

Prosodic focus marking in Seoul Korean-speaking children: The use of duration- and pitch-related phonetic cues

Anqi Yang¹, Sahyang Kim², Taehong Cho³ and Aoju Chen⁴

¹Tianjin University, China, ²Hongik University, Korea, ³Hanyang University, Korea, ⁴Utrecht University, The Netherlands

Children acquiring different languages show adult-like use of at least some language-specific prosodic focus-marking cues by the age of 5 and further develop this ability until the age of 10 or 11 [1-7]. According to [8], typological differences in prosodic focus marking and prosodic systems can affect the rate and route of acquisition of prosodic focus marking. For example, more reliance on phonetic cues accounts for an earlier mastery of phonetic focus marking in Mandarin than in Dutch; lexical use of pitch leads to a later mastery of pitch than duration for focus-marking purposes in Mandarin and Stockholm Swedish than in Dutch.

Korean, as an edge-prominence language, primarily uses the phonological cue, i.e., prosodic phrasing, for focus marking (e.g., [9], but see recent evidence suggesting focus can also be realized without creating new prosodic boundaries [10]). Korean-speaking children use prosodic phrasing to mark focus in SOV sentences in a largely adult-like manner at ages 4–5, but still use it less frequently than adults by 11 [11]. Interestingly, both children and adults frequently produce object nouns as AP-initial words across focus conditions. The present study examined whether Korean-speaking children varied the phonetic realisation of AP-initial words to mark focus. Specifically, we asked how they varied duration and pitch to distinguish (1) Narrow focus from non-focus (Effect of focus); (2) Narrow focus from broad focus (Effect of focal constituent size); and (3) Narrow focus from contrastive (narrow) focus (Effect of contrastivity), compared to Korean-speaking adults.

To address these questions, we analysed data from [11], in which question–answer pairs were embedded in a picture-matching game to elicit 60 SOV sentences, with two- and four-syllable object-nouns beginning with either a high-tone-triggering phoneme or a low-tone-triggering phoneme, across five focus conditions (i.e., narrow, contrastive, pre-focus, post-focus, broad focus). Participants were children in three age groups (six 4/5-year-olds, eight 7/8-year-olds, eight 10/11-year-olds) and twelve adults. The object-nouns were annotated for prosodic phrasing following the K-ToBI conventions [12]. Word duration, initial syllable duration, pitch maximum, pitch minimum and pitch span were extracted from AP-initial object-nouns (1,151 tokens, corresponding to 72% of the usable sentences).

Mixed-effects modelling (lme4 in R) was conducted on each phonetic measure with FOCUS (narrow focus vs. pre-focus/post-focus/broad focus/contrastive focus), AGE (four age groups), and LENGTH (two- vs. four-syllable words) as the fixed factors and SPEAKER and SENTENCE as random effects.

The analyses (Tables 1-6) showed that the adults used longer word and initial-syllable durations and a higher maximum pitch in narrow focus than in pre-focus and post-focus, but used none of the cues to distinguish narrow focus from broad focus or contrastive focus. The 4/5-year-olds used none of the cues to distinguish narrow focus from pre- or post-focus, unlike adults. The 7/8-year-olds used duration in an adult-like way only for the narrow- vs. post-focus contrast. The 10/11-year-olds used duration cues to distinguish narrow focus from both pre- and post-focus, while pitch-based cues remained limited, with adult-like use of pitch maximum only for the narrow- vs. post-focus contrast. Finally, neither the adults nor the children varied duration or pitch to distinguish narrow focus from broad or contrastive focus.

To conclude, Korean-speaking children begin to use duration to mark narrow focus at ages 7–8 and reach adult-like use by ages 10–11, whereas pitch cues emerge later and remain limited. Neither children nor adults differentiated narrow, broad, and contrastive focus using phonetic cues, although such distinctions in adults have been reported for articulatory measures [13]. Overall, phonetic focus marking in Seoul Korean is acquired later than phonological focus marking and later than phonetic focus marking in Mandarin [5, 11]. Nevertheless, as in Mandarin, Korean-learning children acquire pitch cues later than duration cues, a pattern not observed in Dutch [8]. These results suggest that the acquisition of pitch-based focus marking is influenced by factors beyond the use of lexical pitch.

Table 1. Model summary regarding the dependent variable word duration in the comparison narrow focus vs. pre-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	0.290	0.019	15.004	0.000***
Pre-focus	-0.047	0.019	-2.522	0.017*
Age 4-5	0.094	0.028	3.407	0.001**
Age 7-8	0.047	0.025	1.892	0.065
Age 10-11	0.041	0.025	1.648	0.107
Long	0.254	0.018	13.739	0.000***
Pre-focus : Age 4-5	0.041	0.016	2.554	0.011*
Pre-focus : Age 7-8	0.022	0.013	1.673	0.095
Pre-focus : Age 10-11	0.005	0.013	0.410	0.682
Pre-focus : Long	0.026	0.025	1.048	0.305
Age 4-5 : Long	0.121	0.016	7.618	0.000***
Age 7-8 : Long	0.034	0.013	2.662	0.008**
Age 10-11 : Long	0.044	0.013	3.422	0.001**

Table 3. Model summary regarding the dependent variable pitch-max in the comparison narrow focus vs. pre-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	91.050	1.231	73.949	0.000***
Pre-focus	-1.840	1.013	-1.817	0.082
Age 4-5	6.531	1.758	3.715	0.001**
Age7-8	6.367	1.600	3.978	0.000***
Age 10-11	3.759	1.600	2.349	0.025*
Long	0.739	1.012	0.730	0.472
Pre-focus : Age 4-5	2.038	0.364	5.598	0.000***
Pre-focus : Age7-8	1.026	0.289	3.554	0.000***
Pre-focus : Age 10-11	0.786	0.286	2.746	0.006**
Pre-focus : Long	-0.181	1.418	-0.128	0.899
Age 4-5 : Long	-1.047	0.359	-2.915	0.004**
Age7-8 : Long	0.038	0.288	0.132	0.895
Age 10-11 : Long	-0.051	0.284	-0.181	0.857

Table 5. Model summary regarding the dependent variable initial-syllable duration in the comparison narrow focus vs. post-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	0.150	0.009	17.343	0.000***
Post-focus	-0.028	0.008	-3.314	0.002**
Age 4-5	0.029	0.010	2.956	0.005**
Age7-8	0.019	0.009	2.137	0.039*
Age 10-11	0.015	0.009	1.787	0.082
Long	-0.012	0.008	-1.479	0.152
Post-focus : Age 4-5	0.026	0.007	3.908	0.000***
Post-focus : Age7-8	0.007	0.006	1.137	0.256
Post-focus : Age 10-11	0.007	0.006	1.298	0.195

Table 2. Model summary regarding the dependent variable initial-syllable duration in the comparison narrow focus vs. pre-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	0.149	0.011	14.085	0.000***
Pre-focus	-0.027	0.013	-2.032	0.052
Age 4-5	0.031	0.010	2.978	0.004**
Age7-8	0.028	0.009	2.985	0.005**
Age 10-11	0.017	0.009	1.808	0.077
Long	-0.008	0.013	-0.611	0.546
Pre-focus : Age 4-5	0.029	0.007	4.209	0.000***
Pre-focus : Age7-8	0.013	0.006	2.253	0.025*
Pre-focus : Age 10-11	0.004	0.006	0.734	0.463
Pre-focus : Long	0.008	0.018	0.439	0.665
Age 4-5 : Long	-0.006	0.007	-0.851	0.395
Age7-8 : Long	-0.020	0.006	-3.534	0.000***
Age 10-11 : Long	-0.003	0.006	-0.622	0.534

Table 4. Model summary regarding the dependent variable word duration in the comparison narrow focus vs. post-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	0.289	0.019	15.444	0.000***
Post-focus	-0.054	0.019	-2.824	0.008**
Age 4-5	0.103	0.026	4.049	0.000***
Age7-8	0.046	0.023	2.015	0.050
Age 10-11	0.039	0.023	1.702	0.096
Long	0.253	0.019	13.209	0.000***
Post-focus : Age 4-5	0.027	0.016	1.667	0.096
Post-focus : Age7-8	0.009	0.015	0.609	0.543
Post-focus : Age 10-11	0.012	0.014	0.842	0.400
Post-focus : Long	-0.003	0.027	-0.117	0.908
Age 4-5 : Long	0.102	0.017	5.911	0.000***
Age7-8 : Long	0.039	0.014	2.693	0.007**
Age 10-11 : Long	0.052	0.014	3.653	0.000***
Post-focus : Age 4-5 : Long	0.066	0.025	2.666	0.008**
Post-focus : Age7-8 : Long	0.023	0.021	1.064	0.288
Post-focus : Age 10-11 : Long	-0.009	0.021	-0.414	0.679

Table 6. Model summary regarding the dependent variable pitch-max in the comparison narrow focus vs. post-focus

Factor	Estimate	Std. Error	t value	Pr(> t)
Intercept				
(Adults, Narrow focus, Short)	91.070	1.163	78.336	0.000***
Post-focus	-2.716	0.711	-3.818	0.001**
Age 4-5	6.020	1.739	3.463	0.001**
Age7-8	6.404	1.583	4.045	0.000***
Age 10-11	3.754	1.583	2.371	0.023*
Long	0.665	0.691	0.962	0.346
Post-focus : Age 4-5	2.848	0.381	7.480	0.000***
Post-focus : Age7-8	1.685	0.331	5.096	0.000***
Post-focus : Age 10-11	1.047	0.318	3.288	0.001**

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