Predicting the /n–l/ Merger in Hong Kong Cantonese
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Mergers can spread rapidly at the expense of distinctions via dialect contact (1,2). This paper develops a mathematical model that correctly predicts the conditions for the /n–l/ merger in Hong Kong Cantonese (3).

We view the implementation of change as child language acquisition, which can be modeled as competition between alternative linguistic hypotheses (4). Suppose a learner in a contact situation is exposed to a merged system $M_+$ and a distinct system $M_-$ with probability $p$ and $(1-p)$. Psycholinguistic research (5) demonstrates that when homophony (resulting from the merger) poses ambiguity, the language user initially activates the most frequent item even when the linguistic context is completely unambiguous. Thus, if the learner uses $M_+$ to analyze speech, under which /n/ and /l/ are not distinguish, homophony-led misanalysis occurs when the less frequent member of the minimal pair is encountered. Under the $M_-$ system, the learner perceives two distinct consonants: both members of a minimal pair may be misperceived, as /n/ and /l/ are inherently confusable for $M_-$ speakers (6), which also results in misanalysis. The model of change requires one to calculate the expected probability of misanalysis under $M_+$ and $M_-$, and the learner will select the grammar with a lower expected probability. For $M_+$, this is the probability of the less frequent member of the minimal pairs - which is a constant. For $M_-$, we need to incorporate the perceptual confusability of /n/ and /l/ in addition to frequency considerations of orthographic words/ characters, which is a function of $p$. The critical threshold of $p$ can then be solved by comparing the expected probabilities of misanalysis under these two grammars. Using corpus frequencies of minimal pairs (7) and consonantal perception confusability results (6), we can calculate $p$, the tipping point percentage of $M_+$ speakers, which will result in the learner adopting the $M_+$ grammar. The critical value is 0.27; that is, if at least 27% of input to learners comes from merged speakers, the merger will necessarily take hold in the speech community.

The most comprehensive sociolinguistic study (7) shows that /n/ had almost completely lost to /l/ by 1990 for speakers under 45. For the oldest group of subjects (31 - 45 in 1990) born in Hong Kong, approximately 25% of their parents were from Cantonese regions where the merger had taken place. This supports the numerical prediction of the merger model proposed here, which has also successfully predicted the requisite population mixture for the spread of the low back vowel merger in American English dialects (8).