

The perception of tonal and segmental cues to phrasing in Seoul Korean

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This study investigates the ability of listeners to disambiguate between utterances that differ only in prosodic phrasing when tonal and segmental cues conflict. Both tonal processes and segmental alternations can signal prosodic constituency [1] yet work on prosodic constituency relies heavily on evidence from tonal cues. In Seoul Korean (SK), the Accentual Phrase (AP), is marked by a L(HL)H tonal contour, as well as a segmental alternation that applies to lenis stops: voiceless AP-initially and optionally voiced/reduced AP-medially [2, 3, 4]. The extent to which speakers use such segmental alternations as a cue to prosodic phrasing in perception hasn't been widely explored. Previous work on Korean found that listeners can use the voicing cues of lenis stops to perceive prosodic constituency when tonal cues were artificially removed [5, 6]. [5] also reported that when the tonal correlates of phrasing were preserved and the voicing of the AP-initial segment was manipulated to be voiced (which is illicit in AP-initial position), participants were more likely to choose the phrasing suggested by the tonal correlates (henceforth the "intended response"). However, they were significantly more likely to choose the intended response when the tonal and segmental cues matched.

In this study, we leverage the fact that polar questions (YNQs) and wh-questions (WHQs) in Korean can be realized string identically due to the lexical ambiguity of the question word and disambiguated by prosodic phrasing: WHQs are realized with a single AP, and YNQs are split into 2 APs [7, 8]. While [7, 8] found that participants can use tonal cues to disambiguate between the two question types, they did not explore the influence of segmental cues on this case of ambiguity. Our stimuli were 11 YNQ/WHQ pairs with a context word, the ambiguous question word (/ɔn.tʃe/ 'when/sometime') and a disyllabic verb beginning with a lenis stop. They were recorded by a native speaker of SK, and automatically segmented [9]. Verb-initial lenis stops were spliced in from a different repetition of the same question type (same-spliced) or different question type (cross-spliced). See Fig 1 for the experimental conditions and design. We manipulated the voicing of lenis stops in AP-initial position (a, b) where voiced stops are illicit (b), and in AP-medial position (c, d) where the voiceless realization (d) is possible but perhaps dispreferred, as it's less frequent than the voiced realization [2, 3, 4]. It's possible that the effect on perception differs depending on whether the combination of tonal and segmental correlates is illicit or simply dispreferred, which is something that past studies have not tested. Responses indicated whether participants perceived a YNQ or WHQ. Response time was also recorded. We expect 40 participants by June 2024, and report the results from the first 4 here.

Fig 2 shows that participants responded with the intended response less frequently in the cross-spliced condition for both question types. This indicates that both AP-initial and AP-medial segmental manipulations affected the perception of phrasing. The fact that the intended response rate was higher in the cross-spliced condition for WHQs (when the segmental realization was the dispreferred one) and at chance for YNQs (when the segmental realization was illicit) indicates that utterances with an illicit combination of tones and segments were more difficult to parse. The RT data was modeled with a simple linear regression model, shown in (1). Fig 3 plots the model predicted RT by question type and splicing condition. RTs were shorter in the same-spliced condition for both question types (1ii), and the interaction term between splicing condition and question type (1iv) was negative (but not significant), both of which are in line with the response results in Fig 2.

Our findings suggest that both AP-initial and AP-medial segmental manipulations affected the perception of prosodic phrasing when they conflicted with the tonal cues but also found that the illicit AP-initial voiced segment caused a greater relative processing difficulty than the dispreferred AP-medial voiceless segment. This work contributes to understanding the non-tonal cues to intonation and how they are used by listeners in perception.

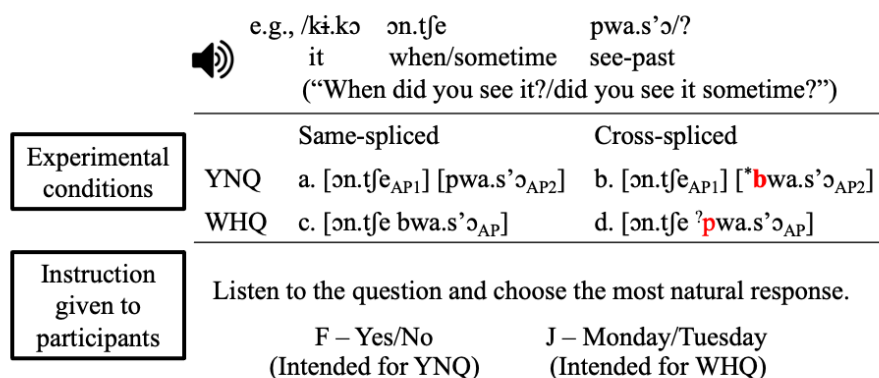


Fig 1: Experiment design. YNQs (a,b) were realized with 2 APs and WHQs (c,d) with 1 AP. In the same-spliced condition, /p/ in /pwa.s'ɔ/ is voiceless for YNQs (a) and voiced for WHQs (c). In the cross-spliced condition, /p/ is voiced for YNQs (b) and voiceless for WHQs (d). In an actual trial, the questions produced with 1 or 2 APs were presented only auditorily. The instruction given to participants and the two responses were displayed in Korean. An ‘F’ selection indicates the participant interpreted the question as a YNQ, a ‘J’ response indicates they interpreted it as a WHQ.

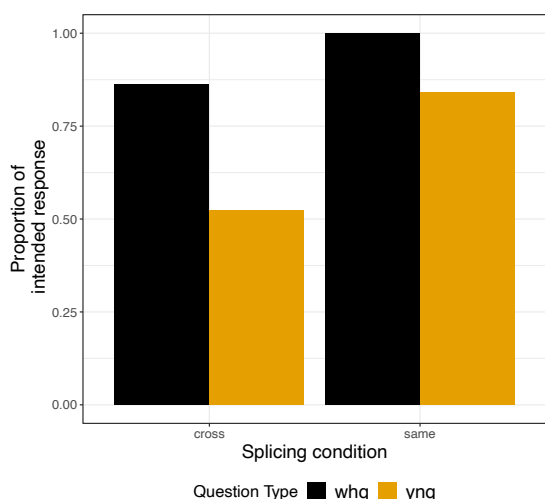


Fig 2: the intended response by question type and splicing condition.

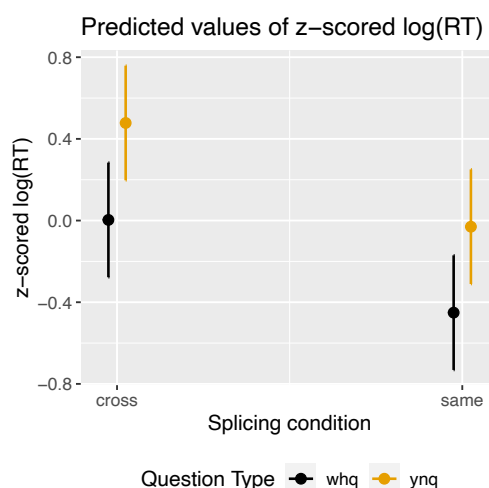


Fig 3: Model (1) predicted RT by question type and splicing condition

(1) Linear regression model results (Formula: z-scored log (RT) ~ Splicing * Question)

Predictors	Estimate	Std Error	t value	Pr(> t)
i. Intercept	0.003	0.142	0.022	0.98
ii. Splicing – Same	-0.454	0.201	-2.259	0.03
iii. Question – YNQ	0.475	0.201	2.361	0.02
iv. Splicing:Question	-0.054	0.284	-0.190	0.84

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