

Phonation Attrition: Production and Perception Evidence of Zaiwa Speakers

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Pressed-modal phonation contrast is a phonetic feature of Yi-Mian branch languages in the Sino-Tibetan family's Tibeto-Burman subfamily. Zaiwa also exhibits this feature[1]. With Mandarin's wide use, younger Zaiwa speakers are less willing to inherit their mother tongues and have weakened linguistic competence. Two core questions arise: how do speakers of different ages differ in their production and perception of phonation types? And does the degradation of native speakers' production or perception of phonation appear first? To answer these questions, this study conducted cross-generational speech production and categorical perception experiments on the phonation types.

The study recruited 29 native Zaiwa speakers as participants, divided into a younger group and an older group (see table1), all from Dehong Prefecture, Yunnan Province, China.

Production We collected three pairs of pressed-modal minimal contrast syllables from 29 speakers (see table2). Four harmonic amplitude difference parameters (H1*-H2*, H1*-A1*, H1*-A2*, H1*-A3*) were extracted via VoiceSauce[2], and duration and pitch data were obtained with Praat[3], converting F0 to semitones[4][5]. Results show that H1*-H2* is the primary cue for distinguishing pressed-modal vowels. Age is a significant positive predictor of H1*-H2* differences, with the gap between pressed and modal vowels widening with age (see fig1). Analyses of duration (see fig2) and semitone (see fig3) show no significant paired differences, indicating they do not contribute to acoustic encoding of pressed-modal contrasts.

Perception The perception experiment adopted the same three sets as above. Six phonation continua (10 stimuli per continuum) were synthesized using inverse filtering and interpolation[6][7]. Participants overall displayed weak categorical perception (see fig4). In the identification experiment, the older group exhibited a significant advantage in partial continua (interaction effect between age group and phonation type in the regression model: $\beta = -0.258$, $p < 0.001$), indicating that older speakers were more sensitive. However, in the discrimination experiment, all participants achieved poor discrimination accuracy.

Cross-generational comparison shows attrition in production and perception. The older group had stable production but weaker perception, while the younger group had weakened acoustic contrasts and blunted sensitivity to phonation shifts. Based on the older group's performance, we infer perceptual attrition precedes productive attrition among Zaiwa speakers.

This research clarifies the core acoustic correlates and intergenerational evolutionary mechanisms of Zaiwa pressed-modal vowels. At the language evolution level, it documents the dual attrition of productive and perceptual abilities in intergenerational comparison, thus enriching our understanding of general language change and development mechanisms.

Table 1. Subjects

Group	N	M	SD	MIN	MAX
Young	14	24.42	6.43	17	35
Old	15	44.00	4.88	36	64

Table 2. Materials

Group	Modal voice	Pressed voice
(1)	[po ⁵¹] “have”	[po ₂ ⁵¹] “cheap”
(2)	[te ⁵¹] “bastard”	[te ₂ ⁵¹] “meet”
(3)	[lo ²¹] “leopard”	[lo ₂ ²¹] “pants”

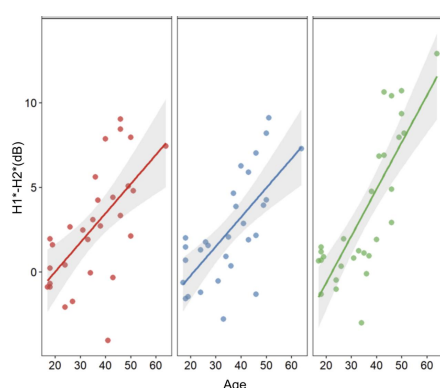


Fig. 1 Regression fit of H1*-H2* and age

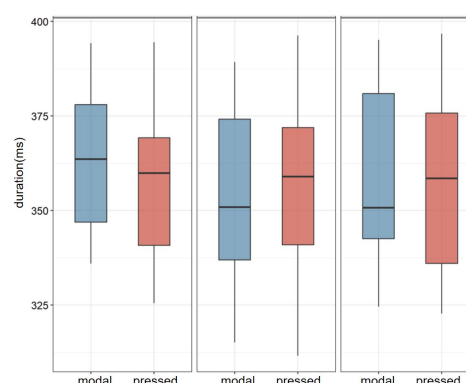


Fig. 2 Comparison of pressed-modal syllable durations of two groups (Younger: blue; Older: red)

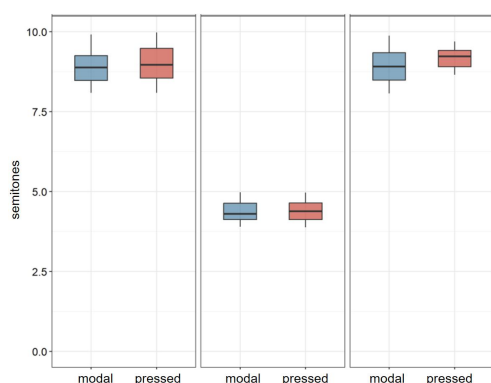


Fig. 3 Comparison of pressed-modal semitones of the two groups (Younger: blue; Older: red)

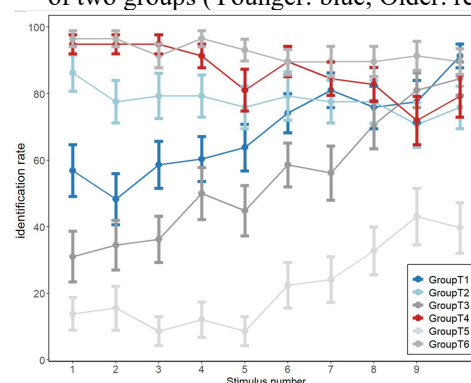


Fig. 4 Curves for identification rates

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