

The biological and cognitive basis of accent based code-switching

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Abstract

Accent-based code switching is changing one's accent as they talk to different social groups. It is more challenging to transcribe words when the listener hears someone speak with a different accent. The regions of the brain involved while processing and speaking with accented speech include the posterior default mode network, and the dorsal attentional network. Not only is the speaker affected, but the listener as well; their learning and attention is affected while hearing accented speech. Some cognitive effects that result from accent-based code switching include a person's attention and learning, which is affected while hearing someone with an accented speech. When hearing accented speech, the brain's speech planning regions and auditory areas interact with each other the most to help find the best match between the speaker's and the listener's phonetic pronunciations/templates. This process allows listeners to be able to easily transcribe the words spoken by a person with the same or similar accent as them with similar phonetic pronunciations. In order to learn to understand the message being conveyed in accented speech by an unfamiliar voice, it is essential to pay attention to not only the words, but also the pitch and tone of the speaker.

Introduction

Accent-based code switching is altering one's accent when speaking to a social group different to their culture (Goyal, 2024). I moved to the United States from India several years ago and felt uncomfortable talking to people with my Indian accent. To resolve this feeling, I altered my accent because I felt the need to "fit in" with my peers. People find the need to change their accents because they want to be understood better and feel comfortable being a part of a crowd with a different accent. We should be more accepting toward people with a different accent as changing one's accent is highly cognitively demanding (Hernandez et al., 2014). A range of different accents also contributes to more global diversity. It is very cognitively demanding for a person to change their accent. This review will explore the biological and cognitive basis of code-switching of the speaker as well as the person listening to accented speech.

Brain activity of the listener

There are multiple cognitive mechanisms that are involved in perceiving speech from a non-native accent. Through an fMRI study conducted by Hernandez and colleagues (2019) on accent perception, it was found that processing non-native accented speech was more cognitively demanding than perceiving speech in one's native language. In the task, participants watched clips from the movie *Alice in Wonderland* either spoken in their native language (Castilian), or dubbed in a non-native accent (Latin American) or in an unfamiliar language (Dutch) as they underwent fMRI.



When participants listened to the movie spoken in a non-native accent, it was observed that there was more engagement of the posterior default mode network (DMN), and less engagement of the dorsal attentional network (DAN) compared to listening to speech in their native accent. Overall, this confirms that processing dialogues in the non-native regional accent was cognitively more demanding than processing dialogues in one's own accent: it required more attentional control at the expense of distraction and greater internalization processes. Additionally, listening to speech in one's native language engaged the brain's reward network. This indicates that people may feel more of a sense of belonging when listening to their native speech compared to speech which is unfamiliar or in a non-native accent. Taken together, this study suggests that there is more cognitive demand when a person is accent based code-switching as compared to when they are talking in their natural accent.

Understanding accented speech

In order to understand what the speaker is trying to convey, it is not enough to simply make sense of the word, but the tone as well. Tzheng and colleagues conducted two experiments to observe how paying attention during exposure to non-native accents affects perceptual learning. In the first experiment, native American-English speakers listened to English sentences spoken by Spanish-accented speakers while performing different tasks such as writing down what they heard and identifying the speaker. The listeners then tried to understand the sentences. In the second experiment, the listeners heard and had to make sense of single words spoken by the Spanish-accented speakers; this was with the absence of indexical cues, i.e., the pitch and tone of their voice. Researchers came to a conclusion that both lexical and indexical cues are crucial to understanding a non-native accent. This suggests that attentional focus plays an important role in understanding someone with accented speech. The listeners had to focus on both, the words as well as the pitch of the Spanish-accented speakers to fully understand the message being conveyed. These findings also indicate that shifts in attentional focus impact how perceptual learning generalizes to unfamiliar voices and utterances.

Conclusion

Increased activities in certain brain areas portray that it is very mentally taxing for a person to speak in a different accent. To understand someone with a different accent, we must pay attention to not only the words, but also the tone of the speaker. The implications of this purpose of the body of research has the potential to help us uncover ways for more acceptance for and patience with people who speak with a different accent as well as give light to the nuanced cognitive processes that occur when people are code-switching which we are not aware about.

References

Hernández et al., *Brain networks involved in accented speech processing* (Spain: Elsevier, 2019),



https://dpl6hyzg28thp.cloudfront.net/media/Hernandez_et_al_2019_BrainLanguage.pdf

Tzheng et al., *Attention modulates perceptual learning of non-native accented speech* (Boston: The Psychonomic Society, 2023),

https://dpl6hyzg28thp.cloudfront.net/media/Tzeng_et_al_2023_AttentionPerceptionPsychophys.pdf