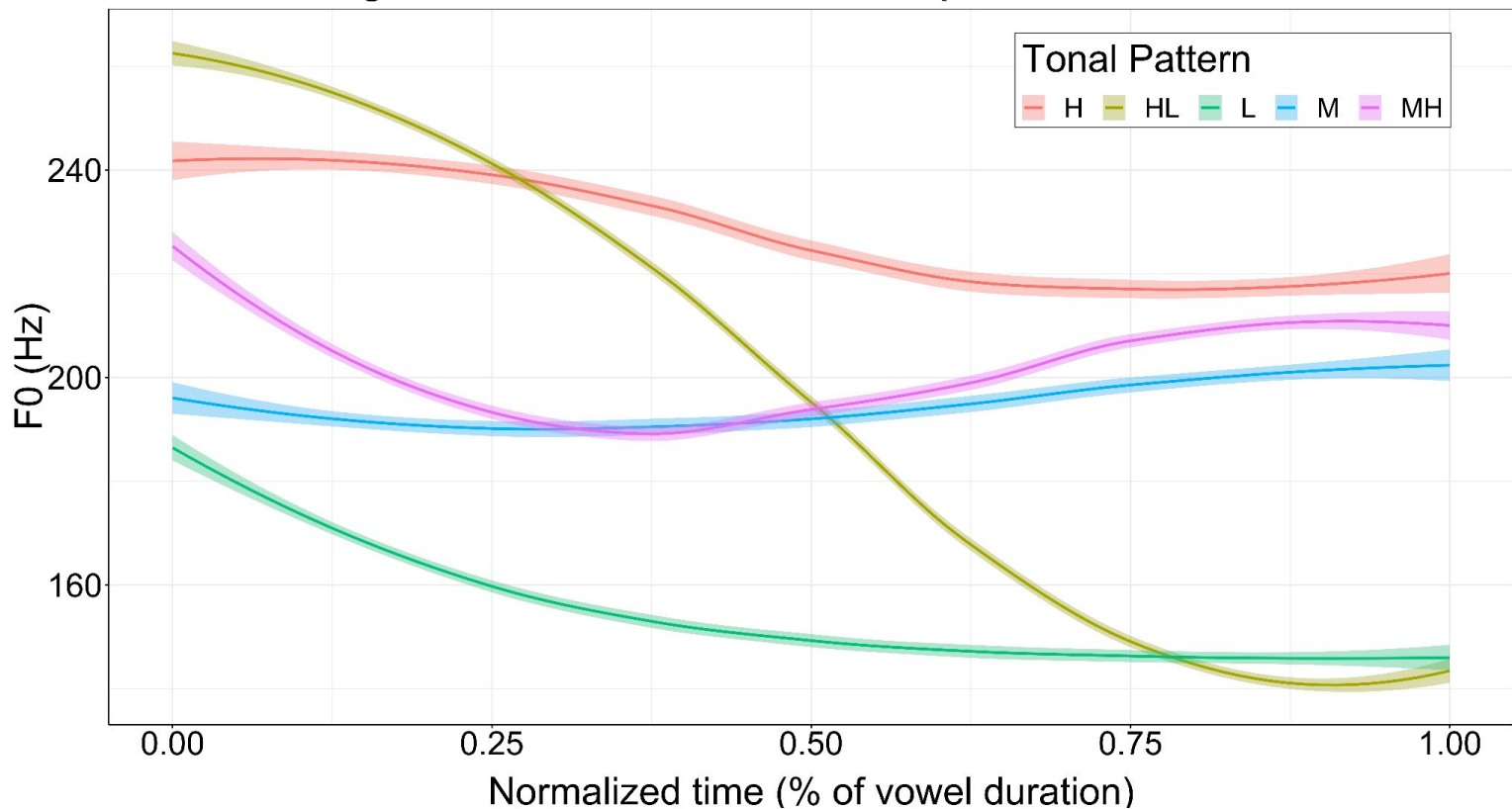
Tonal Typology

- Pike (1948) classifies tonal languages into two categories:
 - “Syllable Tone” (e.g. Gadsup (Trans-NG): Frantz & Frantz 1973)
 - Tonal contrasts on any syllable
 - → Lexical specification of tones on every syllable
 - “Word Tone” (e.g. Kukuya (Bantu): Hyman 1987)
 - Limited melodies, consistent across words of different lengths
 - → Lexical specification of one of a predefined set of licit tonal melodies



The Tonal System in SLZ

- 3 tonal registers (H, M, L)
- 5 tonal patterns possible on a syllable
 - H
 - M
 - L
 - HL (Falling)
 - MH (Rising)

FSR's average F0 contours across tonal patterns



Tonal Restrictions in SLZ: Morae

- Only some syllables can host HL and MH
 - CV'V *yu'u*^{HL} 'house'  *yu'u*^{MH} 'lime (cal)' 
 - CVC *tsil*^{HL} 'morning' *jid*^{MH} 'chicken'
 - CVV *kua*^{HL} 'masa' *bduah*^{MH} 'agave'
- These syllables are bimoraic (Chávez Peón 2010)
- We conclude: Single tones associate to the mora in SLZ

Tonal Restrictions in SLZ: Words

- Bimoraic nouns only demonstrate three of the nine possible tone combinations
 - HL *yu'u*^{HL} ‘house’ *be*^H*ku*^L ‘dog’
 - LL *xa*^L*ag*^L ‘sheriff’ *la*^L*ge*^L ‘leaf’
 - MH *yu'u*^{MH} ‘lime (cal)’ *byi*^M*ne*^H ‘bird’
 - *HH, *HM, *MM, *ML, *LH, *LM
- SLZ looks like a “word tone” language
 - Predefined set of three melodies

Other Tonal Phenomena in SLZ

- Tonal alternation in the verb in 1SG (Bickmore & Broadwell 1998; Broadwell, Foreman & Bickmore 2008; Uchihara & Gutierrez 2020)
- H-triggered downstep (Brinkerhoff, Duff & Wax Cavallaro 2021)
 - Useful diagnostic for the presence of H
 - May explain why previous description (Long & Cruz 2000 on Zoogocho Zapotec) suggested sentence-initial super-high tones

Analysis

Word tone? - No need

- 3 tonal patterns possible on a bimoraic noun
 - HL, LL, MH (*HH, *MM, *LH...)
- Shih & Inkelas (2019), McPherson (forthcoming) - Word tone is epiphenomenal, no “lexicon of melodies”
- OT-style constraints can account for the different tone distributions we observe in SLZ
- Tone/prominence in the input
 - 1 peak per word?
 - H tone? Pitch accent? Stress?

Constraints

*H

Assign one violation for every H tone.

*M

Assign one violation for every M tone.


PEAK-TO-H

Assign one violation for every Peak in input which lacks an associated H in output.


*INCLINE

Assign one violation for every level of upward tonal displacement between two adjacent morae (see Xu & Sun 2002; Yip 2002).


*H ≫ *M (≫ *L)

$\mu\mu$	*H	*M	*L
HH	** W		L
MM		** W	L
 LL			**
HL	* W		*
HM	* W	* W	L
ML		* W	*
MH	* W	* W	L
LM		* W	*
LH	* W		*

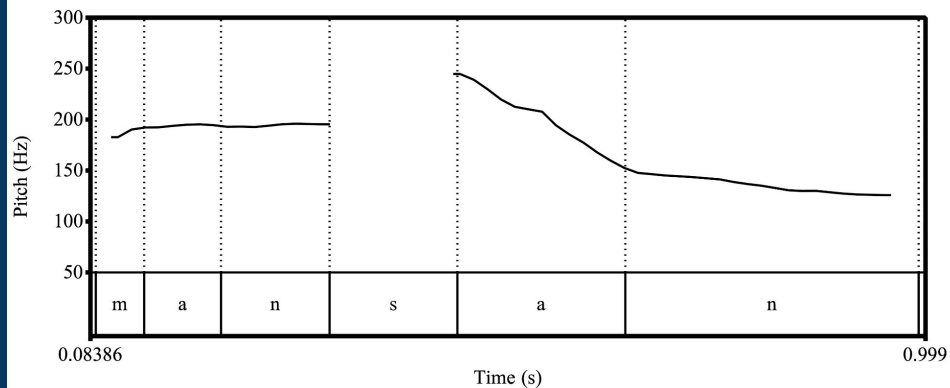
Falls are HL

$\mu\mu$	PEAK-TO-H	*H	*M
HH		** W	L
MM	* W	L	** W
LL	* W	L	L
 HL		*	L
HM		*	*
ML	* W	L	*
MH	* W	*	*
LM	* W	L	*
LH	* W	*	L

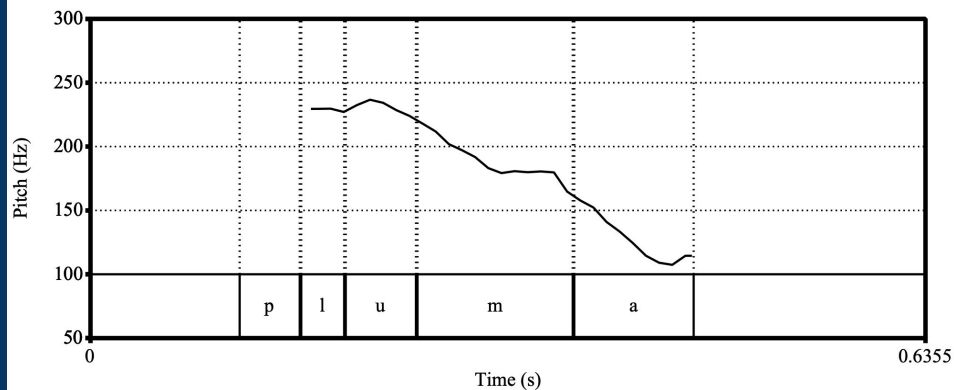
Rises are MH

<i>μί</i>	PEAK-TO-H	*H	*INCLINE	*M
HH		** W	L	L
MM	* W	L	L	** W
LL	* W	L	L	L
HL	* W	*	L	L
HM	* W	*	L	*
ML	* W	L	L	*
 MH		*	*	*
LM	* W	L	*	*
LH		*	** W	L

Loanwords




mansan MHL
Sp. *mansána*
'apple'




pluma HL
Sp. *plúma*
'pen'



Loanwords

plúma (Sp. <i>pluma</i>)	PEAK-TO-H	*H	*INCLINE	*M
H.H		** W		
M.M	* W	L		** W
L.L	* W	L		
H.M		*		* W
 H.L		*		
M.H	* W	*	* W	* W
M.L	* W	L		* W

Loanwords

mansán (Sp. <i>mansana</i>)	PEAK-TO-H	*H	*INCLINE	*M
H.HH		*** W		
M.MM	* W			*** W
L.LL	* W			
L.HM		*	** W	* W
L.HL		*	** W	
 M.HL		*	*	*
M.HM		*	*	** W
M.HH		** W		

Discussion

Understanding tone in SLZ

- A new observation: SLZ words show a limited set of tonal combinations
- Canonical classification: A “word tone” system
- Our proposal: The lexicon specifies an accented mora, tonal patterns fall out from constraints on tone co-occurrence
- Upshot: SLZ falls into a class of similar languages, and lends support to a nascent hypothesis in the phonology of lexical tone: “word tone” patterns are derived, and languages do not specify a lexicon of tonal combinations directly.

Parallels across Zapotecan

- Zenzontepec Chatino (Campbell 2014)
 - Three tonal values (H, M, Ø/L) with limited combinations
 - Similar gaps: *ML, *HH (*MM, *LH only derived morphologically)
 - Only one H per word
 - Other similarities: H-triggered downstep
 - Major differences: H-spreading, differences in tone specification
- Yalálag and Zoochina Zapotec (Avelino 2004, Lopez Nicolas 2004)
 - Three syllabic tones (H, L, HL) → Two tonal values hosted on the mora?
 - Less combinatorial gaps: Not fully investigated, but HH attested

Zapotecan is tonally diverse

- Other Zapotecan languages demonstrate patterns that are more complex:
 - Zacatepec Chatino (Villard 2015): Four tonal values, almost no restrictions on co-occurrence
 - San Lucas Quiaviní Zapotec (Chávez Peón 2010): Monomoraic contours
- In the approach outlined by McPherson (in press), we expect languages all along a continuum from “syllable tone” to “word tone”.
- The puzzle going forward will be modelling the possible and impossible steps along that continuum, and descriptions of tone in Zapotecan and Oto-Manguean as a whole will help contribute to further understanding.

Duxklhenhu' lhe'! (Thank you!)



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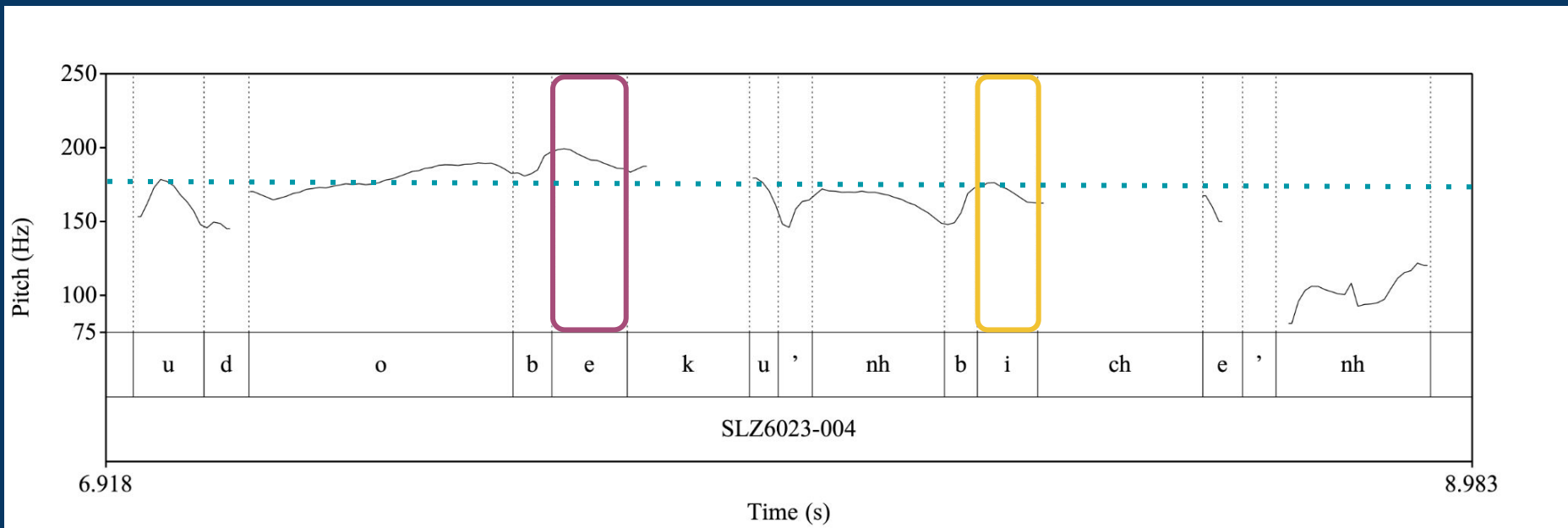
Appendix

Tone and Phonation in SLZ

- Like other Zapotecan languages, tone and phonation are independent from each other, with the exception of Breathy Voice.

	Modal	Breathy	Checked	Laryngealized
H	✓	—	✓	✓
M	✓	—	✓	✓
L	✓	✓	✓	✓
HL	✓	—	✓	✓
MH	✓	(✓)	—	✓

Downstep: H after local H trigger



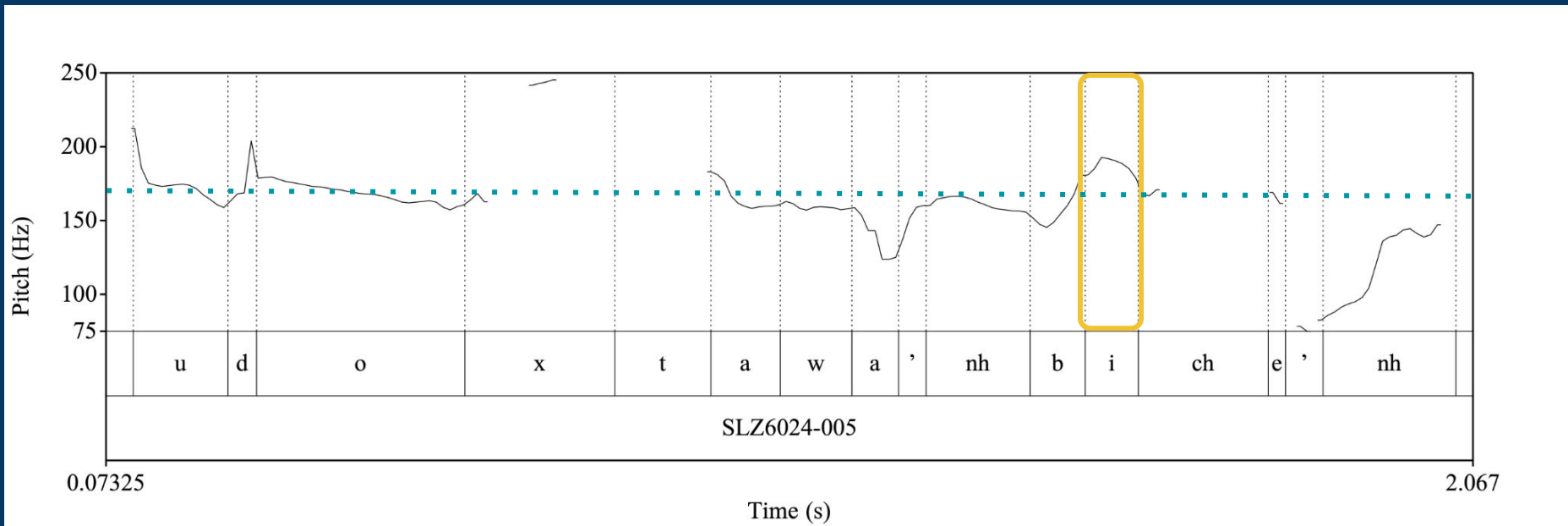
Udo^L
ate

be^Hku'nh^L
dog

bi^Hche'nh^L.
chapulín

(The dog ate the chapulín.)

Compare to: **H** after no local H trigger



Udo^L
ate

xta^Lwa'nh^L
grandmother.my

bi^Hche'nh^L.
chapulín

(My grandmother ate the chapulín.)

Tonal patterns in trimoraic nouns

- LLL *ya'a^{LL}do^L* 'mountain' *μμμ*
- HLL *we^Hlo'o^{LL}* 'caterpillar' *ήμμ*
- MHL *kwa^Mnax^{HL}* 'garlic' *μήμ*
- MMH *nu'u^{MM}l^He^H* 'woman' *μμί*
- Predicted gaps:
 - *M: *MLL, *LML, *LLM, *MML, *MLM, *LMM, *MMM, *HLM, *HML, *MHM
 - *H: *HHL, *HLH, *LHH, *HHM, *HMH, *MHH, *HHH
 - *Incline: *MLH, *LMH, *LLH, *LHL, *LHM

Community materials: The Game of Tones for SLZ

- Within [Nido de Lenguas](#), a collaboration with Senderos, a non-profit led by our consultant Fe Silva-Robles, we work to share the beauty and value of Oaxacan languages around the Monterey Bay region
- As part of our research, we developed a “Game of Tones” for SLZ
 - Interactive listening game to guide players to hear tonal contrasts
 - Available in [Spanish](#) and [English](#) at the Nido de Lenguas website
 - Thanks to Andrew Hedding and Matthew Kogan for their assistance

