

The Bilingual Articulation and Phonology Assessment App for the iPad

With the advent of the expansive use of iPads in the field, we set out to create the first speech assessment application for bilingual children. It is based on the most current research in the field on bilingual speech development, uses the most current technology, and is created and field-tested by speech-language pathologists, with the goals of being efficient and effective.

Overview

The Bilingual Articulation and Phonology Assessment application was developed based on the need for a more efficient and effective way to evaluate and analyze the speech production skills of children with Spanish as their first language or who are early simultaneous bilinguals. Research indicates that children who are exposed to two languages early in life have slightly different patterns of sound development than those who are learning only one language. In order to accurately assess speech production skills, it is necessary to evaluate all sounds in a child's language environment across word position, and to take into account the variation in speech development. In the development of the BAPA, we've done just that.

Meet the Authors

Barabara Fernandes

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.

Scott Prath, M.A., CCC-SLP

Scott Prath is the Vice President of Bilingualistics 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 Bilingualistics 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 Bilingualistics. 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.

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

Ellen Kester is the President and Founder of Bilingualistics, 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.

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.

Tool Development

In the process of developing the target words for the BAPA we evaluated the frequency of occurrence of all of the sounds of English and Spanish in each word position. Our goal was to develop a tool that reflected the occurrence of sounds and words in each language. Efficiency was a top priority and we maximized efficiency in many ways. First, we did not waste any word real estate. Think of speech assessment tools that require word elicitation and only incorporate one of the word sounds into the analysis. Our approach was to incorporate all sounds in words into the overall analysis. As a result, we were able to incorporate each sound into at least two occurrences in each allowable word position for sounds that occurred in those positions more than 3% of the time. Sounds that occur in higher frequency were sometimes incorporated with greater frequency. Sounds that are very late developing sounds with a very low frequency of occurrence were included in the analysis one time. The sound /3/ was not included because it occurs so infrequently.

The result is 63 words in English and 48 words in Spanish that test each phoneme of each language in every allowable word position. The sounds occur on the test up to 6 times in a given position. The frequency of occurrence is consistent with the frequency of occurrence of the sounds in the language.

A second efficiency that was included in the BAPA that makes it stand apart from other speech assessment tools, is a behind-the-scenes calculator. The evaluator marks errors on the screen as they are made and those errors are calculated by type and category (e.g. phonological process) behind the scenes. At the end of the assessment (or part-way through if you have to abandon administration), a chart is emailed to you that contains the number and types of errors, along with percentages of possible occurrences of those errors.

Standardization Information for the Bilingual Articulation and Phonology Assessment App

The BAPA was standardized on 438 children ages 3;0 to 10;11 in the Central Texas area. There are three sets of standardized scores: English only, Bilingual English, and Spanish/Bilinguals in Spanish. The decision to combine the children who were in the Spanish only group and the Bilingual Spanish group was made based on statistics that indicated that there were no significant differences in the groups' performance on the test. This is consistent with related research findings (Fabiano-Smith & Golstein, 2010; Arnold, Curran, Miccio, & Hammer, 2004; Goldstein & Washington, 2001; Goldstein, Fabiano, & Washington, 2005).

The language groups were determined by a number of factors that included use of language in the home by mother, father, grandparents, and siblings, media exposure in each language, parent ratings of their child’s receptive and expressive proficiency in each language on scale that ranged from 0 to 3 (see below), hours of exposure during the day (see below), and the child’s ability to perform the task in each language. If they were not able to label any of the first seven test items spontaneously, the test was not administered in that language.

		0	1	2	3
English:	Understanding	Limited	Basic	Intermediate	Advanced Native-like
English:	Speaking	Limited	Basic	Intermediate	Advanced Native-like
Spanish:	Understanding	Limited	Basic	Intermediate	Advanced Native-like
Spanish:	Speaking	Limited	Basic	Intermediate	Advanced Native-like
		0	1	2	3
Español:	Comprensión	Limitado	Básico	Intermedio	Avanzado Como nativo
Español:	Hablar	Limitado	Básico	Intermedio	Avanzado Como nativo
Inglés:	Comprensión	Limitado	Básico	Intermedio	Avanzado Como nativo
Inglés:	Hablar	Limitado	Básico	Intermedio	Avanzado Como nativo

Please circle the language(s) each person communicates in **daily** with your son/daughter and indicate the amount of time each person spends with your child on an average weekday.

	Circle One Language Option			Circle One Hours Estimate						
Mother:	Spanish	English	Both	1	2	4	6	8	10	12
Father	Spanish	English	Both	1	2	4	6	8	10	12
Brother(s)	Spanish	English	Both	1	2	4	6	8	10	12
Sister(s)	Spanish	English	Both	1	2	4	6	8	10	12
Grandmother	Spanish	English	Both	1	2	4	6	8	10	12
Grandfather	Spanish	English	Both	1	2	4	6	8	10	12
Uncles/Aunts	Spanish	English	Both	1	2	4	6	8	10	12
Cousins	Spanish	English	Both	1	2	4	6	8	10	12
Others	Spanish	English	Both	1	2	4	6	8	10	12

A proficiency score was calculated based on the information provided by the parent. If a child received at least four points in a given language, and they were able to spontaneously label at least one of the first seven test items, the test was administered in that language.

239 children were included in the Spanish/Bilinguals in Spanish group, ages 3;0-10;11.

194 children were included in the Bilinguals in English group, ages 3;0-10;11

199 children were included in the English Only group, ages 3;0-10;11.

All of the children resided in Central Texas. Mexican Spanish was the dialect reported for 95% of those who speak Spanish. 90% of the children in the Bilingual

and Spanish groups were in dual language education programs, in which they were learning to read and write in both languages.

For the analyses of Sensitivity and Specificity, the children who participated in the standardization sample, and an additional 86 students were included. 63 were in the English group and 23 were in the Bilingual English and Spanish/Bilingual group.

Sensitivity and specificity were calculated with three cut-points for each group that correspond with the common clinical cut-points of 1 standard deviation below the mean (Standard Score = 85), 1.5 standard deviations below the mean (Standard Score = 77), and 2 standard deviations below the mean (Standard Score 70). The results are as follows.

Spanish/Bilingual Group

	Sensitivity	Specificity
1 SD below mean	0.94	0.90
1.5 SD below mean	0.72	0.92
2 SD below mean	0.56	0.95

Bilinguals in English

	Sensitivity	Specificity
1 SD below mean	0.92	0.87
1.5 SD below mean	0.92	0.93
2 SD below mean	0.77	0.96

English Only Group

	Sensitivity	Specificity
1 SD below mean	0.5	0.99
1.5 SD below mean	0.79	0.91
2 SD below mean	0.79	0.94

Based on the results of research indicating minimal differences in the Spanish productions of children who are monolingual Spanish speakers and those who are in the process of learning English as their second language, we opted to include a single Spanish normative set that includes children who are predominantly Spanish speaking and children who are bilingual speakers of English and Spanish. There are two separate English norms—one for monolingual English speakers and one for bilingual Spanish-English speakers. The majority of the bilingual participants in the sample have Spanish as their native language and we found very limited differences between the Spanish group and the Spanish bilingual group. There is evidence in the literature of L1 to L2 crossover in bilinguals but limited L2 to L1 crossover. See Pratt (2011) who found that the percent of consonants correct for Bilingual Spanish-English children and Monolingual Spanish children was not significantly different. When Bilingual Spanish-English speaking children were compared to

monolingual children in the English Context, there were significant differences. Thus for the English test, we have bilingual English and monolingual English norms.

Procedures

The BAPA is administered and scored on the iPad. For the specific instructions, please see the Smarty Ears website at:

<http://smartyearsapps.com/service/bilingual-articulation-phonology-assessment/>