Tone and Phonation in Northern Lisu

Rael Stanley[1], Marija Tabain[1], David Bradley[1], Defen Yu[1]

[1]La Trobe University

Lisu is a Sino-Tibetan language, with speakers in Northeast India, Northern Myanmar, Southwest China, and Thailand (Yu, 2007). Lisu is part of the Loloish branch of the Tibeto-Burman language family (Bradley, Lisu, 2003) and is related to Lahu, Jingphaw, and Yi. It has three main dialects – Northern, Central, and Southern (Bradley, Lisu Language, 2018).

Most varieties of Lisu have six tones, though there are some with only four or five tonal distinctions (Yu, 2007). Northern Lisu is one of the varieties with six tones, consisting of: high-level (55); mid-rising (35); mid-level (33); mid-level, creaky voiced (33); low-falling (21); and low-falling, creaky voiced, with final glottal stop (21) (Yu, 2007).

This study presents an acoustic phonetic picture of the tone system and phonation in Northern Lisu, spoken in and around the Nujiang Lisu Autonomous Prefecture, in Western/Northwestern Yunnan Province, China. Native speakers were recruited for wordlist recordings. All speakers were in their early 20s (N = 8, four male speakers and four female speakers). For reasons of space we have only included the female data here. Pitch traces were extracted from Praat (Boersma & Weenink, 2020), and H1*-H2* and CPP tracks were extracted using VoiceSauce (Shue, Keating, Vicenik, & Yu, 2011). The data were plotted over normalised time in R (R Development Core Team, 2008), using the emuR package (Winkleman, Jaensch, Cassidy, & Harrington, 2020).
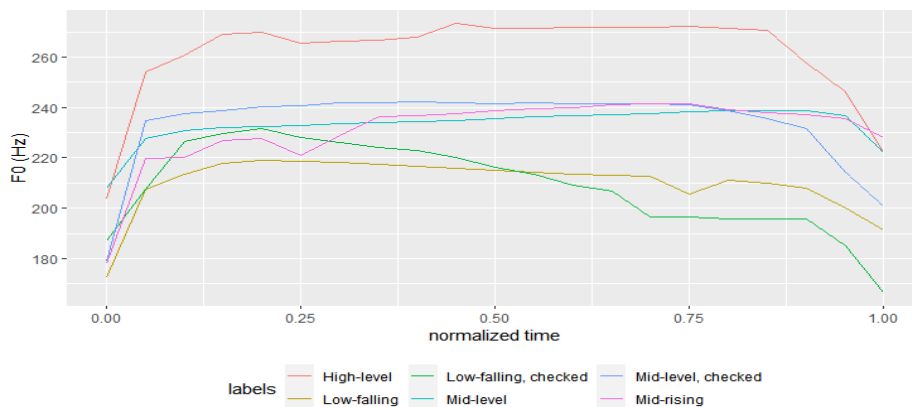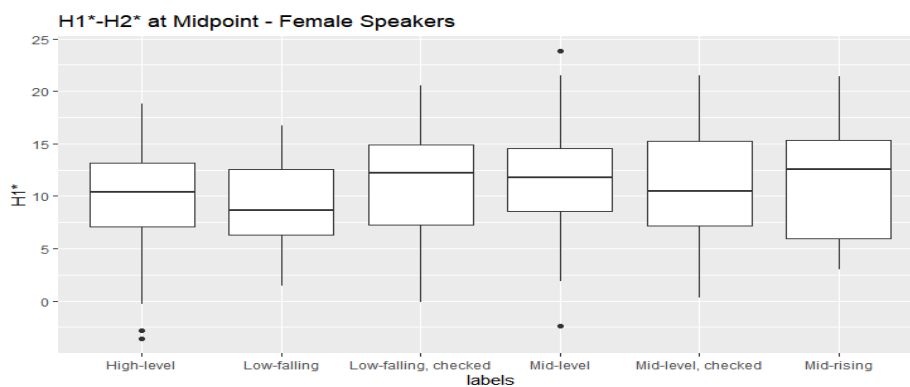

Figure 1. F0 for Female Speakers

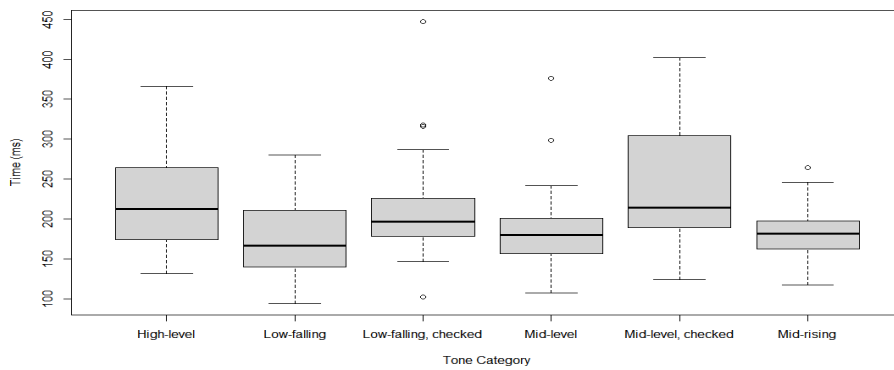*Figure 2. H1*-H2* at Midpoint for Female Speakers*

Figure 3. Duration Boxplot for Female Speakers

As can be seen in Figure 1, for female speakers the high-level tone quickly rises to approximately 270Hz and remains fairly flat before falling near the end of the toneme. The mid-level tone follows a similar trajectory, however its peak is around 240Hz. The mid-level, creaky voiced tone is still rather flat, though it reaches its peak a little later than the mid-level tone. The mid-rising tone starts relatively flat, before rising to approximately 240Hz. The low-falling tone quickly reaches its peak of approximately 230Hz and falls over the rest of the duration. The low-falling, creaky voiced tone peaks a little lower than the low-falling tone and falls less rapidly over the remaining duration.

Figure 2 shows that at the temporal midpoint, H1*-H2* is slightly higher for the mid-level tone than the mid-level, creaky voiced tone, while there is no difference between either of the low-falling tones. In terms of duration, it can be seen in Figure 3 that both creaky voiced tones are longer than their modal counterparts.

An examination of CPP at the temporal midpoint (not shown here) shows that the low-falling, creaky voiced tone has a higher value than the low-falling tone, while comparison between the two mid-level tones shows no difference.

These results suggest that tonal contrasts in Northern Lisu are not confined to pitch but also involve variations in phonation and duration. However, this contrast appears to be largely neutralised in the case of the two mid-level tones, in line with observations from Bradley (1994).

Bibliography

Boersma, P., & Weenink, D. (2020). *Praat: Doing Phonetics by Computer.* Retrieved from http://www.praat.org

Bradley, D. (1994). *A dictionary of the northern dialect of Lisu (China and Southeast Asia).* Canberra: Department of Liinguistics, Research School of Pacific and Asian Studies, Australian National University.

Bradley, D. (2003). Lisu. In G. Thurgood, & R. LaPolla, *The Sino-Tibetan Languages* (pp. 222-235). London: Routledge.

Bradley, D. (2018). Lisu Language. In R. Sybesma, W. Behr, Y. Gu, Z. Handel, & C.-T. Huang, *Encyclopedia of Chinese Languages and Linguistics.* Boston: Brill Academic Publishers.

R Development Core Team. (2008). *R: A language and environment for statistical computing.* Retrieved from http://www.R-project.org

Shue, Y.-L., Keating, P., Vicenik, C., & Yu, K. (2011). VoiceSauce: A program for Voice analysis. *Proceedings of the ICPhS XVII*, 1846-1849.

Winkleman, R., Jaensch, K., Cassidy, S., & Harrington, J. (2020). emuR: Main Package of the EMU Speech Database Management System.

Yu, D. (2007). *Aspects of Lisu Phonoloy and Grammar.* La Trobe University.