

ERP evidence for prosodic familiarity in Mongolian word recognition

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Mongolian lexical prosody, commonly discussed as word stress, realized by multiple acoustic cues and is generally regarded as non-contrastive at lexical level, yet native speakers judge prosodic patterns as more “natural” or “familiar” than the others. The present study asks whether such prosodic familiarity in Mongolian is accessed online during auditory word processing, and if so, at what stages of processing it emerges in the ERP signal. Specifically, we tested whether the words spoken in Standard Mongolian are processed differently when they carry a familiar vs. unfamiliar prosodic pattern, and whether these ERP effects are stable across listeners with different dialect backgrounds under Standard Mongolian input.

Native Mongolian speakers were assigned to a standard group (primarily speaking Chahar sub-dialect) and a non-standard group (primarily speaking Khorchin/Ordos and other sub-dialects), with final analyzed sample size $n=28$ and $n=26$ respectively. The experiment included two tasks, Task1 is prosody judgement, deciding whether the stimulus word had familiar prosodic pattern, and Task 2 is semantic judgement, deciding whether the noun was animate. Stimuli were 160 disyllabic nouns in four syllable types (s-s, s-l, l-l, l-s; s refers to short vowel, l refers to long vowel) based on the vowel location in spoken Mongolian, and each presented in two versions: a familiar prosodic pattern and an unfamiliar prosodic pattern produced by a speaker in abnormal way. The formal experiment contained 320 trials in total, which is 4 (syllable type) $\times 20$ (word) $\times 2$ (prosodic familiarity pattern) $\times 2$ (task) = 320 trials. The trial was presented identically procedure (fixation “+” 500 ms, auditory presentation with response, then 1000 ms blank). The experiment tasks lasted around 30-40 minutes.

EEG was recorded using 64channel Neuroscan system (Curry 7), impedance $< 5 \text{ k}\Omega$, online sampling rate 1000 Hz (DC). Offline processing included down-sampling to 250 Hz, mastoid-rereferencing (M1/M2), filtering (high-pass 0.1Hz, low-pass 60Hz, 50Hz notch), artifact handling(including ICA), and epoching from -200 to 1200 ms with baseline correction (-200-0 ms). Mean amplitude were analyzed over standard ROIs (F3/Fz/F4, C3/Cz/C4, P3/Pz/P4) in pre-defined windows including N200, P300, and N400a/b.

Behaviorally, prosody judgement showed a strong familiarity advantage: accuracy was much higher for familiar than unfamiliar prosody (91% vs. 51), and responses were slower for unfamiliar prosody (1173 vs. 1272 ms). The standard group was overall more accurate than the non-standard group.

In the ERPs, N200 (175-225 ms) revealed an early prosodic familiarity effect: in the prosody task, familiar prosody produced larger N200 amplitude than unfamiliar prosody, with effect observed over frontal and central lobe and notably in the right hemisphere; yet group effects were not reliable, showing the similar early sensitivity across dialect backgrounds. This pattern supports the idea that familiar prosodic configurations are rapidly matched against stored long-term representations of word-form prosody. N400 (400-600 ms) showed a robust mismatch effect: unfamiliar prosody elicited significantly larger negativities than familiar prosody (main effect of prosodic pattern, $F(1,52)=19.74$, $p<.001^{***}$, $\eta^2_p=.275$), with group effects again not significant. Together, the N200-N400a dissociation suggests a two-stage account of Mongolian word-prosody processing, which is early familiarity based accessed to prosodic templates followed by increased integration/re-analysis costs when prosodic expectations are violated-even in a language where word prosody does not lexically contrast meaning.

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