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Phrase length and prosodic complexity effects on pause duration

A study examining the effects of prosodic structure and phrase length on pause duration is presented. The larger motivation of the study is to advance our understanding of how speakers plan and produce speech. Studies on the effects of syntactic structure on pause duration have found that more complex structure leads to longer pauses, leading investigators to the conclusion that longer pauses indicate the time speakers need to plan the more complex structure of the upcoming phrase (e.g., Ferreira 1991, Strangert 1997). While many studies have examined the effects of syntactic structure on pause duration, the effects of prosodic structure have not been investigated thoroughly (but see e.g., Ferreira 1993, Krivokapić 2007). In our study, the effect of prosodically complex phrases (as compared to simpler phrases) on pause duration is examined, where complex and simple refer to whether an utterance branches into two intonation phrases (IP) or not. We are specifically interested in how far ahead speakers plan an utterance and in how phrase length, pre-boundary phrasal complexity and post-boundary phrasal complexity interact in their effects on pause duration.

Subjects read sentences that varied in two ways. First, each sentence included a boundary bounded either by long IPs both before and after it, medium IPs before and after, or short IPs before and after it. Second, the prosodic complexity of the phrase on each side of the boundary, i.e. before and after the boundary, was varied as to whether it was a prosodically complex (branching) IP or a prosodically simple (non-branching) IP. To minimize variability due to speech rate and individual differences the synchronous speech paradigm was employed (see Cummins 2002, 2003, Zvonik & Cummins 2002). 14 speakers (7 dyads) read the sentences. The production of the targeted prosodic structures was verified using ToBI conventions for prosodic transcription (Beckman & Elam 1997). We measure pause duration at the boundary. The results show an effect of both phrase length and complexity. Phrase length shows a graded effect, such that longer surrounding phrases lead to longer pauses than medium long phrases, which in turn lead to longer pauses than short phrases. More complex prosodic structure leads to longer pauses, both pre- and post-boundary. In addition to these effects, we find that symmetry in prosodic structure has an effect on pause duration (where by symmetrical structure we understand those sentences where pre- and post-boundary phrases are both prosodically complex or both prosodically simple), such that symmetrical structure leads to shorter pause duration.

We interpret our findings in terms of speech planning and production effects. Specifically, longer and more complex phrases induce longer pauses as more phonological length or more prosodic structure need to be processed by the speaker compared to shorter or less complex phrases. We further suggest that prosodic symmetry is related to rhythm in speech and that it facilitates the speech planning or production process. Based on an examination of our results and results reported in the literature, we discuss prosodic units in speech planning [Supported by NIH].

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