

Couldn't Stress It Enough!

Acoustic Correlates of Stress in Hul'q'umi'num'

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Introduction

Background Information:

- Hul'q'umi'num'
- Coast Salish language spoken on the east coast of Vancouver Island (Dunlop, Gessner, Herbert, & Parker, 2018).
 - No previous acoustic research on Hul'q'umi'num' stress.
 - Phonological analysis shows that stress is assigned through the interactions of sonority constraints and directionality constraints (Bianco, 1996).

Salish Stress

- Acoustics:
 - Primary stress in Salish languages is correlated with higher pitch and greater vowel length (Czaykowska-Higgins & Kinkade, 1998).
 - St'at'imcets stress has higher pitch and intensity values for stressed vowels compared to unstressed but not longer duration (Caldecott, 2015).
 - In Lekwungen, there is longer duration, higher pitch, and greater intensity of stressed vowels (Nolan, 2017).
- Phonology
 - In Cowichan Halkomelem, stress falls on full vowels and not schwas. Schwas are only stressed when there are no other full vowels present in the word; unstressed full vowels are reduced to schwa or are completely deleted (Bianco, 1996).

Research Question:

What are the acoustic correlates of stress in Hul'q'umi'num'?

Our goal: to compare stressed and unstressed vowels' fundamental frequency (F0 or pitch), intensity, and duration.

Methods

Materials:

- Microphone for recording
- Words recorded (6 bisyllabic words, 4 trisyllabic words, and 1 quadrisyllabic word)
- Macbook laptop with Praat software

Participants:

- One female elder speaker, fluent in Hul'q'umi'num' and English.

Procedure:

- Speaker was given an English word by SFU linguist, Donna Gertz, and asked to translate the word to Hul'q'umi'num'.
- Speech was recorded and saved as a WAV file on the computer.
- Recording was accessed by the researchers through google drive, and downloaded for further analysis.

Data Analysis

- Sound files (.WAV) were opened in Praat.
- Speech was segmented into vowels by their position and specific vowel labels were added.

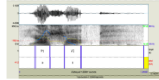


Figure 1. Waveform, spectrogram, and segmentation of vowels of yasa'qw in Praat

- A Praat script was run to gather the acoustic values of all the vowels. The duration of vowels and midpoint values of vowels for pitch and amplitude were taken.
- Values were then put into tables and graphs in Microsoft Excel for further analysis.

Results



Figure 2. Mean Intensity (in dB) in English words with stressed V1

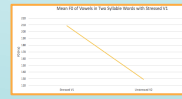


Figure 3. Mean F0 (in Hz) in English words with stressed V1

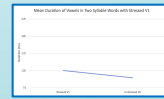


Figure 4. Mean Duration (in ms) in English words with stressed V1

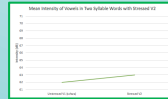


Figure 5. Mean Intensity (in dB) in English words with stressed V2

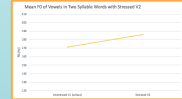


Figure 6. Mean F0 (in Hz) in English words with stressed V2

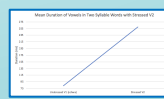


Figure 7. Mean Duration (in ms) in English words with stressed V2

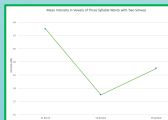


Figure 8. Mean Intensity (in dB) in English words with non-stressed V1



Figure 9. Mean F0 (in Hz) in English words with non-stressed V1



Figure 10. Mean Duration (in ms) in English words with non-stressed V1



Figure 11. Mean Intensity (in dB) in English words with non-stressed V2



Figure 12. Mean F0 (in Hz) in English words with non-stressed V2

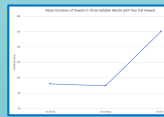


Figure 13. Mean Duration (in ms) in English words with non-stressed V2

Discussion

- Stressed vowels in bisyllabic words in V1 position is expressed with greater intensity and pitch, whereas stress in V2 position is expressed with longer duration.
- Full vowels in V3 position in trisyllabic words have higher values of intensity, F0, and duration than schwas in V3 perhaps signifying the shift of primary stress or the presence of secondary stress.
- Stress seems to be correlated with a combination of the correlates of stress.
- Some confounding factors may include the lack of speaker variation and the small number of tokens in this study.

Contributions & Future Directions

Contributions

- As the first acoustic analysis on Hul'q'umi'num' stress, this research provides a basic understanding of the acoustics correlates of stress in Hul'q'umi'num'

Future Research

- Future research can include a larger scaled acoustic analysis with several speakers and more tokens for a more extensive analysis on primary and secondary stress and the position of vowels.

Acknowledgements

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References

- Bianco, V. M. (1996). *The role of sonority in the prosody of Cowichan* (Master's thesis). University of Victoria, Victoria, BC.
- Czaykowska-Higgins, E., & Kinkade, M. D. (Eds.). (1998). *Salish languages and linguistics: Theoretical and descriptive perspectives*. Berlin: Mouton de Gruyter.
- Dunlop, B., Gessner, S., Herbert, T., & Parker, A. (2018). *Report on the status of B.C. First Nations languages: Third edition*. Brentwood Bay, BC: First Peoples' Cultural Council.
- Nolan, T. (2017). *A phonetic investigation of vowel variation in Lekwungen* (Master's thesis). University of Victoria, Victoria, BC.