

Exploring the Automaticity of Speech Perception and Adaptation

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Spoken language is one of the most prevalent forms of human communication, yet it is highly variable by nature. Even talkers with similar language backgrounds tend to differ in how they produce speech sounds, potentially blurring the boundaries between one sound category and another both within and across talkers (e.g., the categorization boundary is the S-ʃ, or the “Ss”–“Sh” sound continuum). To overcome the lack of one-to-one mapping of speech sounds to speech categories, the human brain possesses cognitive mechanisms that actively learn how talkers speak and construct expectations about how that talker will produce speech in the future. This process typically occurs unintentionally, without the listener noticing how their perception of speech changes over time.

However, the degree of automaticity in speech perception adaptation remains unclear: While a large body of research has found that perceptual learning is not inhibited by distractions, lack of intention, or exposure to multiple talkers, research has found that listeners do consider contextual factors and causality (e.g., accommodating a talker visibly chewing while talking) when learning how talkers speak. Furthermore, the utility of speech perception adaptation may also pose the possibility of listener’s prioritizing adaptation when there is a need to understand speech, versus passively sponging information from background noise in their environment.

In this experiment, we will limit the available attentional resources for speech perception by exposing a listener to two simulated talkers who produce inversely atypical sounds on the S-ʃ continuum (i.e., one talker produces their /s/ sounds more like “Sh”, and the other talker produces their /ʃ/ sound more like “Ss”). The talkers were created to have distinct voices and will be presented as speaking simultaneously. Participants will be instructed to attend to one of the two talkers and select if that talker is saying a word or a nonword in a virtual forced-choice lexical decision task.

We will then test the effects of directing the listener’s attention to one talker on the listener’s ability to adapt their speech perception to both talkers. We will do this by measuring how they categorize sounds on the S-ʃ continuum when heard in the talkers’ voices. If there are limits to the automaticity of speech perception, then we expect listeners will adapt their perceived categorical boundary to align better with the talker’s speech they were instructed to attend to, compared to their adjustment towards the unattended talker. Additionally, the results of this experiment will provide insight into how our brains allocate attentional resources in the context of speech perception when subjected to higher cognitive loads.