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Perceptual linguistic saliency and L2 speech

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One of the major challenges for second language (L2) learners is acquiring a novel L2 sound inventory that differs from their native language (L1). Perception of novel L2 sounds is filtered through their L1 (Dupoux et al, 1999) which in turn can facilitate or hinder L2 acquisition and production. In order to fully understand acquisition of novel contrasts in an L2, it is crucial to understand which sounds the learner is noticing since lexical encoding of new sounds is contingent on awareness of those sounds (Hayes-Harb & Masuda, 2008). However it is difficult to determine which sounds an L2 learner notices or is aware of.

We have an intuitive notion that some sounds are more noticeable than others as some sounds seem to be more "obvious" or "prominent." This characteristic has been termed "saliency." Previous literature has examined saliency and while pointing out that it remains an elusive and largely intuitive concept, no definition has been offered that doesn't rely further on vague concepts such as "some way perceptually and cognitively prominent" (Kerswill & Williams, 2002, p. 81) or "easily noticeable, prominent or conspicuous" (Siegel, 2010, p. 129). Similar to other "intuitive" terms like ease of articulation, difficulty, similarity, and markedness, saliency has remained unquantified and lacks an empirically objective definition. The factors that underlie a segment's saliency to listeners unfamiliar with a given language are unclear. Some possible sources of perceptual linguistic saliency in a second language are the frequency of occurrence of a given segment, the relative frequency of a given segment (compared to the L1), dissimilarity to the phonemic inventory of the listener, and novelty of the segment.

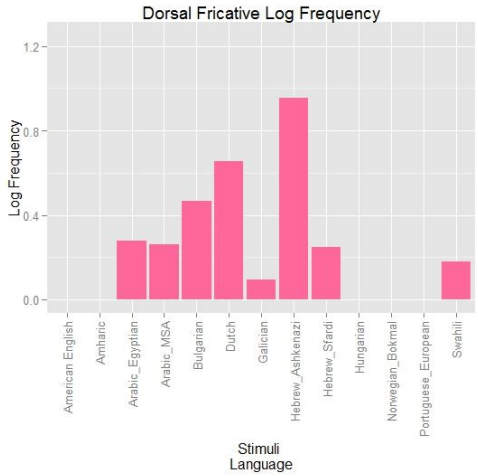
This study aims to empirically instantiate "intuitive" sources of saliency of a segment in languages unfamiliar to a listener by aurally presenting language samples to American English speakers (N=12) and having the participants report the sound(s) that were more "noticeable." We then compare the results of the experiment to three models of perceptual linguistic saliency: novelty of a segment, absolute frequency of a segment, and frequency of a segment relative to American English frequency.

Stimuli consisted of 21 normalized audio recordings of native speakers reading Aesop's 'North Wind and the Sun.' The language samples varied as to whether they contained phonemes that are absent in American English: pharyngeal, and dorsal fricatives. We also included samples of post-alveolar fricatives that varied in frequency. Five types of stimuli included were: Type I – stimuli with pharyngeal, dorsal, and post-alveolar fricatives (Egyptian Arabic, Modern Standard Arabic, Modern Sephardi Hebrew); Type II – stimuli with dorsal, and post-alveolar fricatives (Bulgarian, Dutch, Modern Ashkenazi Hebrew); Type III – stimuli with a high frequency of post-alveolar fricatives (Galician, Hungarian, European Portuguese); Type IV – stimuli with a low frequency of post-alveolar fricatives (Amharic, Norwegian Bokmål, Swahili); and Type V –stimuli with no pharyngeal, dorsal or post-alveolar fricatives, which served as fillers and training (Defaka, Efik, Estonian, Finnish, Hindi, Icelandic, Bjørnvatn Norwegian, Sindhi, Swedish).

Stimuli were aurally presented once in two pseudorandonmized blocks using E-Prime. Participants were asked to orally identify the sound(s) that they "noticed the most." Their oral responses were recorded in Audacity and transcribed in Praat. Responses varied from productions of just the

segment (e.g. [ʃː]), a syllable (e.g. [ʃa], [xa]), to longer non-words (e.g. [ʃah χot͡s xav]). Only the fricative responses were analyzed. Responses were coded for occurrence of fricatives by place of articulation irrespective of voicing and number of productions. Some participants produced a number of different fricatives in a single response and each fricative was coded separately.

Preliminary analysis of the results showed a number of trends. Dorsal fricatives were identified as salient half of the time for five of the seven language samples which contained them (see figure 2), irrespective of the frequency of the dorsal fricative (see figure 1).



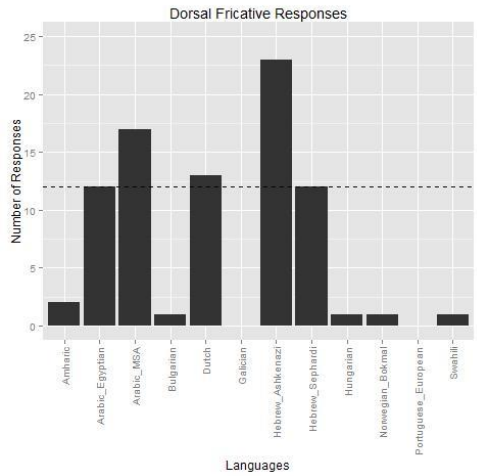


Figure 1: *Dorsal fricative log frequency*

Figure 2: *Dorsal fricative responses*

Pharyngeal fricatives were identified as salient less than 25% of the time for the three stimuli containing them and doesn't appear to be affected by frequency. A greater number of post-alveolar responses occurred for stimuli that contain post-alveolar fricatives with a greater frequency than American English than stimuli that has them at a lower frequency. Analytic statistics will be completed.

The preliminary results suggest that frequency is a source of perceptual linguistic saliency only for segments which are in the language of the listener. Mere presence of a novel segment seems to be an important factor in perceptual linguistic saliency similar to the "novel popout" effect in visual processing (Strayer & Johnston, 2000). This novelty bias is consistent with findings of Chang (2013) which found L1 phonetic drift was stronger when the L2 was novel. By testing saliency under experimental conditions we help to identify major factors underlying this concept. This study thus provides an important foundation for future work in investigating sources of saliency in language and ultimately operationalizing saliency. An empirically motivated conception of saliency ultimately helps us better understand multilingual acquisition of novel contrasts.

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