

Secondary Acoustic Cues to Second Occurrence Focus: Are They Necessary?

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Pitch accent is recognized as the salient prosodic cue for the perception of prominence in focused constituents^[1,2]. However, second occurrence focus (SOF) has stood as a well-known exception to this generalization: in SOF prominence is perceived in the absence of pitch accent. SOF is a semantically focused constituent that is repeated from a preceding discourse in which it had primary focus. In (1), the focused word ‘beans’ is marked with a pitch accent in Sentence A; in B it remains semantically focused (i.e. it associates with the focus operator only) but it may be de-accented, following the newly focused ‘Mary’ with nuclear pitch accent.

This construction has posed a challenge for association with focus theories of focus semantics, which disallow “inaudible focus”^[3]. As a result, a growing body of work has sought to show that SOF is in fact audible via secondary acoustic cues such as duration and intensity^[4,5]. But while this literature has established that speakers produce, and listeners can perceive these cues, no study has shown that they are necessary for SOF interpretation. An underlying assumption has been that in the absence of secondary cues, SOF sentences would be perceived as ill-formed or unnatural. An untested alternative is that listeners recover the intended focus from the prior discourse if audible cues are absent. The present study tests whether secondary acoustic features are required for SOF interpretation; if SOF without such cues are still perceived as well-formed, the standard assumption is incorrect.

In this study, forty-one native English adult listeners participated in a perception task conducted online assessing (a) sensitivity to increased duration and intensity in SOF constructions that lack pitch cues and (b) whether the misalignment of these secondary cues is perceived as unnatural. Stimuli consisted of 56 sentence pairs recorded by a linguistically trained adult male speaker in a sound-proof booth consisting of: (a) a context sentence containing a focused word, and (b) the target sentence containing a new primary focus, the SOF word established in the context sentence, and a target non-focused (NFOC) word. Mean differences in duration (12.9ms), intensity (1.9dB at syllable peak), and pitch (0.9Hz) were calculated for each SOF–NFOC pair to verify that each cue patterned in the expected direction. The sentence pairs were divided into four conditions (fig. 1), differing in Cue Type (pitch accent vs no pitch accent on SOF target [conditions 1,2 vs 3,4]) and Cue Alignment (aligned with the SOF word vs the non-focused word [conditions 1,3 vs 2,4]). Since pitch accent on SOF is optional, conditions 1 and 2 were treated as controls. Given the expectation that a misaligned pitch accent (on a non-SOF word) should sound clearly ill-formed, Condition 2 served to verify that listeners understood the intended SOF from the context sentence and to provide a baseline for comparing the misaligned secondary-cue condition. Consistent with a within-subjects design, participants were exposed to pseudorandomized and counterbalanced lists of all four conditions each containing 14 sentence pairs, and rated the naturalness of each sentence pair on a 7-point Likert scale, where 1 indicated “strongly disagree” and 7 indicated “strongly agree.”

Listener judgments showed a robust contrast between Conditions 1 and 2 (paired t-test, $p < .001$). In contrast, the difference between Conditions 3 and 4 was small and not comparable in magnitude to the baseline contrast, with both conditions receiving similarly high ratings (fig. 2, 3). Crucially, contrary to the assumption that Condition 4 would pattern with the ungrammatical baseline, listeners rated Conditions 3 and 4 as broadly acceptable. These findings suggest that secondary acoustic cues are not essential for SOF interpretation. The conclusion that listeners do not need an acoustic cue to SOF is not necessarily incompatible with current theories of focus semantics. Further study might investigate alternatives that involve phonologically represented focus marking that is phonetically ambiguous, e.g. with post nuclear L* tones on the SOF.

- (1) Sentence A: Fred only eats BEANS_F for breakfast.
Sentence B: No, it is MARY_F who only eats BEANS_{SOF} for breakfast.

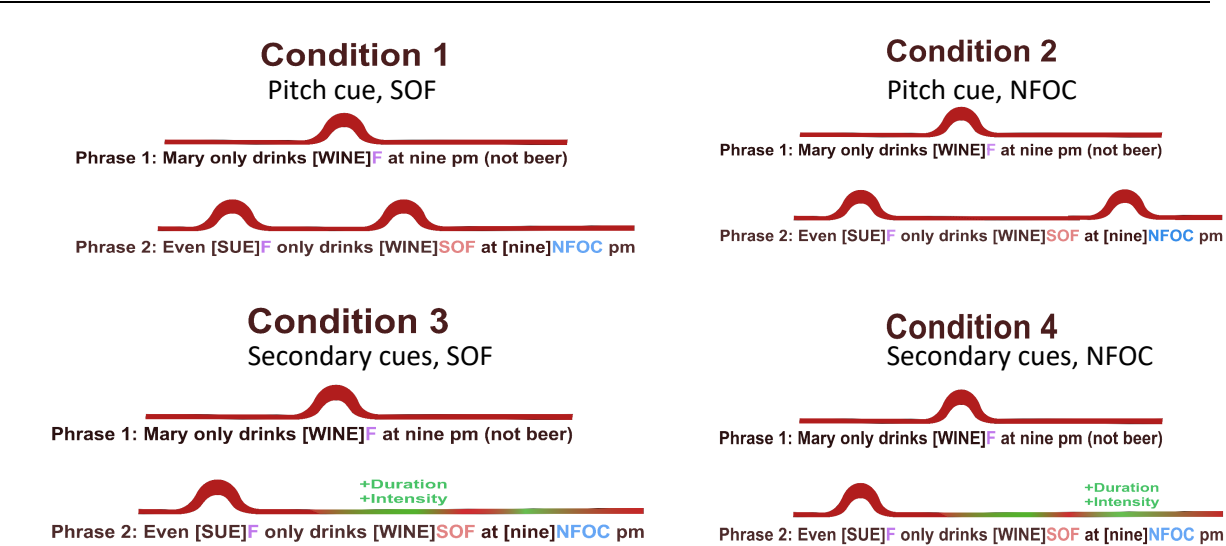


Figure 1. Schematic demonstrations of each of the four conditions. The red curve represents a pitch accent and the green label represents secondary acoustic cues.

Condition	Sentence Type	Average Ratings	Standard Deviation
1	Pitch, SOF	4.2	0.57
2	Pitch, NFOC	3.4	0.49
3	Non-Pitch, SOF	5.4	0.21
4	Non-Pitch, NFOC	5.2	0.28

Figure 2. Means and standard deviations: naturalness ratings of the four conditions across subjects.

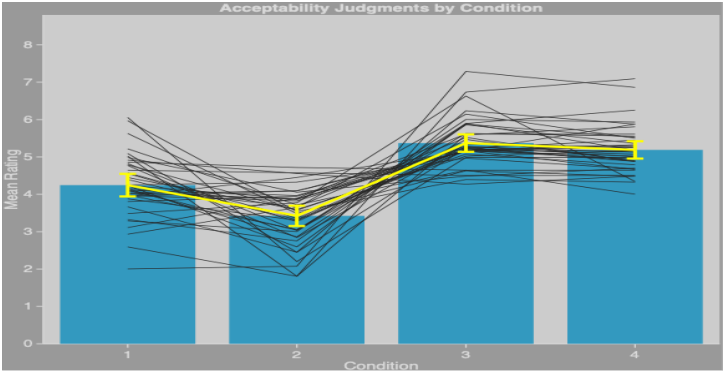


Figure 3. Mean naturalness ratings by condition. Bars show raw means; whiskers indicate 95% within-subject confidence intervals. Narrower lines show normalized subject trajectories (Cousineau–Morey procedure), illustrating consistent clustering of Conditions 3 and 4 across listeners.

References

[1] Beckman, M. E., & Pierrehumbert, J. B. (1986). Intonational structure in Japanese and English. *Phonology*, 3, 255-309.

[2] Féry, C., & Ishihara, S. (2010). How focus and givenness shape prosody. *Information structure: Theoretical, typological, and experimental perspectives*, 36-63.

[3] Baumann, S. (2016). Second Occurrence Focus. In Féry, C., & Ishihara, S. (eds) *The Oxford Handbook of Information Structure*. Oxford University Press. 483-502.

[4] Rooth, M. (1996). On the Interface Principles for Intonational Focus. *Semantics and Linguistic Theory*, 6, 202-226.

[5] Beaver, D. I., Clark, B., Flemming, E. S., Jaeger, T. F., & Wolters, M. (2007). When Semantics Meets Phonetics: Acoustical Studies of Second-Occurrence Focus. *Language*, 83(2), 245-276.