Main Point
VOT produced during a listen-and-repeat task was longer in low-frequency words, but only in the voiceless series and only when embedded in a rich linguistic context.

Research Question
Do lexical usage frequency and immediate linguistic context influence the production of voice-onset time?

Method
Design and Procedure
- **Design**: 56 target words with alveolar and velar stops in initial position, balanced by:
  - a. frequency: high, low
  - b. lexical status: word, non-word (no voiceless non-words)
- **Participants**: 2 men, 4 women, 27.4 years old, monolingual American English talkers, normal hearing/vision, no speech or language deficits, white, right-handed.
- **Data**: Each of 6 participants produced about 700 forms, yielding about 4200 total VOTs.
- **Analysis**: means and 95% confidence intervals are reported in the figure. The data were treated as repeated-measures analysis using non-parametric bootstrap resampling.

Background
- Evidence suggests pervasive influence of linguistic experience in language storage, speech production, and speech perception.
- Perceptual learning has shown recent exposure to specific words can affect representations (Norris, McQueen, & Cutler, 2003; Krizaj & Samuel, 2005).
- Ganong (1980) showed perceptual bias toward real words over non-words. Category boundaries shifted to include more actual words over non-words.
- Talkers’ speech production is affected by ambient language (Sancier & Fowler, 1997) and can be affected by familiarity with specific words in conversational context (Pardo, 2006).

Results

Conclusions
1. VOT production within the voiceless series was affected by usage frequency only when target words were embedded in a supporting linguistic context.
2. VOT within the voiced series was not affected by usage-frequency, lexical status, or linguistic context.
3. The voiceless series is the locus of differentiation in production. This accords with previous work on fine-grained VOT production (Miller, Green, & Reeves, 1986, Volaitis & Miller, 1992). Our previous perception work has shown differentiation in the voiced series with no concurrent effect in the voiceless series (VanDam, 2007; VanDam & Port, 2009).
4. Ganong (1980) showed voicing category boundaries shifted to favor perceptual categorization biasing real words. A similar production effect would be (a) a difference between words and non-words (b) in the direction of category centers shifted toward more extremes (i.e., shorter for voiced and longer for voiceless). The present results fail to show a non-word production effect in either direction, suggesting the possibility of evidence against a production-based Ganong-effect.
5. Fine-grained detail of temporal speech features reveal a complex asymmetry in speech production: detailed structure in the voiceless series but not in the voiced.