

THE USE OF COMPUTER TRAINING TO IMPROVE SPANISH PHONETIC
TRANSCRIPTION AND DIALECTAL KNOWLEDGE

By

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Introduction

In speech-language pathology, it is important to differentiate between a dialectal variation or difference and a speech-sound disorder (SSD) when working with Spanish-speaking clients. Mistaking dialectal variations for SSD can lead to incorrect diagnosis and inappropriate treatment. However, there is limited training in speech-language pathology training programs. The purpose of this preliminary study is to examine the functional relationship between a computer bilingual phonetic transcription training (the independent variable) for students in speech-language pathology and the transcription and knowledge in Spanish dialectal variations (the dependent variable). One student from a bilingual emphasis speech-language pathology master's program was recruited. A research-created computer training was created using teach-model-coach-review to teach the transcriptions in diverse Spanish dialects. Before, during, and after each training, the participant transcribed listened words and indicated the type of dialectal characteristic. Single-case design methodology was used to know the functional relationship between the independent and dependent variable. A visual analysis of the data (complemented with Tau-U analysis) suggest a positive trend and a functional relation between the training program and the knowledge of dialectal variation. Improvement in IPA (International Phonetic Alphabet) transcription was also observed in the following sounds symbol; /t̪/, /j/, d̪ʒ/, /ʎ/, and /j̃/.

Keywords:

speech sounds disorders, bilingual assessment and intervention, transcription accuracy

Literature Review

The most used language in the United States of America, after English, is Spanish (Deshmukh, 2021). According to data projections (Federal Reserve Bank of Dallas, 2021) the bilingual population keeps growing, therefore the need for bilingual services keeps rising. There are around 140,000 Speech-Language Pathologists (SLP) in the United States (U.S Bureau of Labor Statistics, 2021). However, out of those 140,000 SLPs, only 8% consider themselves multilingual, meaning they speak two or more languages (Glass, 2022). Since the number of bilingual professionals is very limited, the training in Spanish dialectal differences is also limited in many training programs across the United States. Unfortunately, only 17% of the Communication Sciences and Disorders (CSD) training programs for Speech-Language Pathology in the United States offer bilingual training (ASHA, 2023). The lack of knowledge and professionals creates a problem at the moment of assessing bilingual (Spanish and English) or monolingual Spanish speaking children. In addition to limited programs that provide Spanish and English training, there is a lack of accurate evidence-based tools that provide bilingual clinicians with reliable information to correctly identify children with SSD (Rivera Campos, 2022). It is extremely important that bilingual clients have as high of a chance of having access to efficient therapy that is accurate for their needs as monolingual individuals, and more specifically that the overdiagnosis of bilingual clients stops occurring (Chondrogianni, 2016).

The role of speech-language pathologists (SLPs) to ameliorate misdiagnosis in speech sound disorders (SSD) is extremely important. It is one of the basic skills that an SLP should master because an individual who does not have a SSD, should not be in therapy. It is appropriate for an individual to speak a variation of the mainstream Spanish dialect. SLPs are

responsible to distinguish between a dialectal variation or a speech disorder to determine if the child possesses a speech sound disorder or if it corresponds to a linguistic dialectal variation (Furlong et al., 2021).

Dual Language Learners and Spanish Speaking Children

In a research conducted at the The University of Edinburgh it was concluded that “Bilingual children with typical development can be overdiagnosed as having language impairment when tested in their less dominant or weaker language” (Chondrogianni, 2016). Testing a child’s speech in their dominant language is pivotal for accurate results, but sometimes it is challenging for SLPs to assess a child in a language that they don’t know, therefore they decide to evaluate in English which could negatively affect the assessment results. It is imperative that a child be tested in a language that they know and are comfortable with for best results of their speech evaluation. That is the reason that this research is of such high importance, so that SLPs feel confident to assess a bilingual child and most importantly, that the child receives the intervention they need to meet their communication goals

Accurate Transcription

An SLP must accurately evaluate and assess children with the purpose of identifying if and which language impairments are present. The SLP training programs prepare individuals to identify speech-sound disorders in children. SLPs rely on phonetic transcription (sounds that represent a symbol) to accurately compare those sounds to the adult speech. In order to identify an impairment or disorder, an SLP must accurately transcribe the child’s speech production. When the SLP incorrectly transcribes the child’s production, then it could lead to children being misdiagnosed with a speech sound disorder.

If a child is being tested for language and speech skills in their nondominant language, their results will not be as accurate as they would normally be in their dominant language (Chondrogianni, 2016). Also, if a bilingual child's speech is not being represented in the norm-referenced test results, then the child's scores should not be compared to that norm-referenced test for the participants that were chosen as "typically developing." According to a research conducted by Chondrogianni where bilingual children were assessed in their second language, the "tasks failed to correctly identify bilingual children with language impairments." (Chondrogianni, 2016). Bilingual SLPs evaluating a bilingual client should be proficient in phonetic transcription in both languages to accurately assess a child's speech sound production in Spanish. Accurate phonetic transcription in Spanish is important because Spanish has specific speech sounds that do not exist in English.

Transcription

Although narrow transcription is essential in clinical practice, broad transcription is more commonly used in clinics and taught in educational settings (Ball & Rahilly, 2002). Training is needed to acquire the necessary competencies to accurately distinguish between a difference and a disorder and deliver services to linguistically diverse clients effectively (Kritikos, 2003). When assessing speech in a bilingual client it's imperative that broad transcription is used instead of narrow transcription. Dialects include various characteristics that would appear in narrow transcription, but it's important that these mark differences, not disorders. Therefore, it is better to focus on actual phonemes and not diacritics when dealing with differences so that these dialectal characteristics do not negatively affect the client's result and mark them as a speech disorder.

Dialectal Differences

The only way to ameliorate the misdiagnoses occurring in bilingual children is for SLPs to be knowledgeable about the differences between a dialectal difference (e.g., dialectal variation) and a disorder within dialects. A speech sound disorder by the American Speech-Language Hearing Association's (ASHA) definition is an "any difficulty or combination of difficulties with perception, motor production, or phonological representation of speech sounds and speech segments-including phonotactic rules governing permissible speech sound sequences in a language." On the other hand, a "Communication difference/dialect is a variation of a symbol system used by a group of individuals that reflects and is determined by shared regional, social, or cultural/ethnic factors (ASHA, 1993). These two are very different and should be treated as such. A difference does not have to be treated unless the client specifically wants to change something about their dialect, but phonetically there is nothing that must be assessed for intervention. A disorder on the other hand, is recommended to be assessed and evaluated to determine which and if an intervention is recommended.

According to Jakielski & Gildersleeve-Neumann, dialects are broken down, there are regional dialects and social dialects which keep evolving. There is no dialect superior to another or more important, usually the language with the most power, with the most prestige is the one deemed as correct, but this does not mean that it's the only correct one. All dialects are accepted and correct for the person communicating with them (Jakielski & Gildersleeve-Neumann, 2018).

Distinguishing between dialectal variations and speech-sound disorders is essential for SLPs who work with Spanish-speaking clients. The lack of resources and bilingual SLPs may lead to failure in accurately differentiating between a dialectal difference (e.g., dialectal variation) and a disorder within dialects. Failing to differentiate between the two can lead to inappropriate

diagnosis and treatment, which can have negative consequences for Spanish speaking or bilingual children. Unfortunately, many SLP programs do not provide sufficient training in this area, which can impact the quality of care that Spanish-speaking clients receive (Peña et al., 2014). Therefore, it is important that SLPs take steps to develop their expertise in distinguishing between dialectal variations and speech-sound disorders, including seeking additional training and resources.

Computer Training

The concept of using teach model coach review has been proven to be effective in various research projects for bilingual adults in their learning process. The four-step process has been effective for bilingual parents in learning about strategies and vocabulary to help their children, as well as many other projects. It is a thorough way of teaching and confirming that the material being taught is maintained for best permanent results (Rivera Perez et al., 2022) (Roberts et al., 2019). First, the material is taught in a simple way so that the participant can comprehend it without any difficulty. Then, the material is shown with examples, also known as modeling the material. After the material has been modeled, the participant has an opportunity to implement the material being taught in certain scenarios so that they can practice using it and are given the correct answers to the examples provided. Lastly, the material is reviewed and hyperlinks are added to the training so that the participant can review individual concepts as they feel necessary.

First, the participant will transcribe a variety of dialects in Spanish using the International Phonetic Alphabet (IPA) to the best of their ability and knowledge before receiving any type of specialized training. Clinicians will then introduce the participant to the teach, model, coach, review method to conduct this study. Clinicians will prepare a well-developed training to

provide the tools needed to accurately transcribe different dialects in Spanish and teach it to the participant in the study. Then, the participant will transcribe a different set of words in the same dialects now applying the new skills and knowledge learned from the specialized training. Once having both transcriptions from the participant, clinicians will compare both of these. Results will indicate the difference of accuracy of transcriptions pre training and post training.

Many SLPs transcribe in the dialect that they know and speak and are not knowledgeable about different phonemes that are present in other dialects. In order to help bridge that gap, to better prepare SLP to treat historically marginalized groups, we will be answering the following questions:

Research Question 1: Is there a functional relationship between the Spanish dialectal training and the knowledge of dialectal variations and the IPA transcriptions?

Research Question 2: Does the participant maintain the knowledge and the use of IPA transcriptions of dialectal variations post intervention?

Methodology

Participants

One participant was selected to participate in this preliminary investigation. The participant signed the Institutional Review Board consent for this research. The participant was a female bilingual (Spanish and English) student who is a part of the Emphasis in Bilingual Speech-Language Pathology master's program at Texas Christian University. The participant has taken Spanish dialectal courses about cultures and Spanish transcriptions but not specifically on dialectal characteristics.

To begin the research, the participant was asked to transcribe in International Phonetic Alphabet (IPA) three different sets of 10 words in each set. Each word was voice recorded and could be accessed by the participant three times. In some words, the participant felt confident with her transcription by listening to the word twice, with others the participant decided to hear the recording three times. This data is considered to be the baseline. There was no previous training or specific instructions other than to transcribe what was being heard from the audio. An audio recording was purposely used so that the production of phonemes did not vary. This led to the participant hearing the exact same production each time they needed it to transcribe the words, with a maximum of three opportunities.

Once the baselines were complete, the participant took a computer assisted training. The training was separated into two modules, this made it easier for the participant's comprehension and more effective so that the participant could truly learn about each characteristic that was being taught.

The first module explained five specific characteristics, (1) Aspiración de la /s/, (2) Omisión de la /s/, (3) Lateralización, (4) Rotacismo, and (5) Sustitución de un sonido por la /X/.

The second module explained the last six characteristics that would be taught in this training, which were the following: (1) Velarización de la /n/, (2) /tʃ/, (3) /ʃ/, (4) d̃, (5) /ʎ/, and (6) /j/.

Each module followed a teach-model-coach-review template. Therefore, each characteristic was first taught and explained, mentioning in which dialects this characteristic is most commonly used as well as the name that it is known for. Then, the characteristic would be modeled, there would be an audio recording and an example of a word transcribed using the specific phoneme. After the model, the participant had the opportunity to transcribe words being

played from an audio recording. Once they were done transcribing the words for each characteristic, then they would be provided with the answers and common incorrect transcriptions. They were also provided with hyperlinks to the teaching part of the module where they could go back and learn about it and practice using the characteristic more before completing the training.

The first training was taught during the third session, therefore there were only two baselines for the characteristics taught in the first module. The data that was collected after training 1: part a and b was considered to be “post-training data” for those first five characteristics, but baseline for the other characteristics that were not taught until the second module. Consequently, the second module’s characteristics have more baselines (3 regular baselines, 2 post-training module 1 baseline) which makes it five baselines in total.

The words that were audio recorded were mixed every session so that the participant did not memorize or recall from previous sessions the characteristics by order.

A single case design approach was used to measure a functional relation between the independent and dependent variables (Horner & Baer, 1978). This approach allows to outline the participant’s results when transcribing words and the knowledge that the training conveyed about dialectal characteristics, as well as how it impacted the participant’s results from baseline until maintenance.

Results

Visual Analysis

Visual analysis involves examining the trend, level, variability, and consistency of data in order to detect any patterns (Kratochwill et al., 2010). In this study, the data was presented using

line graphs, with separate graphs for each participant and module, to determine whether any improvements could be attributed to the skills taught in the modules. Visual analysis of the data indicated a functional relation between the training program and the learning of dialectal variations for module 1 (See Figure 1) and module 2 (See Figure 2) and moderate effect for Module 2 (See Figure 4) and a variable trend for Module 1 (See Figure 3).

To determine the effect size between two variables, the researchers utilized a non-parametric statistical measure called Tau-U. This was followed by a non-parametric statistical analysis which employed the Tau-U effect size to provide further evidence. Raw data was entered to an online calculator to obtain Tau-U effect size (Parker et al., 2011). For interpretation, a small value is considered $> .20$, moderate $.20-.60$, large $0.60-0.80$, and very large $> .80$ effects (Vannest & Ninci, 2015). Tau-U yields the following results, which are significant at $p < .05$. For dialectal variation for module 1 and module 2 (effect size estimate 0.1) demonstrated a very large size effect. For module 3 (effect size 0.33) and module 4 (effect size 0.65) demonstrated a moderate effect.

Discussion

The purpose of this research was to provide bilingual SLPs with accurate information on Spanish dialects and the accurate transcription phonemes for these dialects to lower the percentage of bilingual individuals being misdiagnosed. As mentioned before, it is known that bilingual children have been misdiagnosed over time by SLPs because it is challenging to distinguish a difference vs disorder when an individual doesn't know which type of characteristics are produced in certain dialects (Toth, 2017). The results that were acquired support the idea that even if transcriptions are correct, that doesn't mean that the characteristic is known and understood as a difference. The most important factor of this research study is to

comprehend that there are different productions of phonemes in dialects depending on where they are used and these are acceptable. An SLP knowing about these dialects and the specific characteristics that should be accepted is imperative.

Even if the SLP transcribes the word correctly, they could count it as a disorder if they don't know about the dialectal characteristic. For example, in the word "amor" if a client says "amol" and the clinician transcribes it correctly but counts it as an incorrect /r/ production, then this would negatively impact the client's results. When in reality, the client's family might say "amor" as "amol" in their household because that is how it is spoken in their dialect at home, which is a dialectal characteristic called lateralización. Similar to the situation mentioned previously, there could be hundreds of examples that could occur with real clients if an SLP is not knowledgeable about the client's dialect and its unique characteristics. "As always in the field of speech--language pathology, individual differences must be carefully identified and taken into account" (Velleman & Pearson, 2010).

This research is not demanding that every bilingual SLP master Spanish dialectal transcriptions in order to diagnose accurately, rather it would be allowing bilingual SLPs to have the resources to do so in an appropriate and accurate manner for the benefit of the clients being assessed.

Clinical Relevance

This research was very clinically relevant because it promotes dialectal characteristic knowledge. It is important for an SLP not to only transcribe exactly what they hear, but most importantly to be knowledgeable about the dialect that their client speaks to know if the differences are dialectal or because there might be a disorder present. That is why there were two

different questions: first if the participant knew all the phonemes present in the study and second, if they knew the dialectal characteristics. After the data was analyzed it was concluded that the participant may know how to transcribe some of the phonemes produced in the first module before training, but not the characteristic for each one. For module 2, it was concluded that the phonemes presented were new to the participant, as well as the characteristics.

Therefore, this research results concluded that the computer training aided the participant to be knowledgeable about new phonemes, as well as the dialectal characteristics that could occur with each one of the phonemes taught. This information would lead to knowing if those characteristics are present, depending on the client's dialect if it's a difference or if they should be recommended for further evaluation to assess for a disorder.

Limitation and Future Research

The research that was conducted had various limitations. Although single-case design usually involve a small number of participants, it can still be a rigorous and effective research methodology when appropriately applied. Having only one participant in the study may reduce the generalizability of the findings to other individuals or populations. The second limitation that was faced was the amount of time available to conduct the research. This project lasted seven months which limited findings and time to research more in depth, therefore it was decided that this would be considered a preliminary study.

For future research, the plan would be to conduct the continuation of this preliminary study more in depth to acquire more specific results. First, the training would be polished and more dialects would be added to make the training more advanced and specific. Then, the goal would be to have more participants, at least five or six in the research to be able to compare their

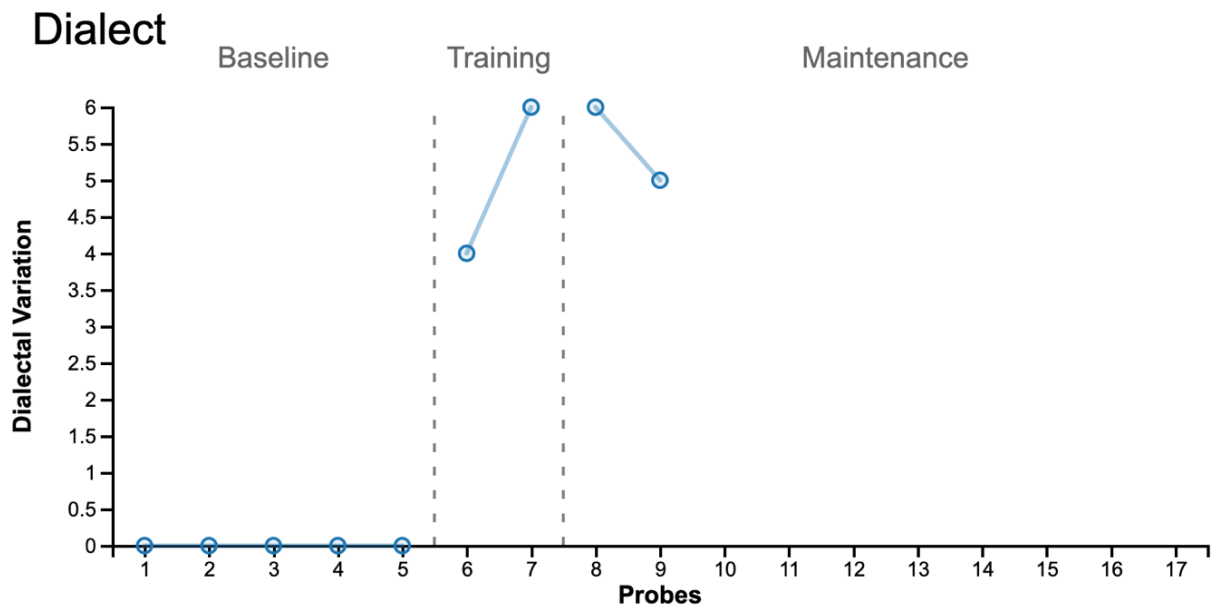
results. Lastly, the audio recordings would be transcribed by two other professionals to have the most accurate transcription of the words and compare the results to have the best answers which would lead to the most effective results of the study.

Conclusion

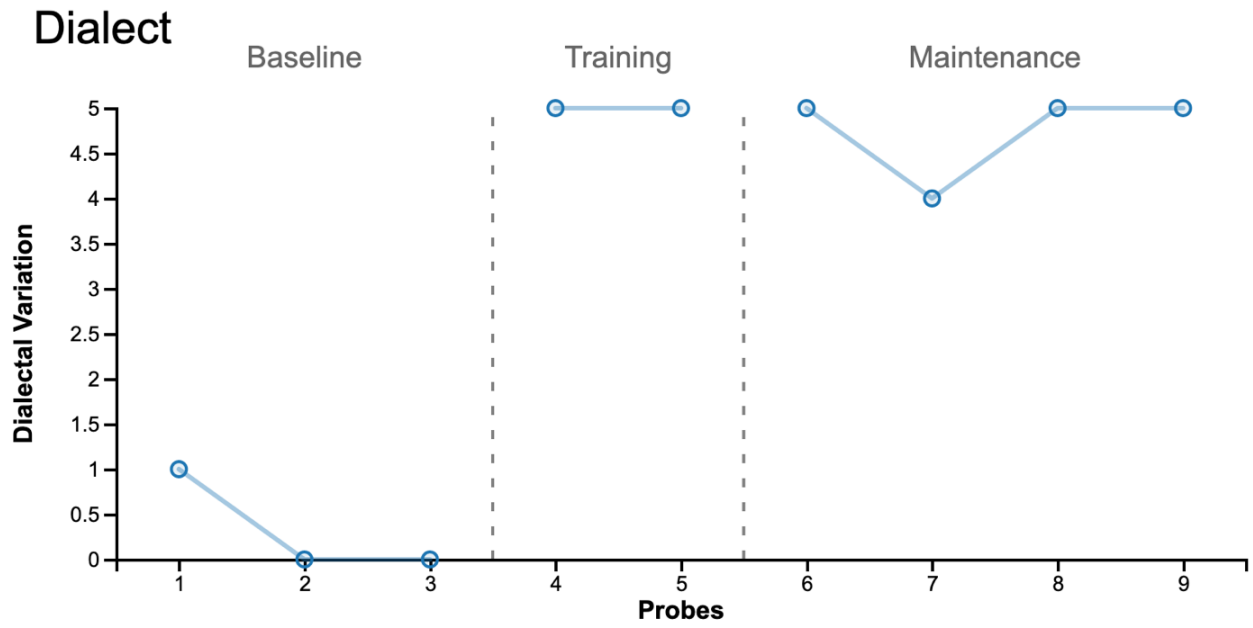
In conclusion, this research is pivotal for the understanding of Spanish dialectal characteristics. The research has proven that the computer training has aided in not only the knowledge in dialectal characteristics, but also in certain phonemes that are not usually heard and transcribed. The more an SLP is knowledgeable about Spanish dialects and the accurate way to transcribing, hopefully the less misdiagnosis that will occur in bilingual children. This research project demonstrates a way to help SLPs learn about their client's dialects which will better their opportunities to assess and evaluate effectively. It is hoped that in the future, this research aids by lowering the percentage of misdiagnosis in bilingual children when assessed for speech sound disorders in their native language which would lead to clients getting appropriate intervention for their disorders or no intervention at all if not needed, giving the opportunity to other clients who would truly benefit from intervention to be provided with it.

Figures

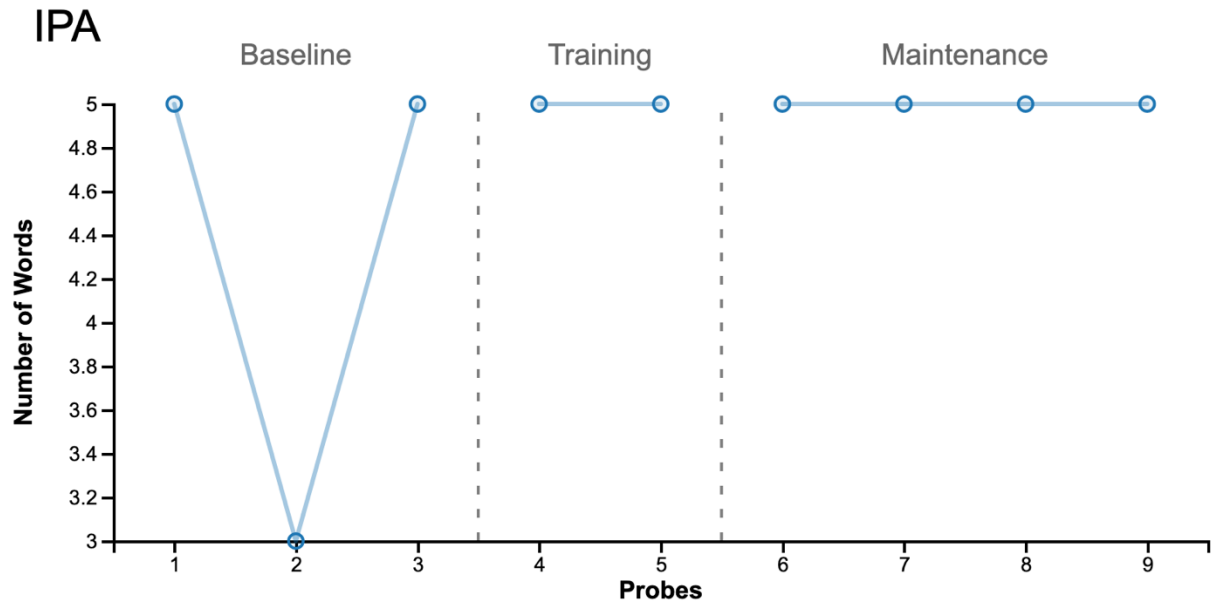
Module 1: Dialectal Variations



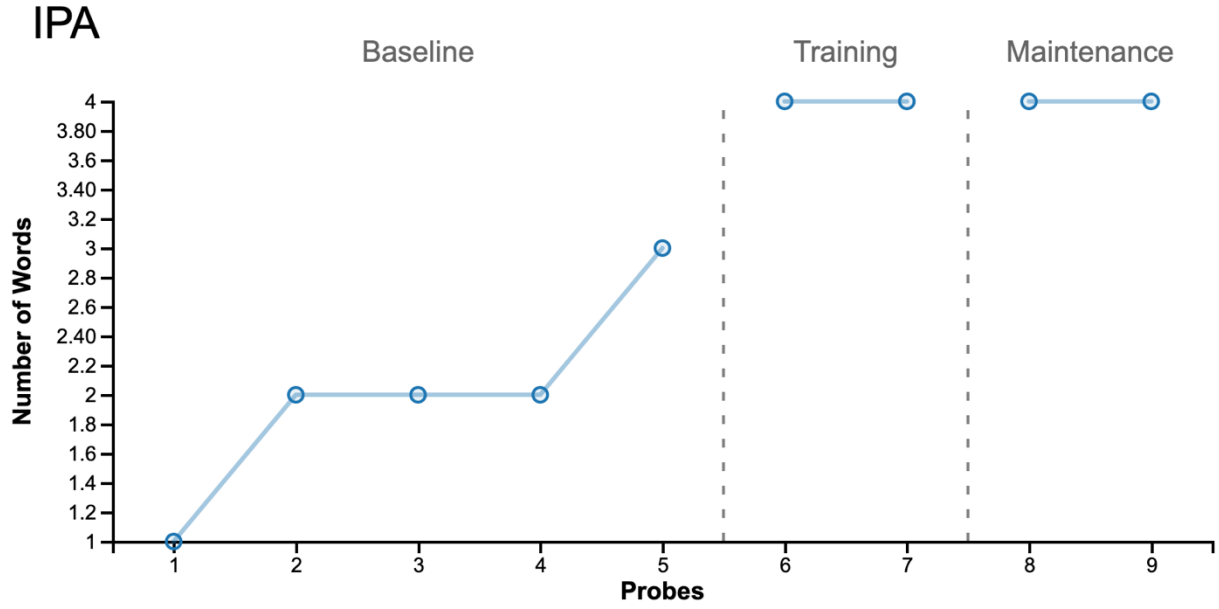
Module 2: Dialectal Variations



Module 1: IPA Transcriptions



Module 2: IPA Transcriptions



References

- Ameal-Guerra, A., Kempff, J., & Schwegler, A. (2018). Fonética y Fonología Españolas: *El español peninsular*, 19, 367-378.
- Ameal-Guerra, A., Kempff, J., & Schwegler, A. (2018). Fonética y Fonología Españolas: *El español americano: variación dialectal y sociolingüística*, 20, 379-403.
- Ameal-Guerra, A., Kempff, J., & Schwegler, A. (2018). Fonética y Fonología Españolas: *El español en Estados Unidos*, 21, 405-425.
- American Speech-Language-Hearing Association (n.d.) *Speech Sound Disorders: Articulation and Phonology*. (Practice Portal). Retrieved March, 28, 2023, from www.asha.org/Practice-Portal/Clinical-Topics/Articulation-and-Phonology/.
- Asha EdFind - find graduate programs in speech-language pathology and Audiology. (n.d.). Retrieved October 28, 2022, from [https://find.asha.org/ed/#sort=relevancy&f:@emphasis=\[Bilingual\]](https://find.asha.org/ed/#sort=relevancy&f:@emphasis=[Bilingual])
- Ball, M. (2002, July). *Transcribing disordered speech: The segmental and prosodic layers*. Retrieved March 29, 2023, from https://www.researchgate.net/profile/Martin-Ball-2/publication/11201541_Transcribing_disordered_speech_The_segmental_and_prosodic_layers/links/55ae63de08ae98e661a6e4da/Transcribing-disordered-speech-The-segmental-and-prosodic-layers.pdf
- Campos, A. R., & Ristau, J. (2022). Effectiveness of an Ultrasound Visual Biofeedback Training for Tongue Shape Assessment During Speech Sound Production. *Language, Speech, and Hearing Services in Schools*, 53(3), 825-836.
- Chondrogianni, V. (2016). Identifying language impairment in bilingual children: issues of (mis)diagnosis Vicky Chondrogianni. <https://www.bilingualism-matters.ppls.ed.ac.uk/wp-content/uploads/2018/06/BILINGUALISM-AND-SLI-briefing-ONLINE.pdf>
- Definitions of communication disorders and variations. (1993). *American Speech-Language-Hearing Association Making Effective Communication, a Human Right, Accessible and Achievable for All*. <https://doi.org/10.1044/policy.rp1993-00208>
- Deshmukh, A. (2021). *Besides English and Spanish, which language do you think is the most commonly spoken in the U.S.?* World Economic Forum. (n.d.). Retrieved October 28, 2022, from <https://www.weforum.org/agenda/2021/12/spoken-language-united-states-america-english-spanish-mandarin/>
- Furlong, L. M., Morris, M. E., Serry, T. A., & Erickson, S. (2021, April). *Treating Childhood Speech Sound Disorders: Current Approaches to Management by Australian Speech-Language Pathologists*. ASHA WIRE. Retrieved March 23, 2023, from https://pubs.asha.org/doi/10.1044/2020_LSHSS-20-00092

Glass, K. (2022, July 18). *SLP and bilingual clients: Pioneering a new approach: USAHS*. University of St. Augustine for Health Sciences. Retrieved March 23, 2023, from <https://www.usa.edu/blog/slp-and-bilingual-clients-pioneering-a-new-approach/>

Jakielski, K. J., & Gildersleeve-Neumann, C. E. (2018). Beyond General American English: Speech Possibilities within and Across Languages. In *Phonetic Science for Clinical Practice* (pp. 264–265). Plural Publishing.

Se Habla Español: U.S.. yet to realize many benefits of a growing bilingual population. Federal Reserve Bank of Dallas. (n.d.). Retrieved October 29, 2022, from <https://www.dallasfed.org/research/economics/2021/0713>

U.S. Bureau of Labor Statistics. (2022, March 31). *29-1127 speech-language pathologists*. U.S. Bureau of Labor Statistics. Retrieved October 29, 2022, from <https://www.bls.gov/oes/current/oes291127.htm>

Rivera Pérez, J. F., Regalado, A., & Lund, E. (2022). Effects of a computer training to teach Spanish book-sharing strategies to mothers of emergent bilinguals at risk of developmental language disorders: A single-case design study. *American Journal of Speech-Language Pathology*, 31(4), 1771–1786. https://doi.org/10.1044/2022_ajslp-21-00157

Roberts, M. Y., Kaiser, A. P., Wolfe, C. E., Bryant, J. D., & Spidalieri, A. M. (2014). Effects of the teach-model-coach-review instructional approach on caregiver use of language support strategies and children's expressive language skills. *Journal of Speech, Language, and Hearing Research*, 57(5), 1851–1869. https://doi.org/10.1044/2014_jslhr-l-13-0113

Toth, H. (2017, August 9). *Disorder or difference? speech-language pathology team at NAU works with English language learners to diagnose speech disorders*. The_NAU_Review. Retrieved March 30, 2023, from <https://news.nau.edu/bilingual-speech-team/>

Velleman, S. L., & Pearson, B. Z. (2010, July). *Differentiating speech sound disorders from phonological dialect differences: Implications for assessment and Intervention*. Topics in language disorders. Retrieved March 30, 2023, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2964673/>