

## Mandarin Prosody Organization and the Role of Silence in Speech Prosody

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### Abstract:

The organization of speech prosody is proposed on the basis of Mandarin Chinese and the effect of breathing in speech production. The organization consists of prosodic units of various characteristics as well as breaks/pauses. Prosodic units include prosodic words, prosodic phrase, prosodic utterance, prosodic group as well as 5 degrees of breaks in speech flow. We performed detailed analyses of the perceived breaks and their neighboring prosodic units in terms of duration, pitch height, volume, and speech rate to show how breaks functioned hand in hand with prosodic units as linguistic cues in speech prosody. We also analyzed the declination effect in speech prosody and found that declination can be interpreted in terms of breathing effect too. Our measurements showed that declination was least significant during the first one third of a larger prosodic unit such as prosodic utterance and prosodic group, but most significant at the last one third. Correlation effect was also found in duration as well amplitude measurements. Note also that both the prosodic units and the breaks are hierarchical, and that our system treats breaks in speech flow as independent prosodic cues. We believe that these effects are biologically based and therefore should be language independent. They are also crucial to the naturalness of speech prosody and are significant to both synthesis and recognition applications.

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