

# Clinical Application of Speech Science in Accent Management

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## Abstract

In our multilingual society, speech-language pathologists often encounter normal speech variations in people who speak English as a second language. These differences result from the influence of their first language(s) on their English, and are distinct from disorders of articulation and phonology. However, many individuals still wish to more closely approximate “American English.” The clinical application of advances in speech science allows assessment of perception and production of speech across individuals. These can aid in describing non-native English accents by providing live feedback.

To bridge theoretical and clinical aspects of speech science, one full-time faculty member and one adjunct faculty member initiated an independent study program with one graduate and one undergraduate student in the School of Communication Disorders and Deafness. The students led an accent management program at a local YMCA branch in Metuchen, New Jersey for six participants. With faculty guidance, advanced speech science software was used to provide biofeedback with traditional approaches to improve participants’ production of English speech sounds. This article discusses pre- and post-accent training outcomes, and the unique experiences of student-peer mentoring in conjunction with student-faculty collaboration.

## Introduction

The American Speech-Language-Hearing Association (ASHA) defines accents as variations of speech execution that may have differences in speech-sound production, prosody, rate, and fluency (n.d.; <https://www.asha.org/Practice-Portal/Professional-Issues/Accent-Modification/>). In our project with the YMCA of Metuchen, we conducted an accent management course for individuals who were characterized as having a national origin accent. Variations in accents are frequently found in individuals who have learned English as a second language, and occur due to the influence of the sound system of the first/native language onto their second language (ASHA, n.d.). While accent modification falls under the scope of practice for speech-language pathologists, we felt it more appropriate to consider our clinical sessions as a course in accent management. Accent modification is viewed as an elective service, and ASHA recommends that speech-language pathologists assist clients in attaining their desired level of competency of Standard American English without jeopardizing their first language (ASHA, 2003).

Traditional approaches address speech sound concerns using minimal-contrast therapy. The approach also known as minimal pairs, highlights the clients' production of phonemes at the word level (Roth & Worthington, 2016). We used minimal pairs with clients to incorporate this component of the traditional approach. In addition, we used an approach that blended traditional and biofeedback models while maintaining client-oriented goals. The combination of approaches aimed to improve both the perception and production of speech sounds in Standard American English in the local dialect. The program was conducted over a ten-week period at the YMCA of Metuchen in New Jersey.

## Methods

### *Participants*

Participants included six adults who have learned English as a second language. The primary languages of these individuals included Spanish (1), Russian (2), Hindi (2), and Cantonese (1). Participants, though comprised of various ethnicities, were similar in their

respective reasons for electing to address their accent. The primary motivator for joining the program was vocational difficulties, with 83% reporting so. The next leading reason was to avoid correction from their children, with 50% reporting so.

*Stimuli*

American English (AE) vowels and consonants were used for training as Participants were trained on AE vowels and consonants in isolation and in words. Training later advanced to phrases and sentences, and finally to connected speech.

*Client-oriented Approach*

When considering adult participants, a client-centered technique often includes functional communication and conversational/group communication (Roth & Worthington, 2016). The commonality of motivators discussed above allowed a client-based approach to be easily implemented. In this project, participants willingly brought lists of functional and vocational target words to each session. These words were practiced using both traditional and biofeedback strategies. Clients also made note of some pragmatic concerns and, to honor their goals, topics such as restaurant manners and small talk were discussed in depth.

*Biofeedback*

Recent evidence suggests that biofeedback approaches can be used in motor skill learning (Byun & Hitchcock, 2012). In a biofeedback approach, clients are instructed to view a model representing the target speech output, to perform the behavior on their own, and to work towards exploring different production strategies to make their output match the original model (Byun & Hitchcock, 2012). Clinicians utilized Praat software (Boersma & Weernick, 2018) to provide biofeedback models. Praat allows recording of speakers and displays the spectrograms and formant analyses. This information was used to provide biofeedback to allow participants to discover their production differences with help from students and faculty mentors. This helped our participants to understand the differences in production on their own, and encouraged them to explore in articulatory play until they were able to achieve close to native-like productions.

## Results

The explanation of speech science concepts, such as the effects of articulatory movements on the appearance and placement of formants, encouraged participants to engage in articulatory exploration. Lingual placement, labial roundedness, and oral cavity size adjustments were modeled and explained using auditory discrimination, identification, and production tasks. The biofeedback model, using Praat software, provided our clients with live feedback on their articulation adjustments and their effects on the auditory output it created. While the accent management course is still in progress, preliminary findings are shown.

### *Vowels*

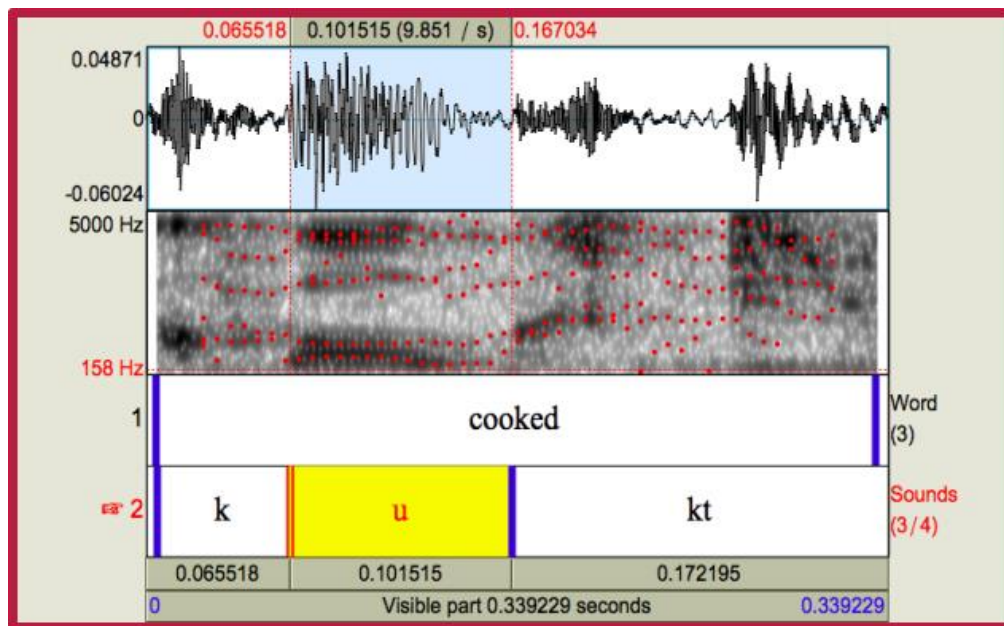
One of the targeted vowels was the production of /ʊ/ (as in “cook”). Participant number-1 had initial production of /u/ (as in “boot”) for /ʊ/ (Fig. 1). The training included awareness of oral cavity size, tongue advancement or backness, and the presence of lip rounding. Specifically regarding vowel /ʊ/, the alteration of lip-roundedness had a noticeable change on the visual representation. The client was able to make adjustments that yielded a new representation of the vowel /ʊ/ (Fig. 2). This production was perceived visually and auditorily as a closer representation of AE.

For production of /i/ and /I/, one of the key differentiation markers is the vowel duration. Participant number-2 used the vowel /i/ production in (Fig 3) to represent both phonemes (/i/ and /I/). Auditory discrimination tasks were used, and after training tongue height and vowel duration, Participant number-2 was able to produce two distinct vowels /i/ and /I/ (Fig. 4).

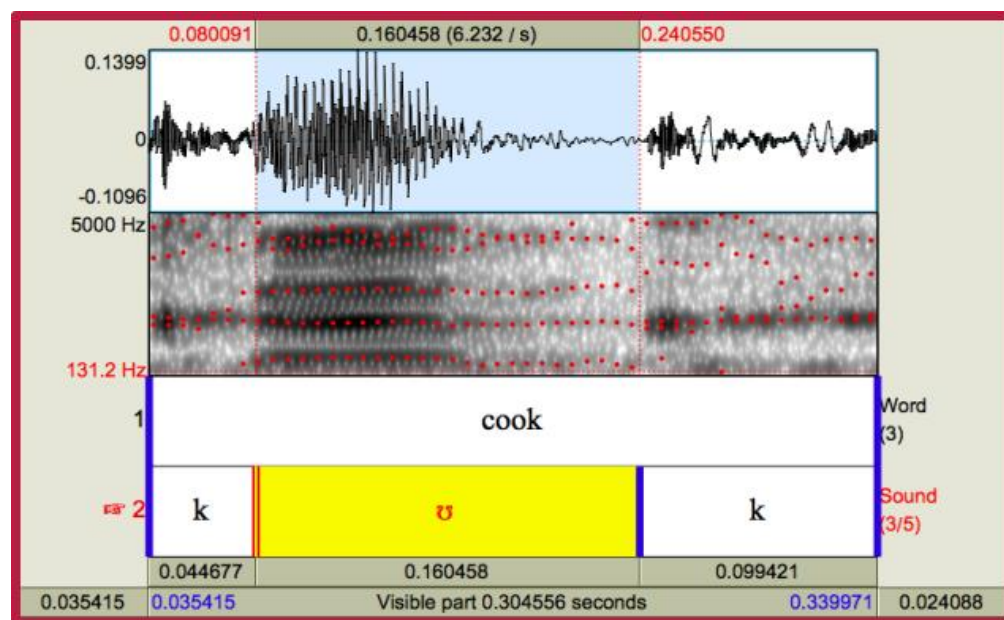
### *Consonants*

A targeted consonant for another participant was consonant /r/. Pre-training, Participant number-3 had a substitution of phoneme /w/ for /r/ (Fig. 5). For consonant /r/ phonetic training and the third formant (F3), training was provided using biofeedback. Auditory discrimination tasks were practiced before production attempts. The client was given phonetic placement cues

to encourage a closer approximation of AE /r/. After training, Participant number-3 was able to produce /r/ without substitution (Fig. 6).



**Figure 1** – Participant number-1 production of /ʊ/ (highlighted portion) in pre-training. Duration is represented in seconds (s) (top and bottom), frequency (left axis) is in hertz (Hz). Word selected and production components (bottom) used in trial for the participant illustrate the auditory process training and awareness of the experiments as described in the text.



**Figure 2** – Same as in Fig. 1 but for post-training.

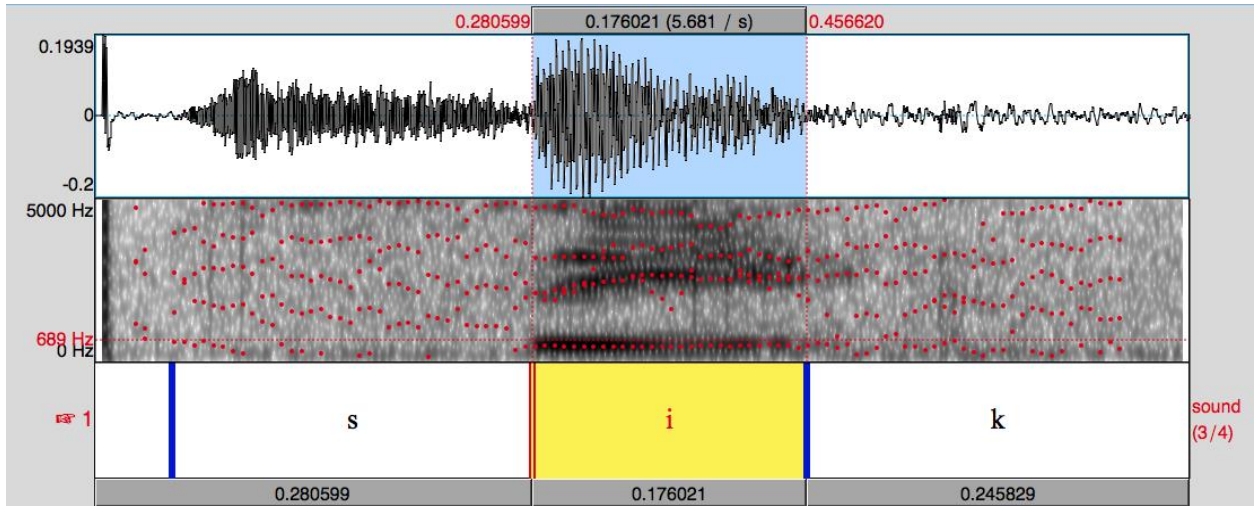


Figure 3 – As in Fig. 1 but for Participant number-2 production of /i/ and /I/ pre-training.

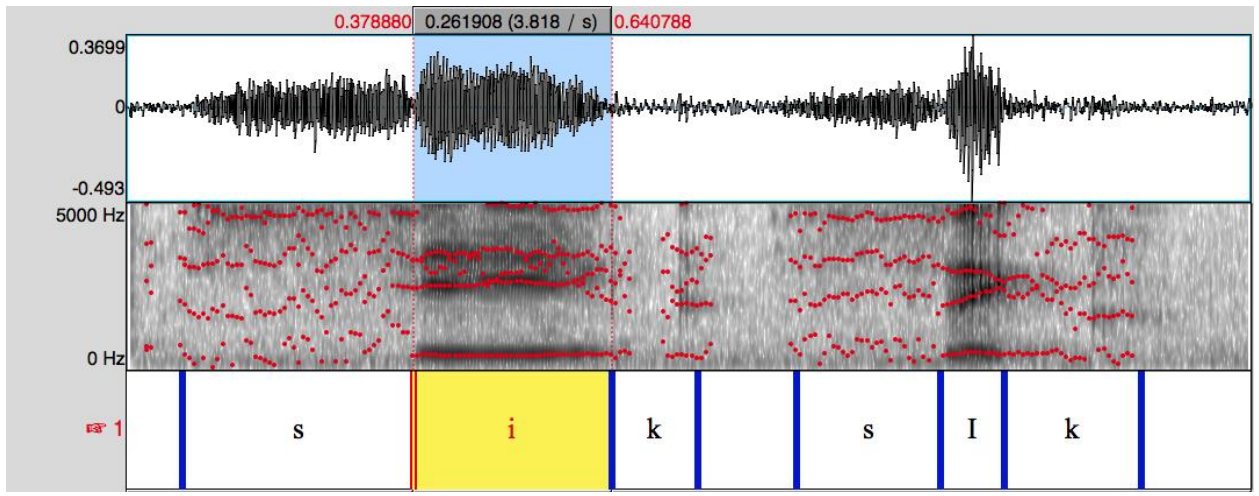


Figure 4 – As in Fig. 3 but for post-training.

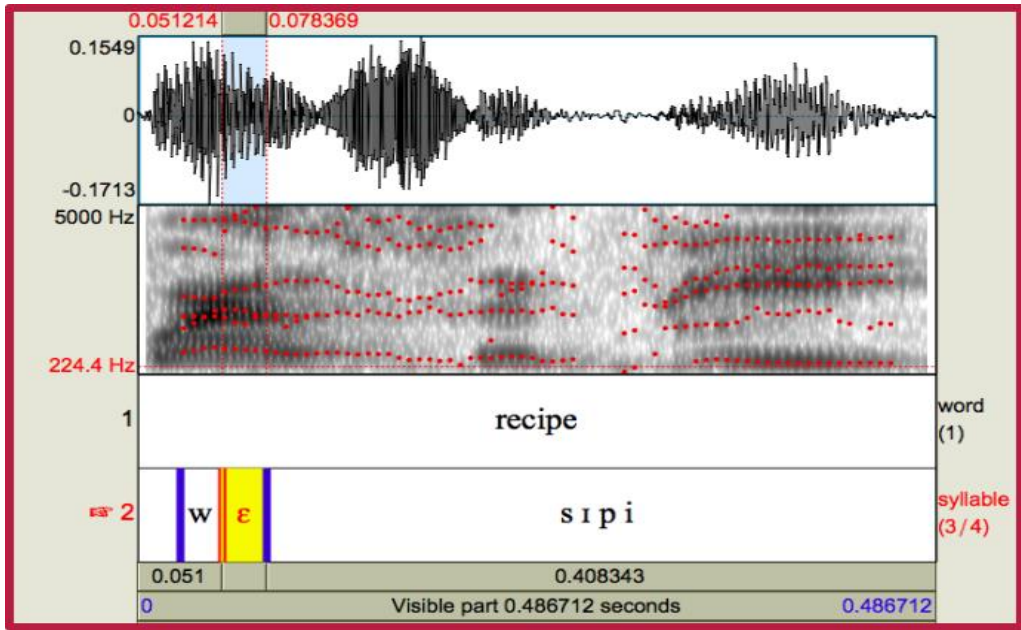


Figure 5 – As in Fig. 1 but for Participant number-3 production of /r/ pre-training.

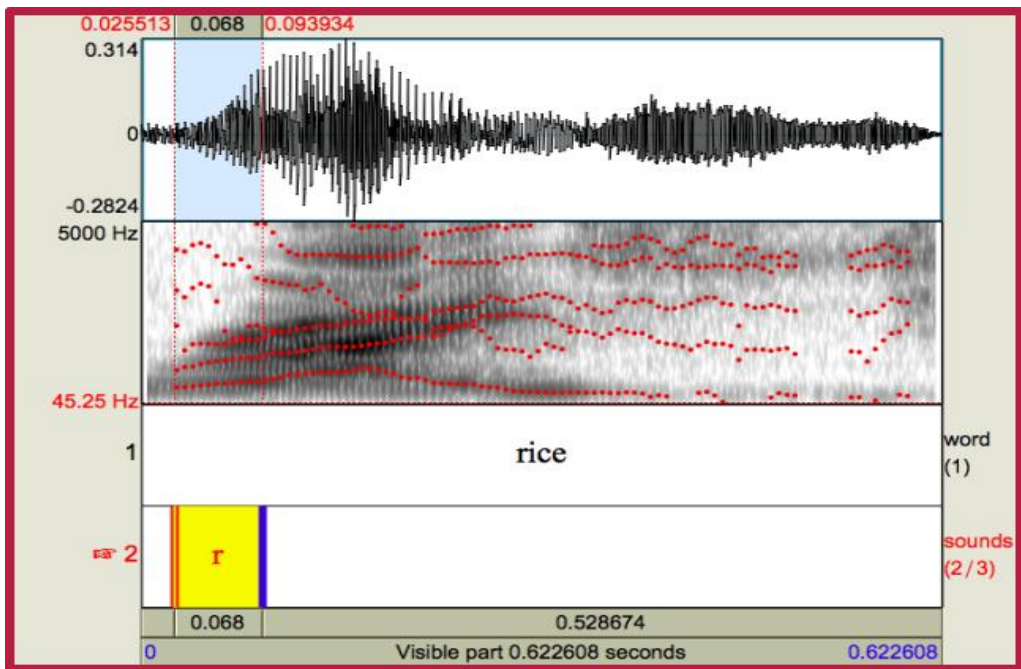


Figure 6 – As in Fig. 5 but for post-training.



### *Student Mentoring*

The team was constructed as a multi-tier approach that varied in levels of education and clinical experience. This design was created to allow for student learning and collaboration from multiple perspectives. The team was comprised of one full-time faculty member, one adjunct faculty member, one graduate student, and one undergraduate student.

### *Undergraduate Perspective*

Clinical experience for an undergraduate senior is limited. Fortunately, the opportunity to participate in a few clinical research studies from several perspectives presented itself. Positions such as student-investigator, research assistant, and pilot participant have previously influenced the growth and development of a future clinician and researcher. Pre-clinical challenges included learning how to interact with clients who had a language difference as opposed to a language disorder.

Consulting with team members and researching various topics ensured undergraduate preparedness for clinical sessions. Findings showed that individuals of varying cultures may have different feelings about receiving clinical services (Roth & Worthington, 2016). Reserving this course as an elective, client-driven service became an undergraduate goal. Strongly encouraging clients to set their own goals and avoiding professional terminology were chosen as appropriate methods to achieve this goal.

### *Post-Clinic Evaluation by the undergraduate student*

After self-evaluation and team feedback, individual growth as an undergraduate clinician and researcher has been observed. Personal characteristics such as patience, professionalism, and empathy were cultivated throughout the ten-week period. Creating and maintaining a professional relationship with clients while providing support, understanding, and unconditional positive regard was achieved. As an undergraduate student, designing long sessions and group sessions was a weekly challenge that has seen improvement.

## Discussion

The results after part one of the clinical project provide evidence that suggests integrated approaches can be used effectively when addressing accent management. Clinicians can combine various approaches within sessions to achieve the same goals.

The importance of including graduate student clinicians and undergraduate students in clinical application of theoretical concepts allows for greater understanding of the material. It also presents the unique opportunity for undergraduate students to enhance clinical skills, and apply the skills to research.

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