

Phonetics and distribution of Tourette's verbal tics produced during active speech

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Persons living with Tourette's syndrome produce an inventory of movements and vocalizations called tics. Tics resemble purposeful, goal-driven movements but are more akin to responses like physiological cough in that they are driven by action-specific urges: producing a tic relieves or reduces the urge to perform that tic (e.g., Jankovic 1997, Singer 2005, Felling and Singer 2011). Tic vocalizations that closely mimic linguistic units such as words or phrases are common and are known as verbal tics. Verbal tics are produced on a background of apparently typical voluntary speech. The corpus study presented here includes a battery of linguistically-informed analyses of verbal tics that occurred during active speech, that is, during performance of a talk. First, fundamental frequency is compared across speech and tic modalities as a means to quantify the distinct sources of control over voice these two systems represent. Second, variability in the duration and intonation of the most frequent verbal tic in the corpus is examined, a unique opportunity to observe variability in these parameters in the absence of the intentions to speak that arguably drive their systematic variability involuntary speech. The third analysis is designed to probe one hypothesized linkage between tic and speech motor systems—the extent to which tics are delayed in the service of fluent production of linguistic units like words and phrases. Intentions to speak and urges to tic can be active simultaneously but speech and tics cannot be produced simultaneously. As a result, speech production units on the one hand and tics on the other have to be deployed in some relative order. The distribution of tics relative to the speech around them indexes the extent to which adult ticking “respects” or interferes with speech production. Tic distributional patterning is examined in three ways. First, tics in the corpus are classified according to their temporal distance from adjacent speech and the proportion of tics that are and aren't speech-proximal is computed. Second, the observed likelihood of tics interfering with word production is compared to the likelihood expected by chance if urge-based and goal-driven event timing was occurring independently. Third, the observed likelihood of tics interrupting intonational phrases is compared to the likelihood expected by chance, an analysis mirroring the analysis for word-level plans. Verbal tics are investigated because they are a convenient model urge-based system to compare directly to a goal-driven system—speech.