

Second Occurrence Focus and the Acoustics of Prominence

This paper reports the results of a production and perception study of second occurrence (SO) focus. SO focus describes the interaction two well known sound-meaning interface phenomena: (i) association of a semantic operator (e.g. *only*, *even*, *always*) with a phonologically prominent argument (Rooth 1992); and (ii) the tendency for semantically given material to lack prominence (Schwarzschild 1999).

The empirical question is whether a semantically given association with focus has phonological prominence. For semanticists, the answer crucially discriminates between grammatically mediated accounts of association with focus (e.g. Rooth 1992, 1996; Jackendoff 1972) and pragmatic accounts (e.g. Partee 1991, Roberts 1996, Büring 1997, Krifka 2005).

Partee (1991) first made the impressionistic observation that the repeated focus *graduate students* in (1) lacks prominence. Several investigations (Rooth 1996, Bartels 2004, Jaeger 2004, Féry & Ishihara 2005, Beaver *et al.* 2006) have since established that SO focused arguments indeed lack a pitch accent. However, it has been argued that SO focus is marked by other cues, particularly duration and spectral energy. Jaeger (2004) reports an average difference between adjacent SO and un-focused words of 8.1-10.1ms and .8519-.6354 dB. While these differences were statistically significant, listeners in a follow-up discrimination task achieved a mean accuracy rate of only 63%.

To verify the claims of previous investigations, a production study was run with three linguistically trained speakers using three verb-noun homophone pairs (e.g. *patches/patches*) in pre- and post-nuclear position. Following the methodology of Rooth (1996), two sentences were recorded in every stimulus (cf. 2): the first allowed comparison between adjacent unfocused and first occurrence (FO) focused arguments; the second allowed comparison between unfocused and SO focused arguments.

Figure 1 shows results of stressed syllable duration by speaker in the postnuclear condition. As expected, a FO focused verb or noun had significantly greater duration than the adjacent word. Surprisingly, only the SO focused verbs had significantly greater duration; the SO focused nouns were statistically equal in duration with the preceding verbs. The same pattern was observed in the prenuclear condition for duration and also in pre- and postnuclear conditions for spectral energy.

A follow-up forced-choice matching task was conducted with six linguistically trained listeners. Subjects were presented with matched and unmatched FO and SO focus sentences (n=40), and had a success rate of 50-60% with 45-80% reliability.

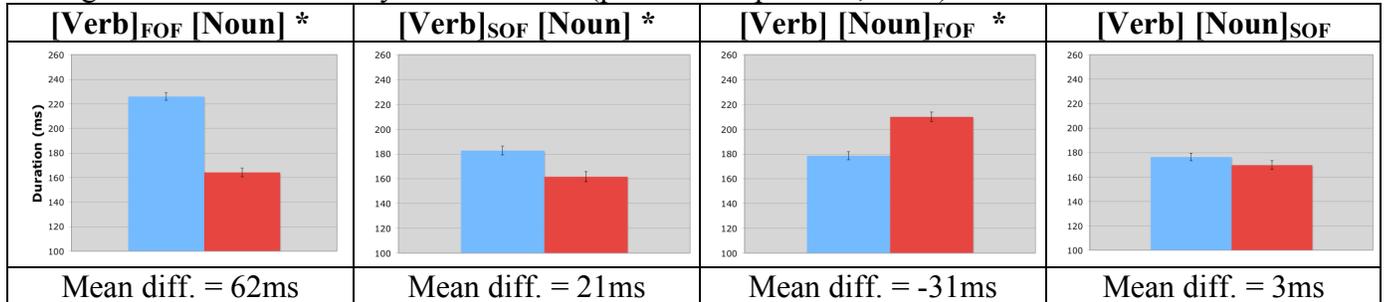
While the results confirm that *some* cues to SO focus are available in the acoustic signal, they also sustain doubt that all listeners are able to exploit these cues in the perception of SO focus. Both grammatical and pragmatic approaches to association with focus may be well-founded: production evidence suggests the non-random influence of semantic focus on the speaker's realization; perception evidence suggests the need for pragmatic information on the part of the listener.

Methodologically, the results caution against taking absolute duration measures as direct correlates of prominence, even after accounting for effects of phrasing (Féry & Ishihara 2006). Several ongoing baseline studies are investigating the possible effects of repetition (Fowler 1988), frequency (Whalen *ms.*), lexical access (Jurafsky 2003), and rhythm (Huss 1978).

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- (1) A: Eva only gave xerox copies to the GRADUATE STUDENTS.
 B: No. PETR only gave xerox copies to the graduate students.
- (2) A: Johnson only PATCHES patches for Microsoft. (He doesn't create them.)
 B: That's right. Even THOMPSON only patches patches for Microsoft.

Figure 1: Mean stressed syllable duration (postnuclear position, n=45)



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