

BILINGUAL ARTICULATION PHONOLOGY ASSESSMENT

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Overview

The Bilingual Articulation and Phonology Assessment (BAPA) was developed for the purpose of assessing the articulatory and phonological abilities of Spanish-speaking and bilingual (English-Spanish) children. Best practices for assessment of speech sound disorders for bilingual children recommends an assessment of all languages spoken by the child. Through assessing both languages, one can more easily rule out or explain second-language influences and can describe errors observed in both languages as well as those errors specific to each language. This evaluation is to be considered as part of a full speech evaluation to include: measures of intelligibility, considerations for second language influence, and considerations for the age of acquisition of each phoneme. The BAPA was developed by Barbara Fernandes, Ellen Kester, Mary Bauman, and Scott Prath and published by Smarty Ears. The BAPA can be used with individuals of all age groups. The BAPA is compatible with the iPad running iOS 4.0 or above.

Uses

The Bilingual Articulation Phonology Assessment can be used to:

- Collect information regarding an individual's articulation skills;
- Supplement data of a standardized articulation measure;
- Determine the presence of an articulation disorder;
- Measure treatment efficacy;

Features

- a. Ability to enter students' information and track their progress overtime;
- b. Tests all phonemes in the Spanish language including clusters;
- c. Offers two testing options: Screening and full assessment.
- d. Ability to record student's productions, review them live and even months after the administration;
- e. Ability to e-mail voice recording files;
- f. E-mail test results immediately after its administration;
- g. Automatic analyses of phonemes based on:

- a. Manner of Articulation

- b. Phoneme
- c. Position in the word
- d. Voicing features
- e. Multisyllabic words
- f. Error Type
 - a. Deletions
 - b. Substitutions
 - c. Distortions
 - d. Consonant Cluster Reductions
- h. Provides automatic positive feedback to student throughout administration;
- i. A sample recording of targeted word is available as you touch images;
- j. Compatible with iPad running iOS 4.0 or later;
- k. Add notes throughout the assessment
- l. Hide written words
- m. Option between one recording throughout the assessment or multiple recordings.

Areas Assessed by BAPA

The BAPA aids in obtaining a complete picture of a child's overall speech sound abilities by assessing and analyzing errors according to both articulation errors and phonological errors. A child may have difficulties with the movement of the speech mechanisms to produce a sound (articulation), with understanding and applying the correct phonological rules or patterns for production (phonology), or a combination of both. An understanding of the specific types of errors made by a child will result in an intervention plan that can more appropriately target the child's underlying speech deficiency.

Administration Considerations

Administration and scoring directions are included in the following portions of this manual.

Spanish Proficiency for BAPA Administration

A near-native proficiency in both oral and written Spanish is needed to administer the BAPA. Knowledge of the (1) words and the (2) sounds of the language spoken by the child enables an examiner to correctly identify which errors have been produced. When synonyms or dialectal variations are produced during testing (e.g., producing *playera* for *camisa* [shirt]), a high level of proficiency in Spanish will enable the examiner to direct the child to produce the target while still validating his or her response. This can also be particularly important for a child with highly unintelligible speech, who may produce the dialectal variation in error. Understanding that the intended word began with an initial /p/ (*playera*) will prevent the examiner from marking the initial sound as an error of fronting (i.e., /p/ replacing the /k/ for *camisa*) when /p/ was correct for the intended word.

Features of the BAPA

The Bilingual Articulation and Phonology Assessment evaluates the production of 50 Spanish phonemes and consonant clusters in 109 instances across 49 words. It is the first and only test in Spanish to account for multiple occurrences of sounds in each position of a word and for production of longer multisyllabic Spanish words independently. Additionally, the BAPA provides a method for tabulating phonological and articulatory productions and will automatically generate a report. Phonemes in all positions are tested more than once in order to calculate a percentage of accuracy.

When a child does not produce /k/ in *cama*, is it because he cannot produce initial /k/, because he is unfamiliar with the word *cama*, or because he was distracted when this test item was administered? Was the erroneous production affected by neighboring phonemes that influenced the production of /k/ for this word (assimilation) that would not affect production in other target words? By probing each item multiple times, the BAPA is able to produce a percentage of accuracy for *each phoneme in each position*. This gives a child multiple opportunities to produce a sound without assuming that the sound cannot be produced when targeted in a single, possibly unfamiliar, position.

Multisyllabic words are probed independently.

When a child does not produce the /f/ in *teléfono*, is it because she cannot produce medial /f/ or because she reduced a syllable from a 4-syllable word? The BAPA limited phoneme analysis to 2- to 3-syllable words to avoid registering a false negative response when errors may be due to difficulties with longer, more complex words rather than the actual phoneme. Instead, multisyllabic productions are elicited in-

dependently in the last five stimuli of the test. The inclusion of 4- and 5-syllable words in Spanish also provides a way to identify the process of weak syllable deletion for more complex words.

Consonant Clusters are correctly defined to improve therapeutic outcomes.

Spanish words contain consonants that come together in two very different circumstances. When two consonants are combined across syllables (e.g., *mos-ca*) they can be considered *abutting consonants*, or a *consonant sequence*. In contrast, when two consonants are paired within a syllable it is often considered to be a *consonant cluster*, or *blend* (e.g., *pri-sa*).

This distinction is critical from an intervention standpoint because *blend* errors are largely the result of difficulty producing /l/ and /r/ independently or in the cluster position, whereas *consonant sequences*, or *abutting consonants*, are more successfully remediated by addressing the individual sound or position (syllable initial, syllable final). The BAPA distinguishes these two types of consonants sequences automatically so that they can be addressed successfully in therapy.

Administration time is decreased while accuracy is increased.

Items were field tested and chosen based on how many phonemes the word possesses and on their ability to be elicited without prompting from the examiner. This resulted in:

- being able to test more phonemes from fewer total words
- increasing the accuracy of the evaluation because the child's production is not a repetition of the examiner's model
- reducing the overall administration time because the interaction time for each stimulus picture was minimal

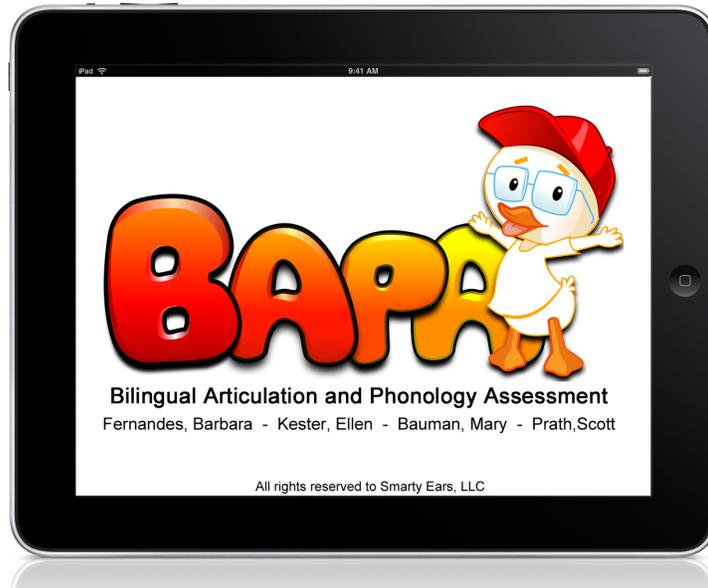
Manual tabulation of a child's responses was eliminated.

The examiner records the errors during administration and the BAPA performs all calculations. Results from the evaluation are described according to manner of production, phoneme position, voicing, and word-specific errors and are produced in easy-to-read tables. The BAPA simultaneously records and tabulates productions in order to give a percentage of accuracy as soon as the administration is completed.

A report is automatically produced.

Via email or a print screen, the results of the BAPA administration are immediately available to be included with the full assessment and written into goals.

How to use it



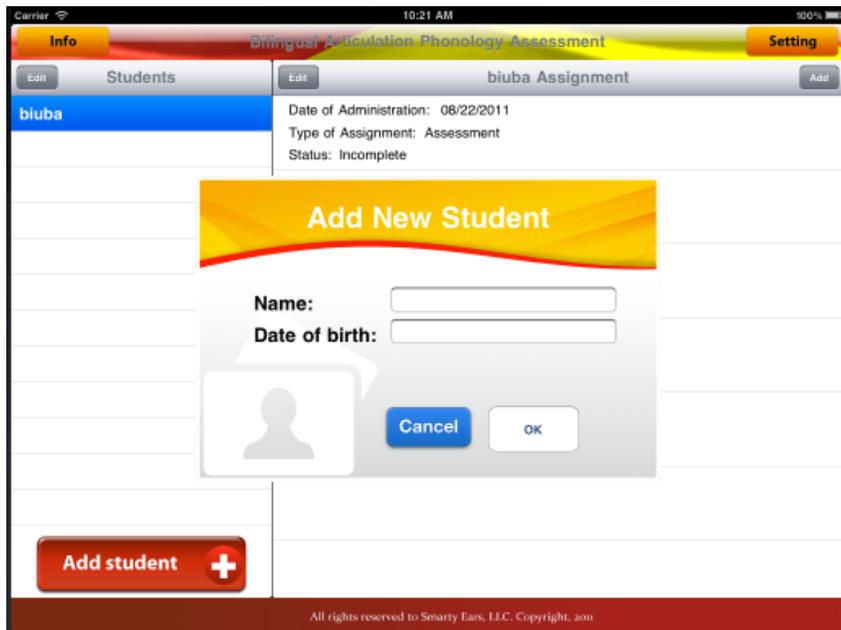
Administration Time

Administration time for the screening is between four and eight minutes. Administration of the full assessment is from nine to twenty minutes. The administration varies depending on the child's attention span, the use of sample recordings for target words, and the use of the recording feature.

Adding Users

In order to administer the Bilingual Articulation Phonology Assessment, the speech-language pathologist must first enter the name and the date of birth of student being tested. In order to enter a new student click on the "add student" on the main menu.





A pop up screen will allow you to enter student’s name and date of birth. After you enter requested information, click on to save the information.

Repeat this process for every student to whom you wish to administer the BAPA App.

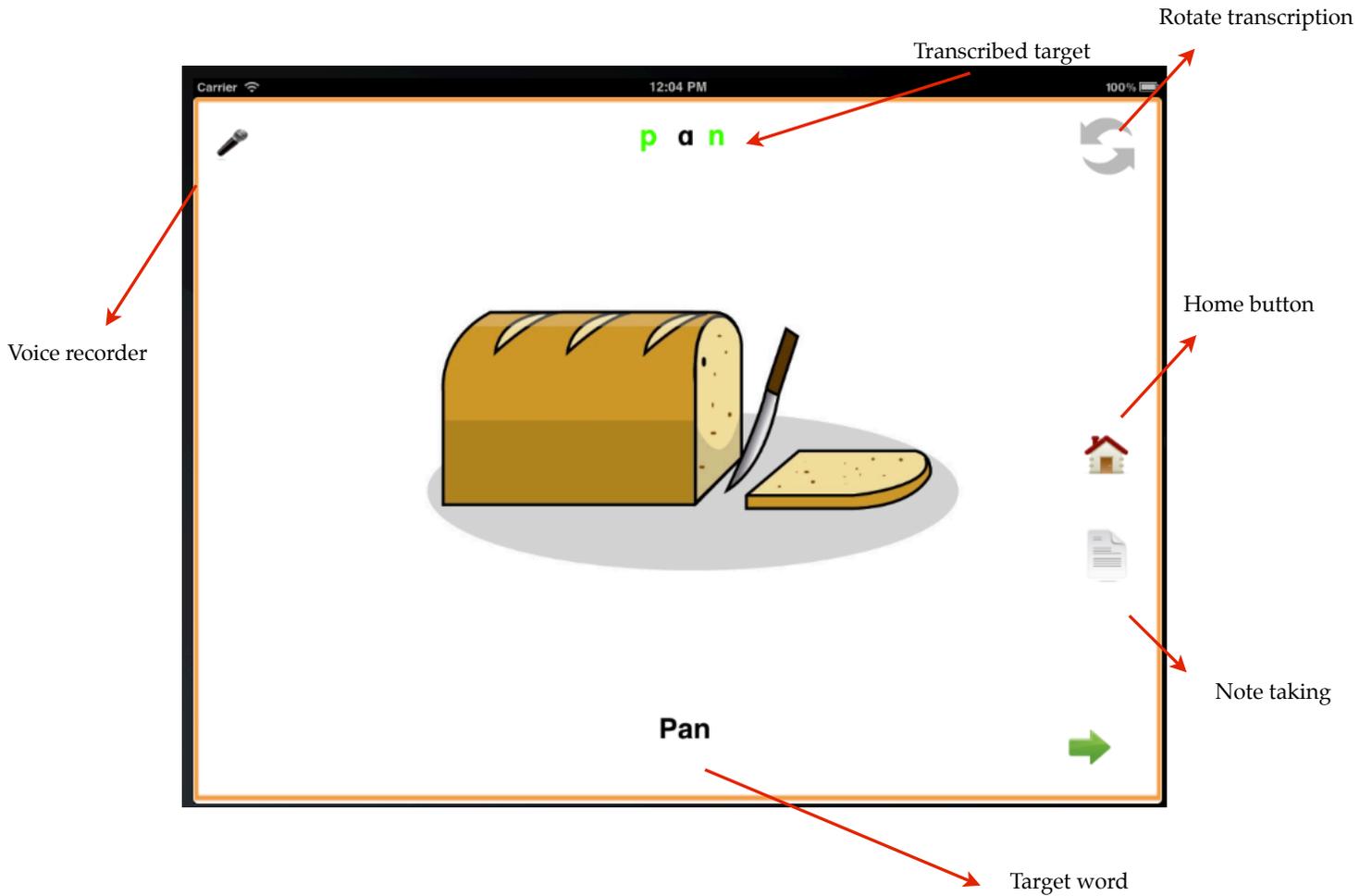
Initiating an assessment



In order to initiate an assessment you must tap on the “new assessment” button located on the right side of the screen.

Full Assessment composition information:

Understanding the testing screen

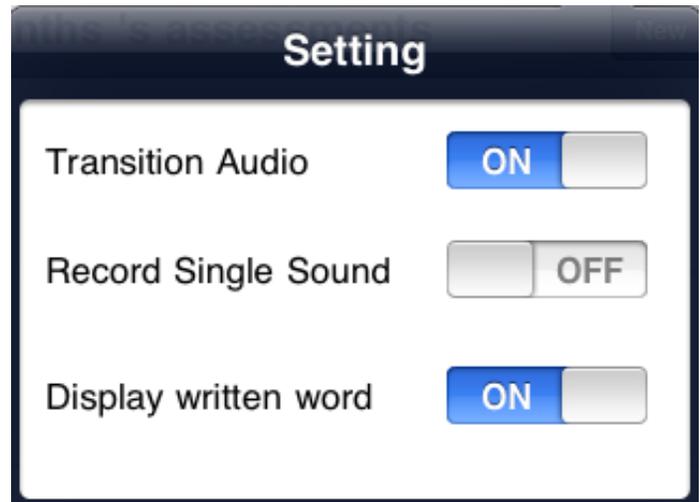


Adjusting Settings

Users can access the settings of the BAPA App on the main menu, by clicking the settings button on the upper right side of the screen.

Transition sounds

Transition sounds refer to the sounds that are played when user advances to the next image during the assessment. This is a praise audio that can be played or turned off.



Voice Recording Options

BAPA contains two options for voice recording:

Record Single Sound ON: Turning on this function will allow SLPs to record one single voice file throughout the assessment without having to press the microphone button for each production.

Recording Single Sound OFF: Turning this function off will allow SLPs to record several voice files and choose which productions they wish to record.

Written cues

It is possible to turn off the written target word below each image by turning the "Written word" button OFF.

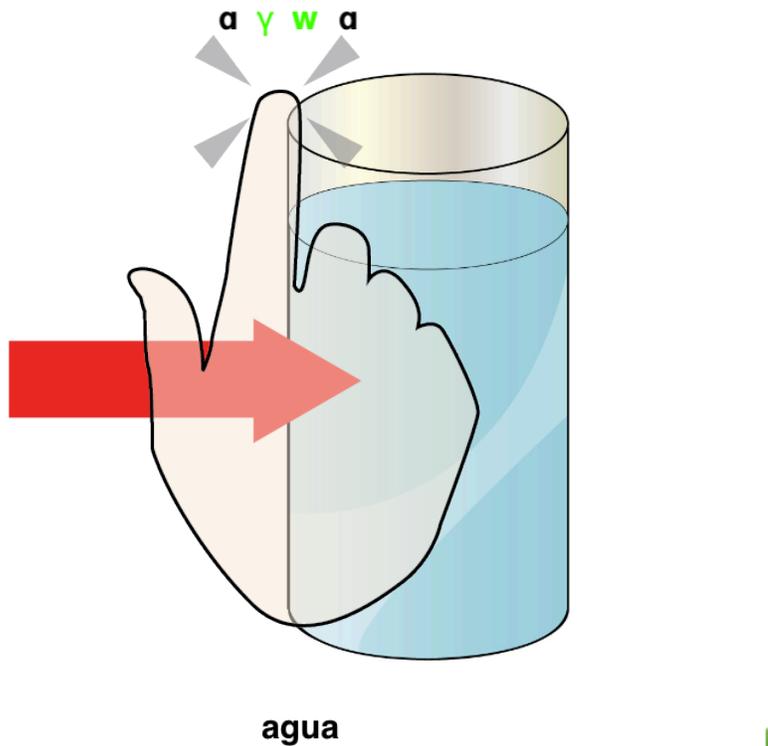
Documenting errors on Bapa

Recording errors on the BAPA is very simple. Each transcribed word is composed of phonemes colored in black and in green (see reference bellow).

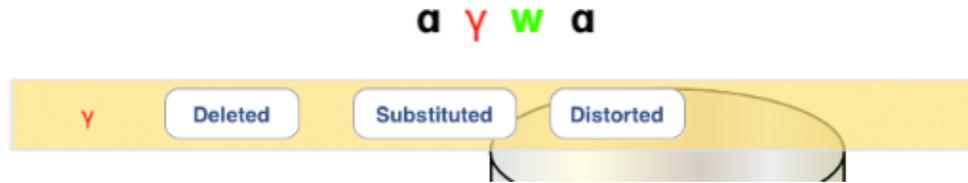
a **y** **w** **a**

The black phonemes on each transcribed word are not targeted and therefore are not touch sensitive. The green phonemes are the targeted phonemes in each word and therefore touch sensitive.

When the student's product was not accurate the speech-language pathologist must tap the phoneme to indicate that the production was not accurate.



BAPA will respond to this gesture by generating a new screen in which you can select the type of error.



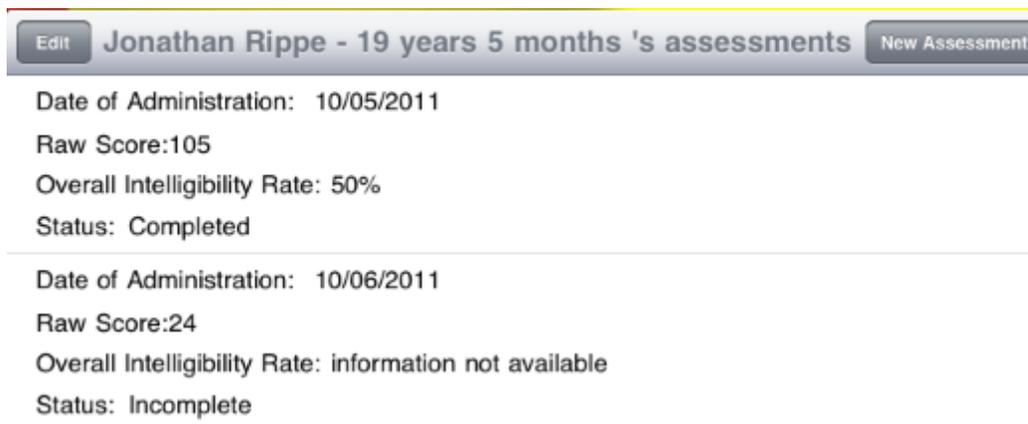
In case production is accurate, do not tap any phoneme, just proceed to the next screen.

Interpreting results

The Bilingual Articulation Phonology Assessment presents the results in six different categories:

- a. Position in the word
- b. Manner of Articulation
- c. Voicing features
- d. Words errors
- e. Error type
- f. Multisyllabic words

Once you finish administration of BAPA, you will find a screen indicating that the assessment has been completed. See image below:



Raw Score

The raw score is the number of targeted phonemes minus the total number of errors.

In order to access the result information tap on box associated with the assessment administered.

a. Position in the word

The phonemes are analyzed based on position in the word. The overall accuracy under this tab is organized below:

Position	Manner	Voicing	Words	Multisyllabic	Error
----------	--------	---------	-------	---------------	-------

Initial: 53.7% accuracy
Medial: 96.1% accuracy
Final: 100.0% accuracy

Based on this example you can determine that student is making significant more errors on the initial position of the word than any other positions.

b. Manner of articulation

The manner of articulation tap, analyzes all the manner of articulation in Spanish. The phonemes are also broken down individually which allows for identification of errors being more frequent to one phoneme or word location within the same manner of articulation.

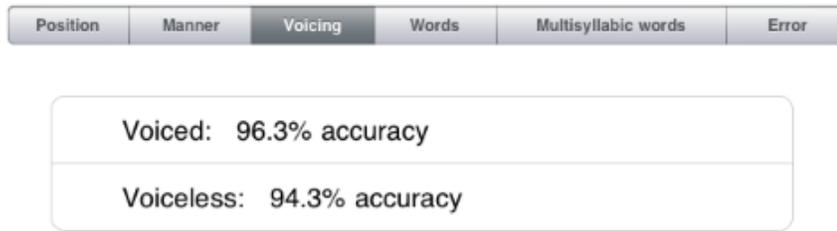
Position	Manner	Voicing	Words	Multisyllabic words	Error
----------	--------	---------	-------	---------------------	-------

Fricatives: 91.3% accuracy

/s/ -	Initial 2/2	Medial 2/2	Final 3/4
/ð/ -	Initial 0/0	Medial 1/2	Final 1/1
/x/ -	Initial 1/1	Medial 1/1	Final 0/0
/ɣ/ -	Initial 0/0	Medial 3/3	Final 0/0
/f/ -	Initial 2/2	Medial 2/2	Final 0/0
/h/ -	Initial 0/0	Medial 1/1	Final 0/0
/β/ -	Initial 0/0	Medial 2/2	Final 0/0

c. Voicing features

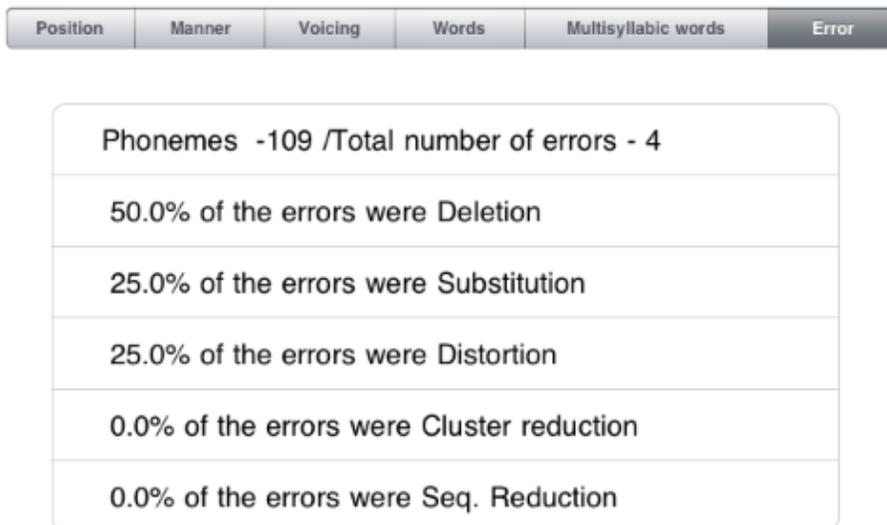
Phonemes are analyzed according to their voice under “voicing” tab.



d. Word Errors

The words errors tab provides information regarding the words targeted on the assessment as well as the errors produced by the student. The phonemes are color-coded to indicate whether a phoneme was produced correctly or not. The green phonemes indicate that the phoneme was targeted and the student produced correctly. The red phonemes indicate an error.

e. Error type



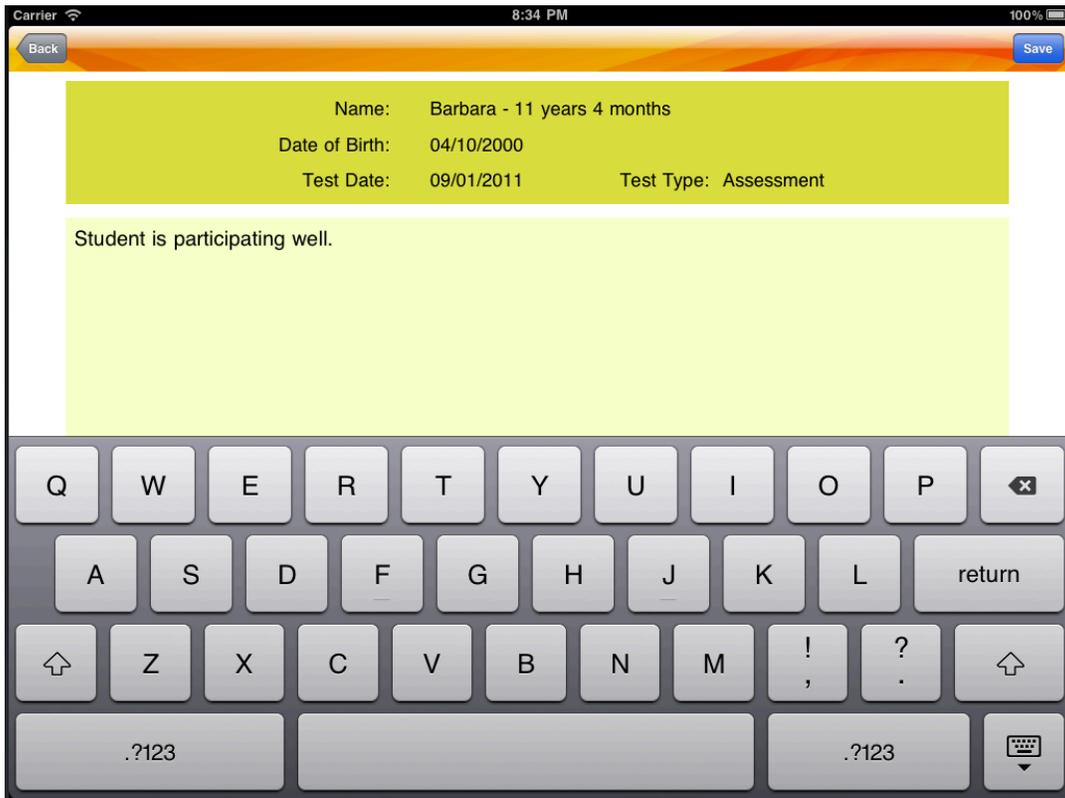
f. Multisyllabic words

The Bilingual Articulation Phonology assessment, assess 6 multisyllabic words. Three four-syllable words, and three five-syllable words are targeted. These words are counted as either correct or incorrect productions rather than individual phonemes within those words.



Adding notes during test administration

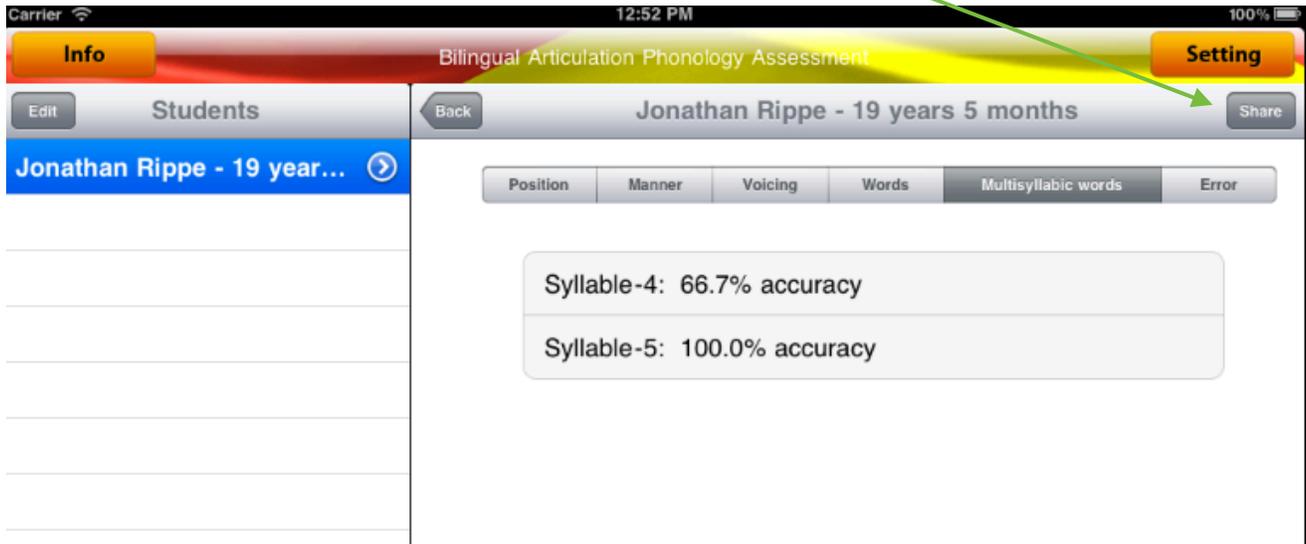
Users are able to enter notes throughout the testing session. Each note will be separately saved not only per session, but also per word. For example: If you are targeting the word “magician” and you notice that the student is dentalizing a specific phoneme you may simply write “dentalized” and BAPA will automatically let you know which target word you were referring to.



Sharing results

E-mailing Results

Speech-Language Pathologists can e-mail the results of the assessment immediately after the assessment is completed. In order to e-mail the results, click on the “Share” button and a pop up screen will display with options for sharing the results by e-mail.

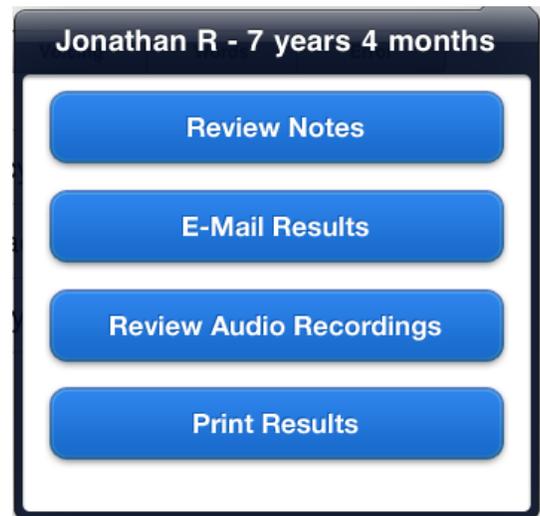


Users can e-mail the results to themselves in order to save for their records and keep a backup of the student's assessment, or to send to the parents.

The e-mail is set up as a simple report. See sample below:

Bilingual Articulation & Phonology Assessment /
Developed by Smarty Ears (Authors: Barbara
Fernandes, Ellen Kester, Mary Bauman & Scott
Prath)
Report

Student's name: Barbara I
Student's date of birth: 04/10/2000
Student's age: 11 years 5 months
Date of Administration: 10/05/2011
Type of testing: Formal Speech Assessment
Raw score: 101



Barbara l's articulation skills were evaluated on 10/05/2011 utilizing the Bilingual Articulation & Phonology Assessment(BAPA). The BAPA is an individually administered clinical tool used for screening, error identification, diagnosis and continued re-evaluation of articulation skills in Spanish speaking individuals. The Bilingual Articulation & Phonology Assessment can be used with individuals of all age groups; it provides qualitative information regarding a student's articulation skills. Barbara l's articulation assessment yields a raw score of 101. The raw score of the Bilingual Articulation Phonology Assessment indicates the total number of phonemes targeted minus number of errors. The higher the raw score, the less errors were demonstrated by the child.

Results obtained on this session are presented and explained below:

1. Manner of Articulation:

Manner of articulation is a parameter used to describe how the oral structures involved in producing speech interact to produce a consonant. The BAPA analyzes the overall accuracy of each manner of articulation, related to the position each consonant is produced at the word level.

Fricatives: 100.0% accuracy

Phonemes	Initial	Medial	Final
/s/ -	Initial 2/2	Medial 2/2	Final 4/4
/ð/ -	Initial 0/0	Medial 2/2	Final 1/1
/x/ -	Initial 1/1	Medial 1/1	Final 0/0
/y/ -	Initial 0/0	Medial 3/3	Final 0/0
/f/ -	Initial 2/2	Medial 2/2	Final 0/0
/r/ -	Initial 0/0	Medial 1/1	Final 0/0
/β/ -	Initial 0/0	Medial 2/2	Final 0/0

Tap-Trill: 100.0% accuracy

Phonemes	Initial	Medial	Final
/r/ -	Initial 0/0	Medial 3/3	Final 2/2
/r/ -	Initial 2/2	Medial 2/2	Final 0/0

Plosives: 100.0% accuracy

Phonemes	Initial	Medial	Final
/p/ -	Initial 5/5	Medial 2/2	Final 0/0
/b/ -	Initial 2/2	Medial 0/0	Final 0/0
/d/ -	Initial 2/2	Medial 0/0	Final 0/0
/t/ -	Initial 2/2	Medial 4/4	Final 0/0
/g/ -	Initial 2/2	Medial 0/0	Final 0/0
/k/ -	Initial 3/3	Medial 2/2	Final 0/0

Nasals: 78.6% accuracy

Phonemes	Initial	Medial	Final
/n/ -	Initial 3/3	Medial 2/3	Final 2/2

/ŋ/ -	Initial 0/0	Medial 1/2	Final 0/0
/m/ -	Initial 2/2	Medial 1/2	Final 0/0

Affricate: 75.0% accuracy

Phonemes	Initial	Medial	Final
/tʃ/ -	Initial 1/2	Medial 2/2	Final 0/0

Glide: 100.0% accuracy

Phonemes	Initial	Medial	Final
/j/ -	Initial 4/4	Medial 2/2	Final 0/0
/w/ -	Initial 0/0	Medial 2/2	Final 0/0

Abutting: 85.7% accuracy

Phonemes	Initial	Medial	Final
/nk/ -	Initial 0/0	Medial 1/1	Final 0/0
/ls/ -	Initial 0/0	Medial 0/1	Final 0/0
/nt/ -	Initial 0/0	Medial 2/2	Final 0/0
/sm/ -	Initial 0/0	Medial 1/1	Final 0/0
/nd/ -	Initial 0/0	Medial 1/1	Final 0/0
/mb/ -	Initial 0/0	Medial 1/1	Final 0/0

Blend: 66.7% accuracy

Phonemes	Initial	Medial	Final
/bl/ -	Initial 1/1	Medial 0/0	Final 0/0
/kl/ -	Initial 0/0	Medial 0/1	Final 0/0
/dr/ -	Initial 0/1	Medial 0/0	Final 0/0
/fl/ -	Initial 1/1	Medial 0/0	Final 0/0
/fr/ -	Initial 1/1	Medial 0/0	Final 0/0
/βr/ -	Initial 0/0	Medial 1/1	Final 0/0

Lateral: 100.0% accuracy

Phonemes	Initial	Medial	Final
// -	Initial 3/3	Medial 3/3	Final 2/2

2. Position of Phoneme in the Word:

Initial: 95.1% accuracy

Medial: 90.2% accuracy

Final: 100.0% accuracy

3. Voicing Feature:

Voiced: 94.4% accuracy

Voiceless: 97.1% accuracy

4. Words:

See below all words administered on the Bilingual Articulation Phonology Assessment, their respective standard phonetic transcriptions and the errors marked by the test administrator.

Phonemes marked in **green** identify targeted phonemes.

Phonemes marked in **red** identify errors identified by test administrator.

Word	Transcriptions/ errors	Comments
pan	pan	
baño	baɲo	(Distorted)
manos	manos	
nido	niðo	
dedo	deðo	
toalla	toaja	
galleta	gajeta	
conejo	konexo	
agua	aɣwa	
bloques	blokes	
cama	kama	
camisa	kamisa	(Substituted /i/)
chancla	tʃankla	(Cluster reduction)
chile	tʃile	(Deleted)
dragon	drayon	(Cluster reduction)
dulce	dulse	(Seq. Reduction)
fantasma	fantasma	
flor	flor	
fruta	fruta	
fuego	fweyo	
guitarra	gitara	
hielo	jelo	
jirafa	xirafa	
lapis	lapis	
leche	letʃe	
libro	liβro	
llanta	janta	
llorando	jorando	
lluvia	juβia	
mesa	mesa	
nariz	naris	

nube	nuβe	
ocho	otʃo	
pañal	paɲal	
pared	pareð	
pelota	pelota	
perro	pero	
rana	rana	(Substituted /w/)
ropa	ropa	
sofa	sofa	
sol	sol	
tambor	tambor	
vaca	baka	
calabaza	kalaβasa	
elefante	elefante	(Syllable(s) reduced)
mariposa	mariposa	
motocicleta	motosikleta	
refrigerador	refrixeraðor	
rompe-cabezas	rompekaβesas	

5. Error Type:

This information pertains to the types of articulation errors and phonological processes exhibited by Barbara I at the word level. Phonemes -109 /Total number of errors - 7

- 14.3% of the errors were Deletion
- 28.6% of the errors were Substitution
- 14.3% of the errors were Distortion
- 28.6% of the errors were Cluster reduction
- 14.3% of the errors were Seq. Reduction

Frequently asked questions

1. I cannot hear the any sound on this application or record voices:

The iPad has a volume button that allows you to turn the volume of the app up and down and a silent button. Make sure you check both buttons. Both the volume and he silent buttons must be turned up.



About the Authors

Barbara Fernandes M.S; CCC-SLP

Barbara, the founder and director of Smarty Ears received her master degree in Speech and Language Pathology with an emphasis in bilingualism from Texas Christian University. Barbara speaks three languages (English, Spanish & Portuguese), and she has worked with children from a variety of ethnic backgrounds and native languages in several countries. In addition to her passion for working with bilingual children, Barbara's passion for technology has led her to become an active blogger known as "GeekSLP" for www.geekslp.com and the blog of the American Speech and Language Association known as the *AshaSphere*. As GeekSLP, Barbara has been invited as a guest speaker in universities and International conferences, and given workshops and presentations around the world on how technology can be implemented to improve the speech and language skills.

In 2004, Barbara was one of the participants of the program jointly administered by the U.S. Department of Education and the Brazilian Ministry of Education, called *"Promoting the Inclusion of Persons with Disabilities in Society Through Assistive Technology: Culturally Appropriate Solutions."* Barbara has created over 30 applications that combine her knowledge of technology with her expertise in speech and language sciences. Smarty Ears is where Barbara's passion is met. As the CEO of Smarty Ears, Barbara Fernandes has created over 30 applications, which have been sold in over 40 countries to speech pathologists, special education teachers, and parents of children with special needs. Smarty Symbols is another one of Barbara's creations; a symbol set that contains 11,000 symbols which also reflect Barbara's passion for technology and multicultural issues. In her spare time, Barbara enjoys traveling abroad, scuba diving and playing with her gadgets and three dogs.

Mary Bauman, M.S; CCC-SLP

Mary earned her master's degree in Speech-Language Pathology with a focus on bilingualism from Texas Christian University. She completed her bachelor's degrees in both Spanish and Speech-Language Pathology at Bloomsburg University of Pennsylvania. Mary's areas of expertise include stuttering and severe articulation and phonological disorders. She has presented workshops on speech sound disorders locally and statewide. Mary teaches courses on bilingualism in speech-language pathology for Bloomsburg University by webinar. She spends her free time creatively, participating in flash mobs, learning to perform circus stunts, taking dance classes, attending festivals, and fully embracing all holidays with full costume, bells, and whistles.

Ellen Stubbe Kester, Ph.D., CCC-SLP

Ellen Kester is the President and Founder of Bilinguistics, a bilingual speech pathology company in Austin, Texas. She co-chairs the Task Force on Cultural and Linguistic Diversity for the Texas Speech-Language Hearing Association and leads the bilingual speech-language pathology trainings for the Region 13 Educational Service Center. She frequently provides workshops on bilingual issues and parent and teacher involvement for the State of Texas Early Childhood Intervention Program and for Texas school districts. She has performed workshops, trainings, and presentations both nationally and internationally. Dr. Kester teaches courses in language development, assessment and intervention of language disorders, early childhood intervention, preschoolers with special needs, and measurement at The University of Texas at Austin. Her research and clinical work address the important issue of differentiating bilingual children with typical development from those with language impairment, and identifying appropriate goals for intervention with bilinguals. Ellen's passion for her work is only exceeded by the time spent with her daughter and younger twins.

Scott Prath, M.A., CCC-SLP

Scott Prath is the Vice President of Bilinguistics Speech and Language Services in Austin, Texas. After earning his master's degree in Communication Sciences and Disorders from the University of Texas at Austin, he worked in the early childhood and school settings. He came to Bilinguistics 2006 and, in addition to providing services to bilingual children in the school and clinic settings, he serves as a mentor to newer team members, directs the development of a number of projects, including SMILE for Infants and Toddlers, conducts research on disproportionate representation of minority students in special education settings, and leads the development of continuing education courses for Bilinguistics. Scott is a talented and entertaining presenter. He has conducted presentations and workshops to speech-language pathologists internationally and extensively throughout Texas. In his spare time he raises four girls, teaches martial arts, plays the guitar, and volunteers as a translator at a local health clinic.

Support

E-mail: contact@smartyearsapps.com

Twitter @smartyears

Website: <http://www smartyearsapps.com>

Facebook: <http://www.facebook.com/smartyears>