Pitch Accent in North Kyungsang Korean Spoken Word Recognition

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North Kyungsang Korean (NKK) is a pitch accent language where the lexical accent pattern of a word is lexically determined as illustrated in the following minimal triple *káci* 'kind', *kací* 'eggplant', *kácí* 'branch'. The role of pitch accent has been understudied for NKK word recognition, while it has been known more for Japanese word recognition (e.g., Cutler and Otake 1999; Katsuda and Steffman 2022), suggesting that pitch accent plays a role in restricting word activation. This study investigates a role of pitch accent in spoken word recognition in NKK, addressing whether pitch-accent information can be used in the lexical access process in NKK. The results revealed that NKK tonal cues facilitate the lexical access with matching segment primes but rather impede it if tone patterns mismatch even with matching segment primes, suggesting that tone mismatch is as detrimental as segment mismatch in NKK word recognition.

Experimental studies were designed to replicate and extend Katsuda and Steffman(2022)'s study to NKK by employing a lexical decision task and priming paradigm but with some modification to make it suitable for NKK lexical activation. In order to test the priming effect of pitch accent in the lexical decision, four prime types (an identity prime, a segment prime, a pitch accent prime, and a control) were included in the study by using 76 bisyllabic word targets and the same number of bisyllabic non-word targets. Two age groups of NKK listeners (12 older; 12 younger) participated in the experiments. In a lexical decision task, listeners judged whether a word presented on the screen is a real word or non-sense word after listening to initial fragments of primes. Response time (in ms.) for correct responses to word target trials was measured, and z-scored response times were analyzed by running linear mixed effects models in R (Baayen et al. 2008) to examine the main effects of age group, prime type and tone type. The dependent variable was z-scored response time.

Results showed that response times(RT) were faster by previous presentation of the identical syllable with the same tone pattern (an identity prime) (1175 ms. in the older group; 724 ms. in the younger group) than either by the identical syllable with a different tone pattern (a segment prime) or by the matching tone pattern but with a different segment (a pitch accent prime) (1211 ms. vs. 1221 ms. in the older group; 788ms. vs. 764 ms.) in both groups, as shown Table 1, although older NKK listeners' responses were slower than younger NKK responses in general. As presented in Table 2, there was significant interaction between prime type and tone type of the target words (p=.02) where the negative estimate indicates faster RT for pitch accent primes in LH type target words, although the main effect of prime type did not reach statistical significance. The interaction between prime type and age group and tone type was also significant (p=.0008), indicating that young NKK listeners were slower in LH type target words by pitch accent primes than older NKK listeners. In other words, pitch accent priming effects were stronger for older NKK listeners in LH type words than younger NKK listeners.

This study revealed that lexical decision was facilitated by segment primes only when matching in pitch accent but impeded by segment primes mismatching in pitch accent, implying NKK listeners exploit prosodic information for their lexical access. Furthermore, the significant interaction between prime type and tone type indicates that NKK listeners actively tap into tonal cues as well as to lexical tone types when it comes to lexical decision. These findings suggest that pitch accent information constrains lexical activation in the process of spoken-word recognition by NKK listeners.

Table 1. Mean Response Time by Age Group and Prime Type

Group	Prime_Type	RT (ms.)	S.D.
Old	Control	1259.41	387.63
	Identity	1175.72	299.27
	PitchAccent	1221.08	361.20
	Segment	1211.07	307.43
Young	Control	756.58	281.72
	Identity	724.47	297.68
	PitchAccent	764.41	300.56
	Segment	788.06	405.68

Table 2. Results of the Linear Mixed Effects Model for RT

Fixed effects	Estimate	Std. Error	df	*t* value	*P*
(Intercept)	-2.20E-01	1.50E-01	3.01E+02	-1.463	0.144528
Prime_TypeIdentity	-1.39E-01	1.68E-01	1.08E+03	-0.826	0.409053
Prime_TypePitchAccent	4.99E-02	1.68E-01	1.08E+03	0.298	0.765957
Prime_TypeSegment	-1.58E-01	1.70E-01	1.08E+03	-0.931	0.352116
GroupExp_Y	8.00E-02	1.66E-01	1.08E+03	0.481	0.630598
ToneL	1.74E-01	2.12E-01	2.98E+02	0.823	0.410932
Prime_TypeIdentity:GroupExp_Y	-1.77E-01	2.37E-01	1.08E+03	-0.748	0.454439
Prime_TypePitchAccent:GroupExp_Y	-3.29E-01	2.35E-01	1.08E+03	-1.4	0.161742
Prime_TypeSegment:GroupExp_Y	-8.89E-02	2.38E-01	1.08E+03	-0.374	0.708681
Prime_TypeIdentity:ToneL	-3.65E-01	2.37E-01	1.08E+03	-1.541	0.123708
Prime_TypePitchAccent:ToneL	-5.36E-01	2.36E-01	1.08E+03	-2.269	0.023487*
Prime_TypeSegment:ToneL	-8.32E-02	2.41E-01	1.08E+03	-0.346	0.729677
GroupExp_Y:ToneL	-3.95E-01	2.35E-01	1.08E+03	-1.683	0.09264.
Prime_TypeIdentity:GroupExp_Y:ToneL	6.32E-01	3.35E-01	1.08E+03	1.888	0.059285.
Prime_TypePitchAccent:GroupExp_Y:ToneL	1.11E+00	3.32E-01	1.08E+03	3.342	0.000861***
Prime_TypeSegment:GroupExp_Y:ToneL	5.46E-01	3.37E-01	1.08E+03	1.621	0.105203

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

References

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