Sensitivity to coarticulatory and social factors in American English sibilant categorization

**Introduction**: Theories of sound change propose that a change emerges when listeners do not compensate for extreme coarticulation (e.g. Ohala 1993; Harrington et al. 2008). Similarly, research in sociolinguistics finds that listeners shift perceptual boundaries in response to perceived social attributes, like gender performance (e.g. Strand 1999; Campbell-Kibler 2011). The present study seeks to combine these two lines of research, examining the interplay of sensitivity to coarticulation and social attributes in the perception of /s/-retraction, an American English sound change in process by which /s/ is approaching /s/ in /str/ clusters, but rarely in /spr/ and /skr/ clusters. Specifically, this study first asks if listeners compensate for anticipated coarticulation in /str/ clusters but not /spr/ clusters. Secondly, we ask if masculine stereotypes influence phoneme categorization differently in the different clusters? And finally, we seek to ask if responses are mediated by perception of race.

**Methods**: Due to the phonotactic restrictions of English, the experiment was presented as a nonce word lexical decision task. Two college-aged white male speakers recorded /s{p,t,c}rimble/, the target of this study, as well as the prevocalic equivalents /simble/ and /shimble/. The onsets from the prevocalic contexts were extracted and digitally mixed to create a seven-step continuum from /s/ to /j/. Each step was cross-spliced onto the preconsonantal target word, creating a continuum from /s{p,t,k}rimble/ to /j{p,t,k}rimble/. Thirty-one participants listened to each step of the continuum for both speakers four times, paired with a different face contrasted for perceived masculinity. Participants additionally completed a short survey, providing basic demographic information and responses to various stereotypes of masculinity, including toughness (Pleck et al. 1993). Listeners’ responses were modeled using logistic mixed effects regressions, with random intercepts for listener and by-listener random slopes for target cluster, suggesting significant individual variability.

**Preliminary results**: Listeners are significantly more likely to respond /s/ in /str/ clusters at higher steps than in /spr/ clusters (p < 0.001), suggesting that individuals are sensitive to their experience with coarticulation and compensate for it. Furthermore, individuals exhibited a high degree of variability, with some individuals exhibiting no compensation for retraction and others exhibiting such extreme compensation that never perceive /j/ in /str/ clusters, even at the highest steps, as in Figure 1. With regards to social information, the manipulated of facial masculinity did not have a significant effect in shifting the boundary for /str/ clusters, perhaps suggesting that retraction in these clusters does not index masculinity for listeners. However, for individuals who have a stronger alignment toward masculine stereotypes of toughness, masculine faces resulted in more /s/ responses, suggesting that these individuals are especially sensitive to coarticulation when it aligns with their expectations, that is, when speakers are perceived as more masculine (p < 0.05). Taken together, these results suggest significant individual variation in the perception of /s/-retraction, with additional variation in its indexed social meaning.

**Continuing directions**: Experimentation is still in progress, with more participants completing the task described above as well as with black and Asian voices and faces, examining the intersection of race with perceived masculinity and sibilant categorization.

![Figure 1](image-url): Individual variation (panels) in percentage of /j/ responses (y-axis) as a function of increased /j/ mixing ratio (x-axis) by target cluster (color: red = /str/, green = /skr/, blue = /spr/). Participant 2006 (left) exhibits no compensation for retraction. Participant 2023 (middle) exhibits a left-shifted response curve, compensating for retraction in at higher steps. Participant 2014 (right), shows a significant left-tail lag for /spr/ and /skr/ and extreme compensation in /str/ clusters, perceiving /s/ at all steps.