

Indigenous Language Knowledge Management: Indexing Phonemes Acoustically

Tengku Intan Suzila T. S.¹, Teo K. S.² and Mohd Yusri M. N.¹

¹Universiti Teknologi MARA Cawangan Pahang, Bandar Tun Abdul Razak Jengka, Pahang, Malaysia
intansuzila@pahang.uitm.edu.my; mohdyusri@pahang.uitm.edu.my

²Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia
teokok@ukm.my

Abstract. One of the branches of community knowledge management system (CKMS) is regional knowledge, which includes indigenous knowledge. Capturing indigenous knowledge requires internalization of the knowledge where learning by doing is essential. The present study discusses indigenous language knowledge management of the endangered Peninsular Malaysia Orang Asli languages while enabling technologies to document language in use and adopting acoustic analysis for phonological presentation in order to create integrated indigenous language knowledge for grammar establishment leading towards preservation and future revitalization purposes. The aim of the study is to appreciate instrumental analysis as a tool that enables enhancement for future phonological study. The study suggests that to better manage language knowledge is to advance and incorporate instrumental analysis over subjective impressionistic analysis.

Keywords: Endangered language, acoustic analysis, Batek Aslian.

1 Introduction

Apart from safeguarding the existence of languages, indigenous language knowledge also ensures the livelihood of heritage knowledge. This tacit knowledge relies on individual knowledge validated by the communities of similar language knowledge blueprints. With greater challenges, oral-based languages have lower life endurance compared to written languages. As with most oral endangered languages, the Austroasiatic Mon-Khmer Aslian language is confronting challenging environments over the more socio-economically lucrative Malay language.

As a method of heritage and language knowledge transfer, storytelling is embraced by many native communities. Modern society and business companies approved storytelling as a successful wisdom transfer method (Koskinen, 2008). Yet not all Malaysian Orang Asli incorporate storytelling in their life. The Batek Hep' of Kuala Tahan National Park utilizes socialization as an interaction platform in forming their knowledge spiral. Socialization permits experiences shared by imitation and observation, enabling the Batek Hep' to disseminate their heritage knowledge through generations (Lye, 1997). Traditionally, this socialization involves parents externalizing hunter-gatherer experiences to children. Unfortunately, submersion into modern tourism industry related lifestyle is inevitable, thus the young adults and children are no longer living a full hunter-gatherer lifestyle thus endangering the survival of their indigenous knowledge and language.

Language Knowledge Management

Language knowledge management efforts is not absent. Some indigenous endangered language knowledge around the world are archived in databases. Empowering researchers to access available language data, these databases also disseminate information about grants and research gaps thus encouraging language knowledge documentation and descriptions before languages become extinct. With different, yet almost similar purposes, these databases target similar audiences. 'Endangered language' is the common keyword in accessing these databases. These databases assist language documenters, linguists, even language communities toward one common goal: preserving and revitalizing language.

Preserving Aslian Languages.

Orang Asli predominantly dwell in southern Thailand and Peninsular Malaysia. Their language is the Aslian language and some speak the neighbouring Austronesian Malay language. Efforts to manage Aslian language knowledge are progressing. Databases like E-MELD, DoBES, OLAC, and SEALang have enabled recordings of Aslian languages (among others) to be archived. These knowledge management databases may boost Aslian language preservation efforts (for much more recent databases, see Endangered Languages Archive (<http://www.ELAR-Archive.org/>)).

Analysing Phonemes Acoustically

In managing language knowledge, technology-based digital archiving and analysis may assist in encouraging scientific based findings. Initial identification of vowel sound through auditory impression techniques in language

documentation has been dominant for years. Yet, technological advancements may offer much more tangible evidences through spectrum impressionistic coding in acoustic analysis (Gradoville, 2011).

Challenges to safeguard Aslian language knowledge include poor Aslian language documentations (Benjamin, 2011; 2013). The available guides to phonological features of Aslian pronunciation and its written IPA convention (Benjamin, 1985-1986) benefit minimal number of researchers, and hurdles include interference from researchers' mothertongues, and unfamiliarity of Austroasiatic features among others (Benjamin, 1985-1986). Although language digital recordings may be archived in databases, analysis relies solely on linguistically trained individuals who may find it difficult to maintain consistency during transcription/documentation. Thus, tedious training in auditory impression method, knowledge of articulatory knowledge and exposure to Aslian features are vital for feasible auditory documentation (Benjamin, 1985-1986).

Yet, this language knowledge may also be managed acoustically to provide results that are comparable for future study. Conversely, articulatory knowledge may offer information of general vowel and place of articulation while vowel formants produced by acoustic analysis may lead to similar information. Acoustic analysis findings are rarely truly applicable, but the repeated research findings are rarely contradictory. Its validity and reliability may rely on content-related evidence and criterion-related validity testing (Gradoville, 2011).

One such acoustic analysis software, PRAAT, synthesizes and analyzes speech using spectrum impressionistic coding (Boersma & Weenink, 2005). Permitting linguists to construct consistent almost accurate phonemic data, PRAAT offers linear predictive coding (LPC) (Markel & Grey, 1979 as cited in Di Paolo et al., 2011). Vowel sounds are indicated by the "most prominent frequencies in a complex sound of intense fluctuating marker as tongue and lip configuration shape different vowel sounds" (Catford, 2001:153). To ascertain accuracy, multiple measurement point is necessitated. A wide selection phoneme spectrum is identified within the formants region of "midpoints as the formants are not in transition" (Pillai, Zuraidah & Knowles, 2012:197). Thus, the reading of the cursor is set in the middle of the darkened areas of the spectrum "to reflect vowel quality identification" (Di Paolo, Yaegar-Dror, & Wassink, 2011:90).

The Present Study

The conceptual comparative study is conducted on three published language research involving acoustic analysis. The first involves an initial 25 year acoustic monophthong study, which assisted later studies in proving language change phenomenon. Second is an Aslian Kensiw phonological acoustic analysis, which confirms and clarifies earlier auditory analysis and lastly, a recent study of Batek Hep' Aslian vowel placement, executed acoustically, enabling a more accurate placement rather than affirming traditional perception of vowel placement.

Aiming to unfold the benefits of acoustic analysis and to appreciate instrumental analysis as a tool for phonological analysis, the present findings significantly encourage the enhancement of instrumental analysis in managing language knowledge for the benefit of future researchers.

2 Findings

Evidently, acoustic analysis allows the effect of language change to be proven scientifically. Mannel and Cox (2009) discusses how Australian English monophthongs change over time and Figure 1 below summarises a comparative study of two Australian male monophthongs acoustic analysis of Bernard (1970) and Cox (1996).

Unable to replicate similar findings, the comparative acoustic analysis findings produce significantly different results as to show the effect of language change which is impossible to prove if the initial study was executed through auditory impression. Figure 1 below charts the distinct frequency of each monophthongs articulation.

contrasting studies to Orang Asli Austronesian language speakers. Thus, instrumental studies encourage research expansions suitable for knowledge bloom and management.

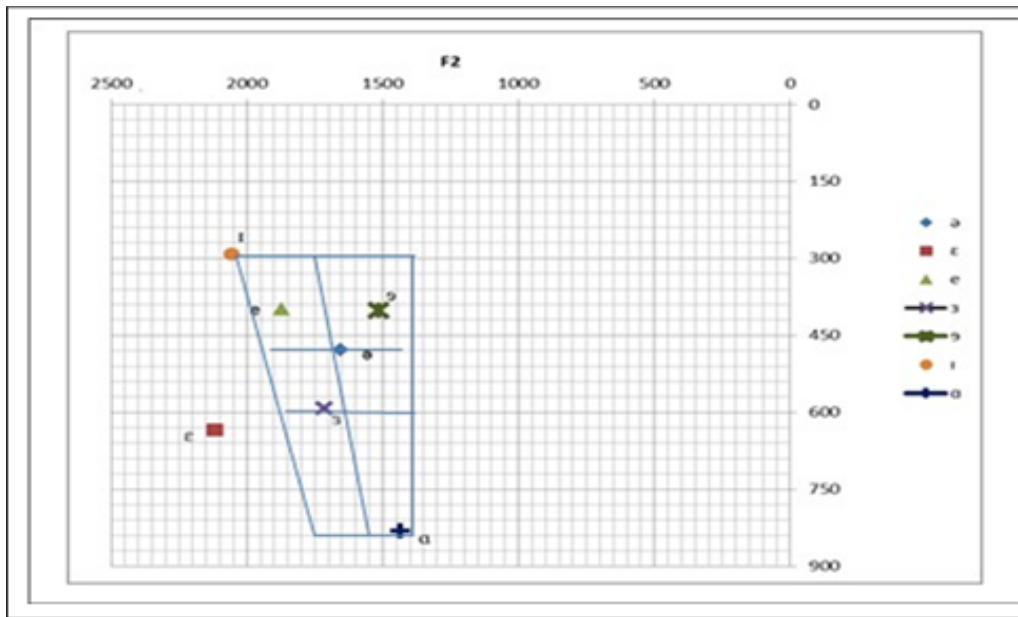


Figure 2: Adapted preliminary suggested Batek vowel chart (Tengku & Teo, 2014b)

Another recent acoustic based study on Batek Hep’ unique consonants suggest differences in male and female pronunciation by enabling visual variants of impressionistic spectrum variances of voiceless labiodental fricative phoneme /ɸ/ and voiced lamino-palatal fricative /z/ (Tengku & Teo, 2014b). Although male-female biological features will expectedly produce variants in articulation, these visual spectrums evidentially certify the findings thus eliminate perception or subjective expectations.

3 Discussion

Language knowledge can be managed technologically without sidelining traditional research methods. Initial traditional auditory perception method allows phoneme recognitions while instrumental acoustic analysis findings ascertain and eliminate total researchers’ dependency. Average consistency can be achieved through multiple gathered data thus allowing independency on linguist inter-raters reliability check.

Essential for future references or comparative analysis, acoustic findings allow findings to be presented quantitatively thus can be subjected to future validation or comparative and contrastive studies.

Instrumentally charted formant placements permit future comparison for future language change research. This could not be executed through auditory impressionistic method where only articulatory descriptions supplement the findings. Thus, acoustic analysis may suggest a much more tangible evidence. This allows language knowledge to be debated widely ensuring the bloom of language knowledge. To date, most archived endangered languages are researched within small circles of linguists.

In short, the combination of knowledge possession on articulatory, auditory perception and acoustic analysis may produce precise findings as even “linguistically-trained individuals alone cannot perceive reliably and demand robust inter-rater reliability” check (Gradoville, 2011:72).

4 Conclusion

Continuously evolving, languages around the world have to be documented and analysed technologically to secure future research potential. Technology advancement is rapid thus non-digital based language documentation where heavy reliance on auditory perception or subjective observation requires re-examination. To add, instrumental analysis too is progressive yet non-instrumental analyses are stagnant. Wise selection of instrumental analysis may minimize the demand for inter-rater auditory impression experts. In short, language knowledge management innovation will improve research and language preservation efforts.

5 References

- Benjamin, G. On pronouncing and writing Orang Asli language: A guide for the perplexed. *Orang Asli studies Newsletter. Parts 1 & 2.* (1985-1986).4: 4–16, 5: 4–29.
- Benjamin, G. *The current situation of the Aslian language.* Retrieved from www.class.cohass.ntu.edu.sg/Publication/Documents/Benjamin.pdf. (2011)
- Benjamin, G. The Aslian languages of Malaysia and Thailand: an assessment. In P. K. Austin. & S. McGill, (eds.) *Language Documentation and Description, 11.* (pp.136-230). London: SOAS. (2013).
- Bishop, N. A preliminary description of Kensiw (Maniq) phonology. *Mon Khmer Studies, 25,* (1992). 227-253
- Boersma, P. & Weenink, D. Praat: Doing phonetics by computer. Retrieved from <http://www.fon.hum.uva.nl/praat>. (2005).
- Catford J.C. *A practical introduction to phonetics.* New York: Oxford University Press (2001).
- Di Paolo, M. Yaegar-Dror, M. & Wassink, A. B. Analyzing vowels. In M. Di Paolo, & M. Yaeger-Dror (Eds). *Sociophonetics.* New York: Routledge. (2011).
- Gradoville, M.S. Validity in measurement of fricative voicing: Evidence from Argentine Spanish. In S. M. Alvord (ed). *Selected Proceedings Of The 5th Conference Of Laboratory Approaches To Romance Phonology.* (pp. 59-74). Somerville, MA. Cascadilla Proceedings Project. Retrieved from <http://www.lingref.com/cpp/larp/5/paper2635.pdf>. (2011).
- Koskinen, K. U. Storytelling as a means to acquire and share knowledge in project-based companies. *Int. J. of Knowledge Management Studies, 2(2),* 236–247.<http://DOI:10.1504/IJKMS.2008.018323> (2008).
- Lye, T.P. *Knowledge, forest, and hunter-gatherer movement: the Batek of Pahang, Malaysia.* Ph.D. dissertation, University of Hawai'i at Manoa, Honolulu. (1997).
- Mannel, R. & Cox, F. Australian English Monophthongs: The monophthongs of Australian English diagram summary of the results of the acoustic studies of Bernard (1970) and Cox (1996). Retrieved from http://clas.mq.edu.au/speech/phonetics/phonetics/vowelgraphs/AusE_Monophthongs.html. (2009).
- Pillai S., Zuraidah M.D. & Knowles G. Towards building a model of standard Malaysian English pronunciation. In Zuraidah M.D. (ed). *English In Multicultural Malaysian Pedagogy And Applied Research.* Kuala Lumpur: University of Malaya Press (2012).
- Tengku Intan Suzila, T. S. Batek Hep word entries. Unpublished manuscript. (2016).
- Tengku Intan Suzila, T. S. & Mohd Yusri, M. N. Linguistic fieldwork in an accelerating obsolescence digital age. 4th *International Graduate Conference on Engineering, Science and Humanities proceeding.* Johor Bahru: Universiti Teknologi Malaysia. (2013).
- Tengku Intan. Suzila, T. S. & T. Kok Seong. Exploring Batek vowels. In Pak Shen Li (Ed.). *Recent Trends in Social and Behaviour Sciences. Proceedings of the International Congress on Interdisciplinary Behaviour and Social Sciences 2013,* (2014a).513 -517
- Tengku Intan. Suzila, T. S. and T. Kok Seong. The Batek Hep' Consonants: A Preliminary Acoustic Analysis of Male and Female Utterances of Unique Consonants. In *Proceedings of the International Conference on Global Trends in Academic Research 2014.* (2014b).