Cognitive interference modulates speech acoustics in a vowel-modified Stroop task

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Abstract

How do cognitive processes influence speaking? We used a novel variant of the Stroop test to measure whether cognitive inhibition could modulate acoustic properties of speech. Participants named the color of words in three categories: 1) congruent (e.g. red written in red), 2) color-incongruent (e.g. green written in red), and 3) vowel-incongruent, with phonetic properties that partially matched the text color (e.g. rid written in red). We hypothesized that the cognitive effort of inhibiting reading in this third conditionsaying red, not ridcould affect the acoustics of the spoken response. A classic Stroop effect was evident: congruent trials were faster than color-incongruent trials. Interestingly, vowel-incongruent trials did not show this reaction time difference, but spoken vowels from these trials were systematically biased away from the visually-presented text. Thus, the inhibition of a competing target is manifest in an accentuation of the acoustic contrast between the spoken and inhibited words.