

Assessing Accented Speech with a Data-Based Assessment Framework: The Key to Evidence-based Accent-Management

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ABSTRACT

Background: Foreign-accent Management continues to be a rapidly growing area. However, due to the vast variability and lack of professional regulation in this area of practice, Speech-language Pathologists and English-as-Second-Language teachers grapple with the basics of assessment, setting goals, planning therapy, and identifying successful outcomes for accent Management. **Purpose:** The purpose of this paper is to introduce practitioners/teachers to a framework of assessment of accent-related communication concerns. The CAAL assessment framework provides major areas to include in assessment of accented speech, along with methods to assess with key examples. Using a proven assessment framework helps identify the key speech and language issues that interfere with communication, thereby setting a useful baseline for effective intervention, numerically tracking progress along the way, and conducting a systematic post-intervention outcome assessment. **Methodology:** Twenty-two areas of communication are identified and described in detail as key areas to identify accent-related concerns. Pre- and post-therapy assessment data, intelligibility judgments by independent raters, and the clients' judgments are used to quantitatively diagnose, set goals in therapy, and measure eventual therapy outcomes. **Conclusions:** Use of a data-driven, objective assessment method helps clinicians to be evidence-based, systematic, and consistent in helping individuals with accented speech. As a result, clients' goals of clear communication can be met rapidly and efficiently.

INTRODUCTION

The US has become significantly diverse in the last two decades. Census 2020 shows that the White alone population decreased by 8.6% since 2010. Concurrently, the Multiracial population has also changed considerably. There were 9 million multiracial people in 2010 and that population is now 33.8 million people in 2020, a 276% increase (Jones et al., 2021). In fact, Jensen et al., 2021 report, "The Chance That Two People Chosen at Random Are of Different Race or Ethnicity Groups Has Increased Since 2010" With such a large proportion of nonnative speakers in the population, speech-language pathologists (SLPs) and English-as-Second Language (ESL) teachers widely receive referrals to provide assistance with nonnative issues of speakers' reduced intelligibility due to foreign accents. The American Speech-Language-Hearing Association (ASHA), the professional licensing and credentialing organization for Speech-Language Pathologists formally recognized the need for addressing clients' communication problems related to dialects and accents in two position papers (ASHA 1983, 1985a). ASHA (2007) stated that the scope of practice includes "individuals with differences in dialect," and "Providing services to modify or enhance communication performance, e.g., accent Management" (p. 8). Consequently, an important outcome has been the changing face of clinical

practice that now increasingly reflects this diversity in the SLP caseload. Furthermore, outsourcing of jobs to foreign countries has created a need for foreign employees to adopt the speech patterns and accents of American clients. Accent-Management services are increasingly being sought out, both by clients and employers, often referred to as “talent assessment” in this niche sector. As the typical caseload for practitioners and teachers increasingly includes individuals from other countries, it becomes necessary for the practitioners/teachers to gain specific accent-related knowledge to identify communication difficulties and understand how to manage them.

Considering the speech-language pathology growing scope of practice, it is important not only to introduce knowledge in the area of accent Management to existing clinicians and teachers, but to also prepare new cohorts of future professionals. Roseberry-McKibbin, Brice, & O’Hanlon (2005) emphasized the need for school-based SLPs’ preparation to include coursework and practicum experience with multicultural clients. Schmidt & Sullivan (2003), in a survey, suggested that universities are providing needed coursework and clinical experience with nonnative English speakers. However, overall graduate preparation is restricted because of limited information, resources, research, and knowledge in the area of accent- and dialect-related communication. Similarly, there is also a dearth of published literature in SLP journals on research and evidence-based clinical practice in the area of accented speech. Examples of few published articles in this area of practice confirm an overall lack of research and clinical knowledge (e.g., Gu & Shah, 2019; Burda-Reiss, 2006; Galletta, 2006; Ferrier, Reid, & Chenausky, 1999; Schmidt & Meyers, 1995; Sikorski, 2005).

Shah (2005) in a nationwide survey interviewed clinical supervisors and directors from 237 accredited graduate communication sciences and disorders programs regarding available resources and specific clinical methods used for clients needing accent and dialect Management. Results identified a number of common problems throughout the nation: (a) an inadequate preparation of students in graduate programs; (b) limited coursework focusing on cross-language issues; and (c) a lack of evidence-based accent Management clinical practices. The survey also indicated the absence of normative assessment tools or test batteries. As a result, clinicians are forced to combine subtests from diverse tests, find and use lesser-known or obscure tools, and devise their own training procedures. Such a clinical approach is based on intuition and subjective impressions. A recent systematic review (Gu & Shah, 2019) confirmed the paucity remains even 15 years later. Of the 964 studies found of accent interventions in healthcare settings, only one program used the CAAI test mentioned in this paper later, the rest of the programs failed to use any benchmark, baseline, or standardized assessments thus recognizing the need for a reliable test as well as need for programs to conduct systematic assessments of baselines and outcomes to ensure that accent management is objective and effective.

Limitations of Existing Assessment Protocols

A detailed listing and comparison of the available assessment measures for accent-related concerns are beyond the scope of this paper; a short overview is provided here, and the reader is referred to Stoyhoff & Chapelle (2005) and Shah (2009) for additional information. Shah (2005) identified that the available foreign accent tests target areas including pronunciation (segmental and prosodic abilities), spoken grammar, spoken vocabulary, and sociolinguistic application of speech. These tests include: (a) the *Compton Speech and Language Screening*

Evaluation (Compton, 1999); (b) the *Phonological Assessment of Foreign Accent* (Compton, 2002); and, (c) the *Proficiency in Oral English Communication* (Sikorski, 2002). Clinicians also use a scattered variety of other screening tools to diagnose foreign accent and dialects, as shown in Table 1.

Table 1: Assorted Sub-tests used by clinicians to assess accent-related communication issues as reported by survey participants in Shah (2005).

Accent-related Communication Issue	Sub-test Used to Assess this Area
Articulation errors	<i>Goldman Fristoe Test of Articulation</i> (Goldman & Fristoe, 2000)
	<i>Fisher-Logemann Test of Articulation Competence</i> (Fisher & Logemann, 1971)
	<i>Photo Articulation Test</i> (Lippke, Dickey, Selmar, & Soder, 1997)
Phonological errors	<i>Khan-Lewis Phonological Assessment</i> (Khan & Lewis, 2002)
Intelligibility issues	<i>Assessment of Intelligibility of Dysarthric Speech</i> (Yorkston, Beukelman, & Traynor, 1984)
	<i>Sentence Intelligibility Test</i> (Yorkston, Beukelman, & Tice, 1996).

None of these afore-mentioned tests are designed to specifically test dialectal or accented errors, therefore, they yield incomplete information about the communication errors emerging from a foreign accent or regional dialect. Furthermore, Shah (2005) found that only a very limited number (n=12) of clinicians (who tended to be well-experienced with accents) assess specialized areas pertaining to dialectal and foreign-accented speech difficulties. Examples of such specialized areas include auditory discrimination, morphology, syntax, semantics, pragmatics, and figurative language use.

While evidence-based practice in speech-language pathology requires data-driven assessments and therapy, the above-mentioned available assessment measures and procedures do not lend themselves to a data-driven approach. Many of these tests are not developed specifically for dialect- or accent-related population. The few that are specifically developed for accent-related concerns are criterion-referenced and thus do not address any normative testing nor include any psychometric data (e.g., Compton's P-ESL (Compton, 2002); POEC (Sikorski, 2002). These tests do not provide a means for making pre- and post-therapy comparisons using quantitative measures. Scores from these tests do not provide basal and ceiling information, nor a direct baseline approach for therapy. Additionally, dialect and accent assessment require comprehensive assessment that targets multiple areas in the same fashion, instead of requiring many discordant supplementary tests. Furthermore, such assessment needs to target specific dialectal and accented speech errors and not rely on error inferences from other communication disorders. Assessment of accented and dialectal speech needs to incorporate normative data in order to compare speech variations to that of native English speakers (e.g., American English). Finally, the assessment process should be reliable, valid, and yield appropriate diagnostic labels and severity indicators for better intervention decisions and therapy outcomes.

Development of a New Test

To meet these existing gaps in the field, and thus enable a systematic, reliable and evidence-based assessment of foreign-accented speech, a new assessment test battery was developed, the Comprehensive Assessment of Accentedness & Intelligibility (CAAI: Shah, 2007). This test

lends a quantitative, comprehensive, diagnostic, and prognostic approach to assessment of accented speech. Existing reliability testing data using the CAAI test battery following the CAAI assessment framework show a strong test-retest reliability (Pearson correlation coefficients ranged from 0.75 to 1.00), strong interrater reliability (Pearson correlation coefficients ranged from 0.68 to 1.00), and inter-item consistency (Cronbach's alpha coefficients from 0.70 to 0.90). Test sensitivity was high for identifying accent-related concerns. Test specificity was high for not misidentifying native speakers as having accent-related concerns (Shah, 2012).

This concludes a brief overview of existing assessment tools available in the SLP practice with accented speech; the remaining paper will describe an assessment framework and assessment procedures derived from the development of the CAAI.

PURPOSE OF THIS PAPER

The purpose of this paper is to introduce a framework of assessment of accent-related communication concerns. The Comprehensive Assessment of Accentedness and Intelligibility (CAAI) assessment framework (Shah 2007c; Shah, 2010a; Shah, 2010b) described in the present paper has been developed in conjunction with the CAAI test battery. Specific stimuli were developed and used in the CAAI test battery such that they followed the CAAI assessment framework which will be described in the rest of this paper. Using the CAAI assessment framework, the test battery has been piloted on 80 native and 260 nonnative speakers of American English; strong reliability data help support the assessment methods and framework that are described in this paper. While best used with the CAAI test battery to ensure a reliable assessment due to the specific examples of words and sentences in the test, the general principles of the framework as described here can be used independent of the CAAI or any other existing battery. In other words, the assessment framework is described in sufficient detail with examples of each area of assessment so as to enable clinicians to devise their own assessment tools in the event they do not have access to a standardized instrument such as the CAAI test battery. The words and sentences selected in the CAAI had been pilot-tested to ensure that they are contemporary, familiar, and relevant to adult English-as-second-language speakers of English. Therefore, if clinicians/teachers were to design their own testing material following this framework, they would need to conduct pilot testing to ensure that their material is age- and culturally appropriate.

DATA-BASED ASSESSMENT FRAMEWORK

The paper describes a framework for conducting an objective assessment procedure that is (1) comprehensive in scope and targets a broad array of communication differences as related to accent concerns that are confirmed by theory; (2) to quantitatively arrive at a diagnosis of accent or intelligibility concerns; (3) to obtain scores of functioning and severity levels in each area of communication as well as an overall intelligibility level; (4) to objectively determine a hierarchy of areas, i.e., task analysis, to target in therapy; and (5) to predict prognosis in each area potentially addressed in therapy.

Preliminary Procedures

Case History, Interview, and Language Background Questionnaire:

Begin with a case history and interview by assessing the following: (a) the client's history of learning English; (b) the age at which he/she began learning English; and (c) any previous therapy or teaching methods used. Such historical information about the client will help make

predictions about the amount and type of instruction the client will need to benefit from accent-Management therapy. For example, previous research findings have indicated that nonnative speakers who learned English after their puberty years will likely have more difficulties than those who had early childhood experience with English (Lenneberg, 1967; Flege et al., 1995). Additionally, relatively older learners will likely have a distinct foreign accent in their speech and will need more extensive therapy and English instruction compared to younger learners, who are predicted to acquire an American English accent relatively faster and easier than the older learners. Moreover, asking the client specific information about variables such as the age of arrival (AOA) to the United States and length of residence (LOR) in the United States (Flege & Fletcher, 1995); amount of English exposure and use; overall motivation in learning English; and self-developed strategies for mastering the communication difficulties due to their foreign accent will assist predictions about therapy prognosis and build rapport in the process.

Areas of Assessment: What Should a Complete Assessment Involve?

Distinguishing Issues and Concerns of Intelligibility from Accentedness:

An important distinction is the theoretical difference between *accentedness* and *intelligibility*. Traditionally, assessment of accentedness and follow-up therapy have utilized the measure of clients' *intelligibility* to arrive at diagnoses, goal setting, and measuring success in therapy. Clinicians and teachers should diverge from exclusively relying on intelligibility and recognize accentedness as a category distinct from intelligibility. Munro and Derwing (1995b) have shown that the phenomena of perceived accentedness and intelligibility are related, yet rather distinct. Intelligibility refers to the actual process of decoding the message and is ascertained by transcribing each utterance heard by listeners in order to arrive at the number of words they were able to understand. Perceived accentedness, on the other hand, is determined by conducting an accent-rating on a scale from "no foreign accent" to "strong foreign accent". Munro and Derwing's (1995) findings showed that despite relatively higher accented ratings, the nonnative speech samples were found to be highly intelligible. Additionally, while all the nonnative stimuli were highly intelligible, there was a wide range of scores for accentedness ratings; only 28% of listeners showed a significant correlation between accent scores and intelligibility scores. Listeners rated utterances as moderately or heavily accented even when they were able to transcribe them perfectly.

Thus, the two phenomena are distinct and need to be treated as separate; a strong foreign accent does not necessarily imply reduced intelligibility, and conversely, despite good intelligibility, clients' perceived accent can still affect and interfere with listeners' perception. Indeed, phonemic, phonetic, grammatical, and intonation errors are more correlated with *perceived accentedness*, but less with the intelligibility measure (Munro & Derwing 1995). While clinical accent-Management and English as a Second Language (ESL) programs typically orient towards only addressing those speech characteristics that affect intelligibility, these programs should also assess and address perceived accentedness as separate from intelligibility. Accented speech, even when free of intelligibility concerns, may still be stigmatized, and pose difficulties to speakers in their personal and professional communication. Therefore, for some clients the goal may be to improve intelligibility, whereas with others, therapy may need to address subtle aspects to help minimize "foreignness" in their accent. The assessment framework described in this paper discusses two distinct ways to assess intelligibility as part of accentedness, and as distinctly independent of accent ratings.

Specific Areas of Speech and Language to be Assessed:

A comprehensive assessment of accent- and dialect-related concerns needs to include a variety of speech and language production and comprehension measures, from the smallest phonemic units of consonants and vowels or syllabic prosody to larger narrative segments and extemporaneous speech. *Figure 1* provides an overview of the various categories involved in such a comprehensive assessment. The broad categories are shown in the outer, larger boxes: Baseline intelligibility and rate of speech; Speech production; Speech perception; and Language. The sections that can be grouped together are designated under those common themes and broad categories. Baseline intelligibility, accentedness ratings, and rate of speech measures form the preliminary areas of assessment. Speech production abilities need to include *suprasegmental/prosodic* units ranging from syllable length, word length, to sentence length, as well as *segmental* units, including the articulation of all English consonants and vowels in various positions of words varying in syllable length. Speech perception also needs to be assessed and can be done using auditory-discrimination measures distinguishing confusable minimal pairs as well as through a labeling/identification task involving single words. Various language areas also need to be probed, such as prepositions, idiomatic comprehension and production, professional vocabulary, and social-pragmatic skills in the speakers' second language (L2).

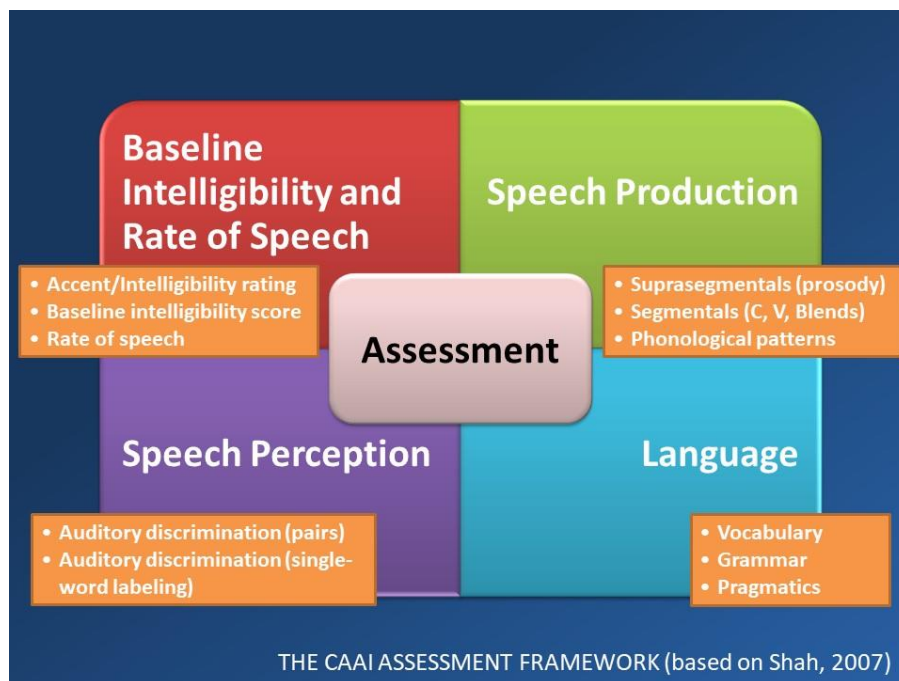


Figure 1: CAAI Assessment Framework (based on Shah, 2007a)

Description and Methods of Assessment by Individual Sections:

The following portions present an explanation of the underlying theoretical rationale for each section that should be assessed, the choice of stimuli within each, and the specific objectives to be met by the examiner during assessment. The examples provided within each section are taken from the CAAI test battery; readers are recommended to review the CAAI test battery to obtain the complete lists of standardized stimuli for each section since they have already undergone and met the measures of reliability and validity.

Accentedness:

It is important to separate the issues of accentedness and intelligibility and determine the actual degree of foreign accent (separate from the degree of unintelligibility) sentence-by-sentence for the client. This distinction is important not only from a theoretical perspective (as explained above, e.g., Munro & Derwing, 1995), but also to better meet the client's individual therapy goals.

The clinician can assign a rating that represents an interaction of accentedness and intelligibility on sentence reading. Ratings can be performed on a Likert scale of 1-5, where 1=negligible difference from mainstream American English, and 5= very strong accent, impossible to understand. An average rating across all elicited sentences is obtained (e.g., an average of 12 sentences included in this section of the CAAI battery). The sentence corpus should represent all the phonemes of English as well as a range of sentence-length that includes single to multisyllabic words to sufficiently draw out the client's range in accent. Comparing the average rating score for the client with the range in ratings across the sentences shows whether the client's degree of accentedness remains consistent, regardless of sentence-type, or whether certain sentences draw out the foreign accent more than other sentences.

Intelligibility:

The client is asked to read the Rainbow Passage. The clinician should ascertain whether any unfamiliar words for the client are present in the Rainbow Passage prior to it being read. An intelligibility percent score is obtained by counting the words produced by the client that were difficult to understand. Thus, Intelligibility percentage = (Total number of words understood correctly/330) X 100 (where 330 is the total number of words in the Rainbow Passage).

This score serves as a *baseline*, i.e., a numeric measure to compare with post-therapy improvement in an objective and quantitative manner. Similarly, the rate of speech is estimated through the objective measure of calculating the number of syllables per minute (SPM). The formula to compute SPM is $458 \times (330/z)$ (where 458 equals the number of syllables in the passage, 330 equals total number of words in the passage, and z is the time taken, in seconds, by the client to read the passage). The client's score can be compared to normative values, wherein average rate equals 180-260 SPM, slow rate is less than 180 SPM, and fast rate is greater than 260 SPM (Brysbart, 2019). If the rate is overly slow or fast, it is likely to interfere with perceived intelligibility. Thus, this measure determines whether rate of speech is an issue that requires intervention.

Sentence-level Intonation:

Various types of sentence-level pitch patterns should be assessed. For example, the CAAI test battery provides ten varieties of sentence-level intonation for assessment, e.g., final falling, final word pitch rise, final word rise-fall etc. Any deviations from an expected intonation pattern can be scored as incorrect and the pitch contours should be hand-drawn. An example of a sentence from the CAAI battery with its overlaid intonation contour is as follows: "*I have everything I need*" (*falling intonation*).

Word-level Intonation:

Four basic types of word-level intonation patterns (two variations of pitch drop and two of pitch rise) are discussed in this section of the CAAI test battery. In order to elicit natural

intonation, the words are to be produced by the client in response to a prompt sentence or cue provided by the examiner. Responses can be scored as correct or incorrect. For example, in the cue sentence, "*I passed the test!*" is used to elicit the target word level intonation for the word, "*Good!*" (Pitch drop).

Lexical Stress in Single Words of Varying Syllable-Length:

Distinct from the previous section that targets single-syllable length, this section contrasts stress and intonation over words of varying length. In response to cue-sentences provided by the examiner, the client produces different words with natural stress and intonation patterns. These words can vary in length from two to four syllables and consist of primary and secondary lexical stress that targets various syllable-positions within the words. For example, there are a total of 12 words of varying length and stress patterns in the CAAI test battery. A response is scored as correct if the client stressed the correct syllable. For example, in the cue sentence, "*What color is a banana?*" the response should indicate stress on the first syllable, "Yellow" (two syllable word, stress on the first syllable).

Derivative Stress in Multisyllabic Words:

This section assesses clients' knowledge and use of stress on words that are related to or derived from other words and shares a common base. While scoring, the examiner is asked to note whether the indicated underlined syllables were stressed, and appropriate phonological changes, where applicable, were made, e.g., *electric*à *electrician*, /k/à /ʃ/. For example, the CAAI test battery uses 9 pairs or triplets of words where the stress is derived from the root word, e.g., economy, economic, economically.

Contrastive Lexical Stress:

This section should assess contrastive stress on similar words: (1) where the contrasting words are in separate sentences; and (2) where the contrasting words occur concurrently in the same sentence (e.g., "*He could lead if he would get the lead out*"). If clients know that these words have distinct stress patterns depending on their grammatical role in a sentence, they will be able to demonstrate such knowledge in at least one of the two above methods. Additionally, the two different methods will help determine whether the contrasts are made only when the words co-occur and hence cue the differences, or whether the client has independent knowledge of these contrasting words and their stresses and does not need them to be in the same sentence to realize the distinction. For example, method one includes two different sentences to contrast the word-pairs, "**present**" vs. "*present*," namely, "*I have a birthday **present** for you*" versus "*I will **present** the award at the party.*" In method two as mentioned above, the contrasting words are included in the same sentence, for example, "*To **convict** a **convict** of his crime is real justice.*" Responses should be scored as correct if the client's response matches the indicated response; incorrect stress patterns are noted and used for post-therapy comparisons. The CAAI test battery provides a total of twenty sentences that include each of the two methods described above.

Emphasis:

In this section, the natural emphasis of words in conversation is assessed through role-playing. The examiner reads cue-dialogs with appropriate sentence intonation, phrasing, and emphasis on underlined words, which in turn, will help elicit naturally emphasized words from the client. Two of three possible scenarios are initiated by the examiner to provide a starting framework,

and in the final scenario, the client is asked to initiate the conversation. Collectively, the three scenarios help identify the clients' emphasis abilities in pragmatically contrasting roles (i.e., emphasis depending on whether he/she is the leader or follower in conversations). An example scenario is as follows:

Examiner: Bob, when are you returning home? Tuesday morning or evening?

Client: Evening.

Examiner: Do you think we'll still be able to go to the party?

Client: No, I'll need to get ready for the meeting.

Scores can be assigned as correct if the client emphasized (i.e., spoke louder) the bold face/underlined items. As an example, the CAAI test battery includes three scenarios for elicitation—two of which are initiated by the examiner and the third is initiated by the client, thus ensuring that natural emphasis is tested in both types of pragmatic situations.

Sentence Phrasing:

This section assesses seven different phrasing rules involved in producing English sentences. Phrasing is expected to be realized by briefly pausing at the appropriate junctures indicated by commas or periods, and/or producing a slight pitch change as shown by red contours included in the test. Either pause or pitch change is an acceptable cue for phrasing, and the response is scored correct if either cue is present. An example is the sentence: “*No, Jane, I am not angry,*” which represents a phrasing rule wherein pause/pitch change is expected before or surrounding the name or title of a person directly addressed. The CAAI test battery uses a sufficient representation of the English phrasing patterns by selectively using seven varieties of phrasing rules.

Contrasting Sentence Pairs:

Like the previous section, this section also targets sentence phrasing, but extends it to contrasting sentences. The goal of these sentences is to assess whether the client is aware of ambiguity of meaning in two similar-sounding sentences, and whether he/she can disambiguate these ambiguous sentences, using appropriate pitch and pauses at the juncture of tags. Ten parenthetical and tag-type contrasting sentences have been selected from Shah, Baum, and Dwivedi (2006), and are also used in the CAAI battery to elicit phrasing contrasts; an example is provided below. Clients are expected to pause and/or make the appropriate pitch. Either a pause or pitch change is an acceptable cue for phrasing, and the response is scored as correct if either cue is present. A pair of contrasting sentences follows: “*The family that likes to eat, the Burgers, left hungry*” versus “*The family that likes to eat the burgers left hungry.*” Pause and pitch drop are expected at both comma junctures in the first sentence, and if either cue is produced by the client, the response is scored as correct.

Consonants Word List:

This section assesses the articulation of consonants in initial, medial, and final positions in single words by having the clients read a word list. The CAAI test battery uses 65 words for testing, which represents a complete list of English consonants in their varying word-positions. The words selected in the CAAI had been pilot-tested to ensure that they are contemporary, familiar, and relevant to adult English-as-second-language speakers of English. Target consonants that are substituted, deleted, or distorted in some ways are to be scored as incorrect. The total error-count will help provide a *quantitative* measure to compare in pre- and

post-therapy assessments. However, a *qualitative* analysis of the errors is also important to help plan therapy. For each target consonant, indicate if it was deleted in either position in a word, or if it was substituted by a different sound, check off that sound on a phonetic grid. A phonetic grid helps to visually identify error patterns. A phonetic grid for vowels, for example, would include all the vowels listed in one vertical column, and then provided with all the alternate vowels on a horizontal row that can be substituted for that vowel. Then the examiner would check off the cell corresponding to the target vowel and its substituted vowel. An individual phonetic grid is provided for consonants and vowels respectively in the CAAI test battery. Keep track of the word-positions where the errors were produced, and make notations of I (Initial), M (Medial), and F (Final) accordingly. The resulting pattern that emerges will show: (a) which sounds are frequently problematic in articulation; and (b) which sounds may pose confusion in understanding the difference between them for the client.

Consonant Clusters Word List:

As described in the above section, varieties of consonant clusters (blends) are tested in varying positions in client's reading of single words. Like the previous section, errors with target-clusters are counted in the error analysis, whereas errors with non-target clusters are noted. It would be important to ensure that each consonant cluster is tested in its varying position in English words, i.e., initial, medial, and final to the extent they make legitimate English words. In the CAAI test, 59 words are used to test a comprehensive and representative variety of consonant clusters in their varied word-positions.

Vowels Word List:

This section assesses vowel articulation in varying positions in single word contexts. The CAAI test assesses vowels in two separate sections: one section tests each of the 15 English vowels and 2 diphthongs in common 1-2 syllable words as a simple assessment to determine if the client can produce each of these phonemes. In the second section, the CAAI test battery investigates the overall patterns of vowel errors by using words that are typically problematic for nonnative speakers of English. For example, words such as "onions," "souvenirs," "specific" and "back" contain vowels that are typically problematic across most accented varieties of English. An extensive list of words was developed for the CAAI test battery based on our pilot assessments of over 123 clients, analyzing their error patterns, and identifying the most frequently mispronounced words. Thirty-five representative words are used in the CAAI test battery to assess this section. The following example of the word, "souvenir" further illustrates the possible variations that may typically be found as vowel substitutions. It can be seen that nonnative speakers of English tend to pronounce this word in three different ways typically, and next to the word the expected pronunciation is shown to be substituted by the incorrect pronunciation.

Varying pronunciation Expected pronunciation → typically incorrect pronunciation

suv <u>ɪ</u> nɔz	/E/ → /I/
s <u>o</u> v <u>ɪ</u> nɔz	/u/ → /o/, /E/ → /I/
s <u>o</u> vEnɔz	/u/ → /o/

Phonological Processes:

In addition to assess the articulation of certain phonemes found to be difficult to produce by nonnative speakers of English, phonological processes should also be assessed. Phonological

processes help to determine if the clients' speech production difficulties can be explained by underlying patterns transferred from their first language (i.e., phonological interference) and/or part of their interlanguage phonology (i.e., their unique blend of merging their first and second languages). Certain patterns are common across nonnative speakers of English, regardless of language background, as they represent unique aspects of English phonology that are problematic for non-native English speakers. Some of the common phonological processes to look for include final *consonant devoicing* (e.g., "dogs" is pronounced with a /s/ instead of /z/), *final consonant deletion* (e.g., /v/ is dropped in saying "five"), *epenthesis*, *adding an intrusive schwa*, *vowel reduction*, *tense-lax vowel confusion*, and *cluster reduction*, among others. The CAAI test battery tests for 13 different phonological processes that were found to be typically mispronounced by nonnative speakers of English. For specific phonological issues based on different first language varieties, please refer to Swan and Smith (2001) or McLeod (2007). For basic guidelines in assessment and intervention for phonological issues, please refer to Lowe (1994).

Auditory Discrimination (Paired Contrasts):

The clients' auditory discrimination abilities are assessed to determine and identify client's *production* errors that are related to their possible difficulties with auditory *perception* of those sound contrasts. E.g., a Japanese-speaker of English would have difficulty distinguishing between the English /r/ and /l/ in the word, "rice" because Japanese does not have an exact match for /r/ or /l/.

An extensive list of sound-contrasts should be assessed within the context of contrasting minimal pairs; each contrast should be assessed in both initial and medial/final positions. Clinician reads each minimal pair (ensuring that the client does not get any visual cue) and the client reports whether each pair is "same" or "different." To avoid any listening-bias, these pairs should be presented in randomized order, with "foils" interspersed within the corpus. The crucial objective of this assessment is to identify whether clients hear or do not hear a difference when there is a difference between contrasts. It is important to offer a large variety of pairs for listening since the issue could be hidden in a specific combination of sounds. In the CAAI test battery 91 pairs are provided for testing; different combinations may pose different challenges based on the first language phonology of different clients. A relatively greater number of "different" pairs should be compared to no-contrast pairs (i.e., foils). For example, the following pairs show two contrasts and one foil:

Foil pile-pile
k-g, final back-bag
k-g, initial come-gum
s-sh, initial same-shame
s-sh, final bass-bash

Auditory Discrimination (Labeling of Single Words):

This section represents a different method to test auditory perception skills that is necessary in addition to the one in the previous section. In this method, auditory discrimination is tested through the ability to accurately identify sounds from a similar set of response choices. Some of the sound-contrasts are typically problematic for most nonnative speakers of English regardless of their first language (e.g., /v/-/w/); whereas other contrasts are more typical within a specific language background. For instance, Spanish speakers have been found to

present difficulty in discriminating /s/-/ʃ/-/tʃ/-/dʒ/-/z/-/ʒ/ contrasts, whereas speakers from China or Japan may have difficulty discriminating between /r/-/l/. The examiner reads each word aloud (from a string of sound contrasts) and the client writes the exact word he/she heard. For example, a string testing /w/-/v/-/f/ contrasts includes words such as “while”, “vile”, and “file”. Client’s spelling errors are not counted as incorrect as long as the correct target phoneme was identified (e.g., a response written as “wile” instead of “while”). Seventy-five words are included in the CAAI test battery that represent contrasts across 7 different groups (e.g., /s/-/ʃ/-/tʃ/-/dʒ/-/z/-/ʒ/ is one group of contrasts).

Language Assessment:

The following areas are designed to assess the knowledge and use of various language domains, including grammar, vocabulary, semantics, and pragmatics. The material is designed for relatively advanced speakers of English, who presumably know the basic grammar rules of English but may be challenged by the day-to-day idiomatic use of English, advanced professional vocabulary, or relatively subtle and complex grammatical rules. The goal of assessing such advanced functions is to help career professionals identify and correct their English-language subtle issues that may be interfering with the communication and/or making their accents that much harder to understand due to the ambiguities and awkward sentence constructions.

Prepositions:

This section assesses several prepositions that are typically found to be problematic for nonnative speakers of English. Clients may be asked to complete sentences using appropriate prepositions. Two examples follow:

We eat breakfast _____ the morning, but dinner _____ night. (in, at)
You will meet him _____ Friday. (on)

Nineteen varieties and examples are provided in the CAAI test battery to assess basic prepositions.

Colloquial/Idiomatic Use of Prepositions:

Typically, many nonnative speakers of English may know the formal rules of grammar from having received prior academic instruction in English but may not have experienced hearing or producing the basic prepositions in a colloquial usage or slang. For example, the client may say “Are we still on **at** tonight, instead of saying “... for tonight”). In the CAAI test battery, eight different varieties of colloquial usage of prepositions are tested.

For testing, the examiner reads aloud sentences and asks the client to verbally fill in the blank with a preposition. Examples include:

Are we still on _____ tonight? (for)
I could go _____ some ice cream right now. (for)

Contrasting Prepositional Idiomatic Phrases:

Expression and comprehension. Often, nonnative speakers may have heard idiomatic phrases before but may only have an approximate idea of how they are used. As a result, they may not understand some of the American-English prepositional phrases and may produce them incorrectly or awkwardly. An example of confusable prepositional phrases includes contrasts

between: “*blow up*”, “*blow off*”, “*blow away* or *blown away*”, and “*blow out*”. Using these incorrectly can cause a social faux and be embarrassing for the client, and confusing to his/her listeners. It is important to separately assess expressive (speaking) and receptive (understanding) abilities to capture their knowledge of colloquialisms and slang expressions. Assess expressive knowledge first by asking clients to define or make sentences with each phrase. If the client fails to use idiom appropriately, then receptive knowledge should be assessed by presenting cued-sentences and asking the client to select the appropriate phrase to fit each sentence. In the CAAI test battery, 19 different varieties and combinations of prepositional idiomatic phrases are assessed.

Comprehension of Idiomatic Expressions:

Assess idiomatic expressions that are broader in scope compared to the closed-choice expressions used in the previous section. The examiner reads out loud a variety of colloquial expressions in sentence contexts and asks the client to explain the meaning of the underlined phrases, for example: “*Before we can get it off the ground, we need to come up with a good plan for this project*”. (Meaning: initiate action). Clients will be expected to draw upon their past experiences and context-clues. Marked difficulty in this area may be indicative of an overall lower familiarization and exposure to the American-English communication and culture.

The CAAI test battery assesses 12 different idiomatic expressions that are relevant and routinely used in professional settings.

Advanced Vocabulary:

As part of overall language knowledge, assess advanced vocabulary that is likely to be encountered by individuals in all professional settings. A lack of knowledge of the right meaning or using words incorrectly in their sentence-context would impact the accent and intelligibility of the speaker as listeners will tend to be confused about the meaning and perceive the speech to be challenging. A functional knowledge of advanced vocabulary is rather important for nonnative speakers’ integration and success in the work environment and in mainstream society.

In the CAAI test battery, 20 words were selected from the larger pilot testing done; these selected words are representative of professional vocabulary of navigating a broad array of professions and disciplines. As a method to assess, the examiner asks the client to indicate meaning of target vocabulary words by choosing from the multiple choices provided. For example,

Target word: *Redundant*.

Multiple choices provided:

A. Repetitious, B. Essential, C. Dull, D. Circular.

Conversational Grammar (Syntax, Morphology, And Semantics):

In this section an overall analysis of conversational grammar is elicited through a conversational sample. Grammatical errors could also confuse listeners, who may tend to perceive the accent as more challenging and stronger due to the grammatical ambiguities.

The examiner should audio record and transcribe the entire conversational sample, and subsequently analyze for errors. Since grammar is a rather challenging area to assess and grade,

a detailed Grammar Reference Guide is provided in the CAAI test battery to help identify errors in various parts of speech and grammatical categories; specific grammatical error patterns detected in nonnative speakers of English are included to compare with, and easily categorize the nature of clients' grammatical errors. Some examples verbs and their conjugations, varieties of adverbs, varieties of adjectives, copula and auxiliaries, issues with pronouns, use of gender markers, use of number markers, and so on.

Pragmatic Issues:

Going beyond pronunciation, a detailed overview of pragmatic and nonverbal issues, typically associated with cultural and linguistic differences, are important to assess as part of a complete and comprehensive baseline communication assessment. Pragmatic behaviors provide insight into how the client comes across in a social context. A client's pronunciation and accent can be further impeded by incongruent pragmatic and/or nonverbal cues. Some examples of communicational pragmatics to look for include eye contact, vocal projection, facial expressions, gestures, topic initiation, topic maintenance, turn taking and so on.

It may be especially helpful to video-record a conversational dialog for possible pragmatic difficulties. In the CAAI test battery, 11 different pragmatic behaviors are assessed, and the examiner is given guidelines for variation to look for in each, e.g., in the behavior of "*Topic Maintenance and Repair*", the examiner is asked to note if client *a) dominates conversation; b) gives brief, non-detailed answers and needs many prompts for details; c) is uninterested in exchanging information; d) fails to attend to listeners' nonverbal cues to maintain or repair conversations; e) produces "run-on," tangential, or circumlocutory responses; or f) otherwise exhibits any other inappropriate conversation behavior.*

For an in-depth focus on pragmatic and cultural differences in the clinical context, please refer to Shah (2007b). For additional details on pragmatics of cross-cultural communication, please refer to various chapters on this topic (Uzzell, Ponton, & Ardila, 2007).

TYING IT ALL TOGETHER

Drawing Meaningful Conclusions from the Assessment

After completing the entire assessment and scoring of all sections, it is important summarize the client's strengths and limitations. The overall severity of the client's functioning can be arrived at by comparing the average and the range of severity across all items. The examiner should include comparison scores at three performance levels: 90% (mild difficulty), 70% (moderate difficulty), and 50% (strong difficulty). Scores of each assessed area can be compared to these comparative performance levels to yield a numerically based severity level of the client's accent-related communication difficulties.

Further, the severity estimate should provide distinct severity levels for the client's accentedness relative to intelligibility. For example, consider a client who scored 75% on baseline intelligibility. If most section scores for that client are in the mild difficulty category, a few in the moderate range, and only 1-2 items in the strong category; then on average the client's severity level will be reported as "Mild-moderate foreign accent with moderate intelligibility. The numeric scores also serve to determine the client's prognosis in each area, as well as in overall communication.

In addition to the numerically driven assessment procedures described thus far, it is also important to make accent management goals as quantitative as possible to reduce inherent subjectivity and thereby ensure greater effectiveness from intervention/teaching efforts. For example, while areas that are either moderately or strongly impaired are the highest priority in treatment, one or two areas that are only mild-moderately affected can be targeted earlier as well in order to see rapid improvement and give the client a sense of confidence at the beginning. Refer to Shah, 2009a; Shah 2009b (and updated versions, Shah, 2023a; Shah 2023b) for two case-studies with a low-proficiency and a high-proficiency English speaker for a complete account from assessment to intervention and subsequent successful discharge from accent management service.

Post-Intervention Outcome Assessment using the Assessment Protocol

The numeric data-based approach of the CAAI assessment framework and the corresponding CAAI test battery can also be used to make decisions objectively about the client's success in therapy and transfer of this success to real-life situations. For example, the entire assessment can be repeated after a duration of a therapy program, and pre- and post-therapy comparison scores can yield an objective inference of the client's success in therapy. As a measure of success that reflects real-life performance, intelligibility judgments of the client's speech can be elicited from neutral listeners to determine whether even unfamiliar listeners find the client sufficiently intelligible after therapy. The scores of the CAAI protocol can also be compared against clients' professional metrics. For example, in working with foreign-accented physicians, we have found it useful to compare the CAAI test scores with the client's *patient satisfaction scores* at periodic junctures to ensure that we are working on the most relevant areas of communication—and seeing progress— as measured against the client's performance measures.

SUMMARY

This paper demonstrated an assessment framework measuring dialectal and accented variations in speech. The overall framework is designed with the objective to conduct evidence-based, data-based, numerically-driven assessments leading to numerically-based therapy/intervention/teaching. Each section has included descriptions of measures that yield quantitative data that can be used to arrive at an analysis of the client's strengths and areas of difficulty using numbers and objective data as opposed to subjective impressions. Scores help make an overall diagnosis of severity in both intelligibility and degree of accent. Moreover, the baseline numeric data serve as a starting point in planning and prioritizing goals in Accent-Management therapy or an English-as-a-second-language classroom program. Similarly, numeric scores help make objective pre- and post-therapy comparisons of progress. With relative degree of difficulty experienced by the client in each area of the assessment procedure, a *direct* estimate of the client's severity of communication difficulties in English will yield prognostic data. With such data-based, numeric methods, it is possible to change the area of Accent-Management from its present-day unguided, subjective state to an evidence-based area of clinical practice.

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