

## Chain shifts and transphonologizations are driven by homophony avoidance

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Loss of a phoneme contrast through merger is significantly associated with a low degree of resulting word-level homophony (Kaplan, 2011; Wedel et al., 2013). For example, there are very few English words distinguished by the two low-back vowels /ɑ/ as in 'cot', and /ɔ/ as in 'caught', and this vowel contrast has merged in many dialects of North American English. In contrast, phonemes that do not merge are characterized by many such 'minimal pairs', that is, words that would become homophonous if the phonemes were to merge. In these previous studies, homophony avoidance was associated with *lack* of change. Here, we show that homophony avoidance appears to also drive two superficially distinct, *active* sound changes. **Chain shifts** occur when a set of phonemes move in concert within phonetic space. For example, the front vowels in New Zealand English have undergone a chain shift upwards, such that the vowel /æ/ in 'pat' has raised to /e/, and the original /e/ in 'pet' has raised to /i/ (Bauer et al., 2007; Hay et al., 2015). **Transphonologizations**, on the other hand, occur when the primary cue distinguishing two phonemes merges, while a minor cue expands in concert to become the primary cue. For example, aspirated and lenis stops in Korean are historically distinguished by a voice-onset-time (VOT) difference, with a minor distinction in f<sub>0</sub> on the following vowel. In modern Seoul Korean, this VOT difference is collapsing, while the f<sub>0</sub> difference has expanded to become the primary cue (Silva, 2006). These two superficially distinct classes of sound change have in common that lexical contrast is maintained throughout the change: in a chain shift, one phoneme moves into the space occupied by another, which concomitantly shifts away into a neighboring part of the phonetic space. In a transphonologization, one cue to a phoneme contrast merges, while at the same

time another cue to the same contrast expands. Here we show that while phoneme mergers are characterized by a low number of minimal pairs (and therefore low numbers of resulting homophones), chain shifts and transphonologizations are characterized by especially high numbers of minimal pairs. Our dataset comprises a genetically and areally diverse set of twelve languages which have undergone historically recent mergers, chain shifts and transphonologizations. We identified the number of minimal pairs distinguished by each phoneme contrast participating in a change, as well the number of minimal pairs associated with a comparison set of similar contrasts that have not participated in a change. Relative to the distribution of minimal pairs of non-changing phoneme contrasts, we find that mergers, as shown previously, are drawn significantly from the lower end of this distribution. Conversely, we find that contrasts that have undergone chain-shifts and transphonologizations are drawn significantly from the higher end of this distribution (Figure 1). These findings are consistent with computational work showing that category shift in one phonetic dimension (e.g., chain shifts) and category shift across multiple phonetic dimensions (e.g., transphonologizations), can be driven by the same mechanism (Wedel, 2012). More broadly, these findings provide support for usage-based theories of change in which information-theoretic factors like homophony avoidance play a fundamental role in shaping languages' sound systems over time (Flego, 2022; Sóskuthy, 2013; Winter & Wedel, 2016; Winters et al., 2018).

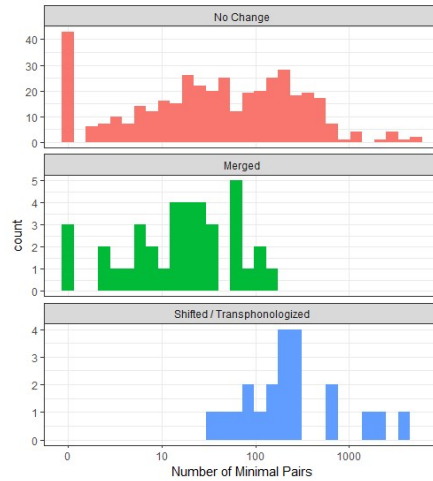


Figure 1. Comparison of minimal pair counts for each sound change category.

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