The perception of second occurrence focus

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Roadmap

- Focus sensitivity

- The argument from second occurrence focus

- The perception of second occurrence focus

- Conclusions and future work

Focus sensitivity

- Focus sensitive expressions like *only* are dependent on the position of focus in their syntactic scope.

- In English, focus is typically marked by a nuclear pitch accent; i.e., the last pitch accent in a phonological phrase – see Cohan (2000) and Ladd (1996:45-46).

- In a situation where the doctor gave Pete and Sandy a pill today, and gave nobody anything else, (1a) is true while (1b) is false.

  (1)   a.   The doctor only gave Pete a PILL today.
             b.   The doctor only gave PETE a pill today.

- A wide range of expressions are focus sensitive: questions, focus sensitive operators like *only* and *even*, counterfactual conditionals, adverbs of quantification, frequency adverbs, generics, emotive factives and attitude verbs, superlatives and modals (Rooth 1996a; Hajičová *et al.* 1998).

Where does focus sensitivity happen?

- The phenomenon of focus sensitivity has repercussions for semantics and pragmatics.

- Is it semantically or pragmatically mediated? If it is semantically mediated, then compositional interpretation must have access to focus at some representational level.

- Rooth (1985), Jacobs (1983), Krifka (1992), von Stechow (1985/1989) say that there are lexical items and construction-specific rules that refer directly to the notion of focus, and that focus sensitivity is mediated by compositional semantics.

- Dryer (1994), Roberts (1996), Schwarzschild (1997), Vallduví (1990) and Williams (1997) argue for accounts in which pragmatic factors optionally link the interpretation of focus sensitive expressions to their associated focus.

- The argument from SECOND OCCURRENCE FOCUS is the standard empirical argument against semantic accounts of focus sensitivity.

- If the pragmatic account of focus sensitivity is right, then natural language semantics needs no special component for focus.

Second Occurrence Focus

Background

- When a focused element is repeated, focus marking has been claimed to be absent:

  (2)   A: Everyone already knew that Mary only eats [vegetables]$_\text{F}$.
                        B: If even [Paul]$_\text{F}$ knew that Mary only eats [vegetables]$_\text{SOF}$, then he
                          should have suggested a different restaurant.
                          (adapted from Partee 1999)

- It has been generally assumed that lack of pitch accent implies lack of focus marking. However, focus could be marked by other means.

The argument from second occurrence focus

- The argument from second occurrence focus says:

  A. Semantic theories (e.g., Rooth 1985) require focus marked elements in the scope of focus sensitive expressions.

  B. In the case of second occurrence focus there is no such element.

  C. Therefore focus sensitivity is optional and requires a pragmatic account.

- Drawing on a previous production study of second occurrence focus and a new perception study, we are now going to see how (B), and thus the argument from second occurrence focus, cannot be used as an argument in favor of pragmatic approaches to focus sensitivity.

Previous production study: Beaver *et al.* 2003

- Beaver *et al.* (2003) performed a multi-speaker multi-discourse production experiment.

- The goal was to examine whether words in second occurrence focus are prosodically distinct from non-focal occurrences of the same words; see also Rooth (1996b) for an earlier single-speaker pilot production experiment.

- A minimal pair:

  (3)   a. Both Sid and his accomplices should have been named in this morning's court session.

          b. But the defendant only named Sid in court today.

          c. Even the state prosecutor only named Sid in court today.

  (4)   a. Defense and Prosecution had agreed to implicate Sid both in court and on television.

          b. Still, the defense attorney only named Sid in court today.

          c. Even the state prosecutor only named Sid in court today.

- A number of possible intonational correlates of focus were examined, including maximal (f_0) pitch, pitch range, word duration, r.m.s. intensity, and energy (= intensity*duration).

- Further details about the experimental design can be found in the paper located at `http://montague.stanford.edu/~dib/Publications/sof.pdf`.

Results of production experiment

- A minF$'$ repeated measures analysis yielded the following results:

  - A significant main effect for duration (minF$'$(1,24) = 4.755; $p = 0.039$): second occurrence focus expressions are on average longer than non-focal expressions (6 msecs).
  - A significant main effect for energy (minF$'$(1,24) = 5.539; $p = 0.027$): second occurrence focus expressions receive more energy than non-focal expressions.
  - Marginal main effects for r.m.s. intensity (minF$'$(1,20) = 5.54; $p = 0.07$), standardized minimum pitch (minF$'$(1,23) = 3.3; $p = 0.08$), and standardized pitch range (minF$'$(1,17) = 4.2; $p = 0.06$).

- No main effect of maximum and mean pitch could be found.

A perception experiment

- The production experiment yielded significant effects but small differences (e.g., 6 msecs duration difference).

- Are the effects large enough to be perceptible?

- If not, the marking of second occurrence focus could not influence interpretation, and the argument from second occurrence focus might survive.

Mission

- To use a systematic, objective instrumental methodology to answer the following question:

  > Are hearers sensitive to the intonational correlates of second occurrence focus?

Experimental design

- 10 native speakers were asked to judge prominence of words in 40 sentence pairs differing only in the position of second occurrence focus.

- The pairs were spliced from the earlier production data in such a way that no discourse context was available; i.e., last sentence only.

- A possible pair would be (3c) and (4c), repeated in (5).

  (5)   a.   Even [the state prosecutor]$_F$ only named [Sid]$_{SOF}$ in court today. (= (3c))

            b.   Even [the state prosecutor]$_F$ only named Sid in [court]$_{SOF}$ today. (= (4c))

- The production pairs used were chosen randomly to establish balance of conditions, discourse and speakers, but without regard to the acoustic measurements (e.g., duration) reported above.

Results of the perception experiment

- Subjects performed significantly above chance in distinguishing second occurrence focus (mean = 62.5%; $p < .001$).

- Every single subject performed above chance (two-tailed t-test: $t = 6.22$, $df = 9$; $p < .001$) and they performed 'alike' (no interaction of subjects and performance: Pearson chi-square = 5.688, $df = 9$; $p > .7$).

How do listeners identify second occurrence focus?

- If listeners are able to identify second occurrence focus in the absence of discourse clues, how do they do it?

- To determine this, we examined how well energy, intensity, duration, different pitch measures of the stimuli, or combinations thereof predicted the decision of subjects.

- Energy differences between the first and second word whether marked as second occurrence focus or not are a very strong predictor of the decision made by subjects (regression: $F(1,36) = 27.8$; $p < 0.001$; R-square = .436; entering additional measures does not improve the regression significantly).

- Pitch values (standardized and unstandardized maximum, minimum, mean, and range) have close to zero predicting power (and this is not due to multi-colinearity with non-pitch factors).

Interim summary

- Second occurrence focus is prosodically marked and perceptible.

- The production and perception studies demonstrated that non-pitch intonational correlates of focus (e.g., energy) play a significant role in distinguishing words in second occurrence focus from non-focal occurrences of the same words.

- The reason why focus-marking has been claimed to be absent on words in second occurrence focus is that pitch accent only plays a marginal role.

Why is second occurrence focus marked without pitch?

- Our results suggest that in one specific type of environment focus is marked primarily using energy (or duration and intensity), and that hearers are sensitive to these correlates.

- What factors are likely to be relevant to non-pitch marking of second occurrence focus?

- *Post-nuclear deaccenting*: second occurrence focus follows a nuclear accent

  - A nuclear accent is the last accent in a phonological phrase, so placing a nuclear accent early in a phrase, as in (6), implies that all following words must be unaccented.

    (6)   Pat gave a [book]$_F$ to Sandy.

- *Deaccenting of repeated material*: second occurrence focus is repeated material.

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- There is a strong tendency in English to reduce the prominence of accent in repeated material (Ladd 1980). Example (7) is adapted from Ladd (1996:175).

(7)   A:I've found an article for you in a German journal.
       B:I don't READ German.
       B':?I don't read GERMAN.

- Standard second occurrence focus examples involve both of these factors.

- The prosodic marking of words in second occurrence focus suggests that deaccenting is actually suppression of pitch movement, not suppression of accent; see Grice *et al.* (2000) on evidence for post-nuclear accenting.

Conclusion

- Previous production studies demonstrate that there is an acoustic correlate of second occurrence focus, at least in the classic form of the phenomenon, involving repeated foci in POST-NUCLEAR position (i.e., after the main pitch accent of the sentence).

- We have shown that the effects are perceptible.

- Second occurrence focus does not demonstrate optionality of focus, and the main argument against semantic theories of focus sensitivity is (as it stands) specious.

- Post-nuclear deaccenting and deaccenting of repeated material involves suppression of pitch movement, not complete deaccenting.

Future Work

- On the semantic side of things:

  - Is marking of second occurrence focus optional or obligatory?

- On the phonetic side of things:

  - What is the precise combination of factors that is used to infer focus- and second occurrence focus assignment (e.g., pitch vs. other factors)?
  - What are the broader conditions under which non-pitch marking is used?

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