Individual Differences in L1 Perception & their Effects on Discrimination of Unfamiliar Nonnative Vowel Contrasts

Adults are known to struggle with new language sounds. The dominant theoretical perspectives attribute these difficulties to the influence of the native phonological system that functions as a filter and impedes accurate perception and production of L2 sounds [1]. In this study, we examine how individuals with the shared native phonological system differ in perceiving the sounds of their native language (L1) and to what extent these differences influence L2 perception.

We argue that speakers of the same L1 vary in how their native phonemic categories are represented in the perceptual space. Such differences in L1 perception systems might have effects on the perception of unfamiliar sounds (L0). We propose that the perceptual compactness of L1 categories [2] have effects on the perceptual accuracy of L0 contrasts. Listeners with more compact categories perceive L0 sounds more accurately than listeners with less compact categories.

68 Spanish monolinguals varying in acoustic and phonological memory capacity – measured by a target sound recognition task and a serial nonword recognition task, respectively – participated in the study (Figure 1). To assess participants’ auditory perception of the novel Russian contrast /i - i/’, we used a rated dissimilarity task with goodness-of-fit ratings. To map the perceptual space underlying the native category /i/ in each participant, we used a goodness rating task. For this task, we developed a set of stimuli made of 28 synthesized variants of a Spanish vowel /i/. A set of variants that formed four vectors in a psychoacoustic space around the prototype /i/ vowel was obtained by modifying F1, F2, or both at the same time (Figure 2). F1-F2 pairings that were outside the range of the possible human vowel space were excluded. The participants had to rate each variant using a 10-point rating scale. To calculate a perceptual compactness index of the Spanish category /i/ for each individual, we counted the number of tokens that were selected as good exemplars of this category (the rating goodness greater than 5) and multiplied this number by their distance from the prototype.

The collected data demonstrates a connection between the degree of compactness of the native category /i/ and the L0 discrimination ability.

References
Figure 1. Study design.

Figure 2. The prototype vowel /i/ (in the center) and its variants on four orbits surrounding it.