**Prosody, Semantic Plausibility and the MV-RR Ambiguity**

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Ambiguity is pervasive in natural language, and the listeners face a daunting task in resolving it in ordinary communication. We know that prosodic cues are one of the methods speakers use to help listeners determine the structure of utterances, and therefore, resolve ambiguity. I looked at how speakers signal syntactic, or sentence, structure using prosody in the MV-RR ambiguity and how semantic plausibility affects this.

Prosody is the intonation pattern you use when you speak. It’s the way you say things as opposed to the words you use. For example, the difference between the statement *Julie went to the store.* and the question *Julie went to the store?* is one of prosody. Prosodic cues include intensity (loudness), pitch and duration. Prosodic patterns indicate groupings which may or may not correspond with syntactic groupings. It is possible, therefore, that prosody could be used to signal syntactic structure. I used duration measurements for this study. Increased duration on a word may indicate a prosodic boundary which may be signaling a syntactic boundary.

There are many types of syntactic ambiguities. Some are global and can’t be resolved by syntax alone (e.g. *Put the dog in the basket on the star* (Kraljic & Brennan, 2005)). Other ambiguities are temporally ambiguous, meaning that, while the first part of the sentence is ambiguous, the syntax does eventually resolve the ambiguity. The MV-RR ambiguity is a temporal ambiguity. Consider sentences (1) and (2) below.

1. *The small animal examined the peas and carrots.*  MV structure
2. *The small animal examined by the chef was filthy.* RR structure

The underlined portion of the sentence is ambiguous between a main verb (MV) structure (1) and a reduced relative (RR) structure (2). The rest of the sentence reveals which structure it is. However, you need to get past the verb to determine this. I was interested in how prosody on the ambiguous portion of these sentence differed between the two syntactic structures.

Previous production and perception studies show that prosody is used to disambiguate several global and temporal ambiguities (Edmonds, Killam & Liljestrand, 2014; Jun & Oh, 1996; Kang & Speer, 2003; Kang, Speer & Nakayama, 2004; Kraljic & Brennan, 2005; Marslen-Wilson, Tyler, Warren, Grenier & Lee, 1992; Millotte, Wales & Christophe, 2007; Schafer, Speer, Warren & White, 2000). The MV-RR ambiguity has not received much attention in the prosody-syntax literature, although it has been examined in the syntax-semantics literature (MacDonald, Pearlmutter & Seidenberg, 1994; Ni, Crain & Shankweiler, 1996).

The relationship between prosody and semantic plausibility has been examined in a number of perception studies (Blodgett, 2004; Dede, 2010; Misono, Mazuka, Kondo & Kiritani, 1997; Snedeker & Yuan, 2008; Wagner & Crivellaro, 2010). These studies suggest that there is an interaction between prosody and semantic plausibility. How prosody and semantic plausibility interact in production has not, however, received much attention.

This study looked at four types of target sentences:

1. *The small animal examined the peas and carrots.*  Plausible MV
2. *The small animal examined by the chef was filthy.* Plausible RR
3. *The small tomato examined the peas and carrots.*  Implausible MV
4. *The small tomato examined by the chef was rotten.* Biased RR

The plausible MV (3) and RR (4) conditions used subject-verb combinations, such as *animal examined*, which are equally plausible in the MV and RR structures. The implausible MV (5) and biased (6) RR conditions used subject-verb combinations, such as *tomato examined*, which were implausible in the MV structure and, therefore, biased towards the RR structure.

Four participants completed the experimental task. They were asked to read 40 target and 40 filler sentences aloud for audio recording. The target sentences included ten of each type of sentence. One biased RR sentence was excluded from the analysis because it was deemed implausible. The recordings were analyzed using Praat (Boersma & Weenink, 2016). Duration measurements, including any following pauses, were taken for the subject of the sentence and the immediately following verb.

The plausible MV and RR conditions were compared to assess whether prosody was used to signal syntactic structure on the ambiguous portion of the sentences. Although the differences were not significant, longer duration was found on both the subject and the verb in the RR condition compared to the MV condition. This suggests speakers may make stronger boundaries in both places in the RR condition.

The implausible MV and biased RR conditions were compared to the plausible MV and RR conditions to assess how the semantic plausibility of the sentence affected the use of prosody. In the main verb conditions, longer duration was found on the implausible MV subject compared to the plausible MV subject while shorter duration was found on the implausible MV verb. This suggests speakers focus or emphasize the subject when the MV structure is implausible.

In the RR conditions, there was shorter duration on both the subject and the verb in the biased condition compared to the plausible condition. This suggests speakers use weaker boundaries when the sentence is biased towards the RR structure, perhaps because they feel less need to make a distinction. Neither the MV nor RR results were significant, although they do suggest semantic plausibility may affect prosodic realization.

While none of the results were significant, possibly due to the low number of participants, they do suggest that speakers may be signaling syntactic structure in the MV/RR ambiguity through prosody and that there may be an interaction between prosody and semantic plausibility. Further research with more controlled stimuli and more participants may shed more light on this.

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