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Development of Word Recognition Materials for Native Cebuano Speakers

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ABSTRACT

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Within recent decades speech audiometry materials have been developed in various languages in order to more accurately identify and evaluate hearing impairment in native speakers. This advantage, however, is not available to native Cebuano speakers. The purpose of this study was to develop, digitally record, evaluate, and psychometrically equate a set of Cebuano bisyllabic word lists for use in measuring word recognition ability. This process began with recording 260 commonly used bisyllabic Cebuano words by a native speaker noted for his quality and pleasantness of speech in his native tongue. These recordings were then evaluated by 20 normally hearing native Cebuano listeners (21 to 63 years old. Of these words, 200 were selected and then divided into 4 lists of 50 bisyllabic words and 8 half-lists of 25 bisyllabic words. Statistical analysis of the word recognition materials found no significant difference among the lists or half-lists. The mean psychometric function slope at 50% for the bisyllabic word lists and half-lists is 7.3%/dB. The mean 50% threshold for the lists was 19.7 dB HL (SD = 0.1dB. Adjustments were not necessary. The results of the current study are comparable to those found in other languages. Digital recordings of the bisyllabic word lists are available on compact disc.

Keywords: speech audiometry, word recognition, speech discrimination, speech recognition, Cebuano, Visayan, Philippines, bisyllabic

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DESCRIPTION OF THESIS STRUCTURE

This thesis, Development of Word Recognition Materials for Native Cebuano Speakers, is part of a larger research project and portions of this thesis may be published as part of articles listing the thesis author as a co-author. The initial pages of this thesis are written with traditional thesis requirements and the body is written as a journal article, and will be suitable for submission to a peer-reviewed journal in speech-language pathology after both portions are completed and combined. Supporting materials are provided as appendices including an annotated bibliography in Appendix A which addresses background research, studies, and articles related to the current project.

Introduction

Comprehensive Audiometric Testing

The presence, degree, type, and nature of a hearing impairment can be determined through audiological testing. A comprehensive audiological evaluation would include a number of assessments: otoscopy, tympanometry, acoustic-reflex threshold, air, and bone pure-tone audiometry and speech audiometry (American Speech-Language-Hearing Association, 1990). Otoscopy is a physical observation of the ear canal and tympanic membrane. Tympanometry measures the mobility of the eardrum and can detect damage therein, fluid in the middle ear, or other middle ear disorders. The acoustic reflex threshold relates to the middle ear muscle function and allows information to be gathered regarding the reaction of the ear to presentation of intense sounds. Pure-tone threshold testing is conducted using both air conduction and bone conduction audiometry. During a pure-tone assessment a listener is presented with a few frequencies at octaves and midoctaves that range between 125 Hz and 8000 Hz. Results from this testing show the intensity levels at which the listener can detect sound 50% of the time. Though unaffected by language or dialect, pure-tone testing alone does not produce a complete understanding of a listener's ability to hear and comprehend everyday communication (Egan, 1979). Pure-tone testing presents simple sinusoidal sounds, whereas measurement of speech comprehension is much more complex and therefore requires further evaluation using speech stimuli.

An audiological evaluation will commonly measure an individual's ability to perceive and process speech as well as pure tones. Speech audiometry consists of procedures that use speech stimuli to assess auditory function. The basis of speech audiometry is to measure an individual's sensitivity and understanding of speech (American Speech-Language-Hearing

Association, 1988). American National Standards Institute (2004) clearly states that the clinical significance of speech audiometry is dependent on the availability of standardized materials, particularly recorded speech materials. The speech recognition threshold (SRT) and word recognition scores (WRS) are the two typical speech audiometry measurements made during a comprehensive audiological evaluation. Due to the focus of the current project, only word recognition score testing will be discussed further.

Speech audiometry materials have evolved over the centuries. Egan (1944) put forth initial word lists that were used to measure word recognition performance. His criteria for word lists included monosyllabic structure, equal average difficulty of word lists, equal range of difficulty of lists, equal phonetic composition of lists, representative sample of American English and familiar words. With these criteria set Egan created 20 lists of 50 words known as Psycho-Acoustic Laboratory (PAL) PB-50 word lists. Hirsh et al. (1952) further developed speech audiometry materials by using Egan's PB-50 lists and having judges rate the familiarity of the words. Of Egan's 1000 monosyllabic words, 200 were selected and 4 new phonetically balanced lists were created called the Central Institute for the Deaf (CID) W-22 word lists 1-4. Hirsh et al. recorded these materials and used a VU meter to monitor his voice while producing a carrier phrase before each word. Original materials were recorded, however live voice has been used to present stimuli during WRS testing. The development of recorded materials, particularly the phonographic records followed by the compact disc, allow materials to become standardized. The American Speech-Language-Hearing Association (1988) recommends that recorded voice instead of live voice be used to ensure test-retest reliability, consistency, and accuracy during testing. Other WRS materials have been developed, however, they are not commonly used including Lehiste and Peterson's (1959) lists of phonemically balanced words and sentence level tests developed by Fletcher and Steinberg (1929). Fifty words are commonly used in word recognition testing materials for ease in conversion to a percentage score and to facilitate phonetic balancing. Beattie, Svihovec, and Edgerton's study (1978) briefly discussed the value of half-lists cutting word recognition testing time and avoiding listener fatigue. They also found that half-lists may be used as reliable screeners. Full-lists may be used for further assessment when there is reason to doubt the accuracy of the listener's word recognition ability based on a single half-list.

Today, word recognition testing is the most common method to assess a patient's ability to understand speech at suprathreshold levels. This testing is administered in either quiet or in noise, however, in the present investigation all testing was completed in a quiet environment. Listeners are not familiarized with the words presented to them, unlike SRT. The word recognition stimuli include a list of words that are commonly found in the listener's language (Carhart & Tillman, 1966). Many languages, including English, use monosyllabic words as they are commonly found in the language. Bisyllabic words have been used to measure WRS in other languages (Nissen et al., 2011; Nissen, Harris, & Dukes, 2008; Nissen, Harris, Jennings, Eggett, & Buck, 2005). Bisyllabic words are more commonly found in the Cebuano language, consequently, these words were used for word recognition testing in this study.

The word recognition stimuli are traditionally presented at a comfortable listening level 25-40 dB HL for normal hearing individuals and the listener repeats each word they hear (Hamid & Brookler, 2006; Penrod, 1980). Word recognition scores are obtained by calculating a percentage of correct responses for an entire list of words. Hamid and Brookler reported that a high score (90-100%) is expected for normally hearing individuals. Low word recognition scores are indicative of a hearing deficiency that impacts daily communication, particularly speech.

Lists and half-lists used to measure the WRS need to be equivalent to ensure reliability across each list (Beattie et al., 1978). There have been arguments regarding the consistency and reliability of scores for half-lists, however, a more recent study discovered that true phonetically balanced lists are impossible due to the phonetic construction of the English language (Grubb, 1963; Martin, Champlin, & Perez, 2000; Martin & Clark, 2009).

Speech audiometry testing in English has been of great benefit to native-English speakers. However, word recognition scores would not accurately represent a non-native English listener's ability to understand speech (American Speech-Language-Hearing Association, 1988; Rimikis, Smiljanic, & Calandruccio, 2013). The American Speech-Language-Hearing Association recommends that the listener be presented with task instructions in the language appropriate to the listener. It is obvious that non-native English speakers being administered speech discrimination tests should be presented with materials in their native language. Countries all around the globe lack the recorded media to perform speech audiometry in their own language and in their own countries. Consequently, they are unable to receive hearing services to better their quality of life. In the last few decades, speech audiometry materials have been produced in a number of languages other than English including Cantonese, Russian, and Mandarin (Harris et al., 2007; Nissen et al., 2011; Nissen et al., 2008). Efforts are being made to spread these materials and make them available in various countries. Currently, speech audiometry materials are not available in Cebuano, the second most common Filipino language (Cebuano, 2016). Digitally recorded speech audiometry materials in Cebuano that have been standardized with respect to audibility and psychometric function slope are in need of development. Thus, the purpose of this study is to develop, digitally record, evaluate, and psychometrically equate a set of Cebuano bisyllabic word lists for use in the measurement of word recognition ability.

Cebuano Language

Cebuano is one of over a hundred languages spoken in the Philippines. It originated on the Cebu Island, however, Cebuano is mainly spoken on central and southern Philippine islands including Bohol, Davao, Negros oriental, Southern Leyte, and Mindanao (Endriga, 2010). It is the most commonly used language by native-speakers in the Philippines. Tagalog, being the national Philippines language, is the most commonly used, but more often as a second language for Filipinos. In the Philippines, 15.8 million of the 100.98 million Filipinos speak Cebuano natively, and there are an additional 10 thousand Cebuano speakers in other countries (Cebuano, 2016). The Cebuano language belongs in the Austronesian family. It is categorized as Malayo-Polynesian, West-Malayo-Polynesian, Meso-Philippines, South Bisayan Language, Cebuano (Endriga, 2010; McFarland, 2004).

The diversity of dialects and languages in the Philippines can mainly be drawn back to a lack of communication between islands and cities as well as high communication among smaller communities. Cebu city is fortunate to have an easy-access port that has permitted more frequent communication across communities. Cebu is the second most populated city in the entire Philippines (Yu, 1975). Consequently, words often borrowed from the Cebuano language cause neighboring languages to appear more related to the Cebuano language (McFarland, 2004). The high level of interaction in Cebu is part of the reason why Cebuano shares words such as *mata* (eye), a less commonly used word, with other languages such as Tagalog, Hiligaynon, and Bikol. Each language has had a unique historical development of the sound system in the individual communities. This explains why a common word *rice* is *bugas* in Cebuano and Hiligaynon, but is pronounced as *bigas* in Tagalog and *bagas* in Bikol and Ilokano.

As mentioned above, Cebuano is spread across multiple islands of the Philippines. Various names and spellings are used to refer to Cebuano. The name Visayan (or Bisayan) is commonly used interchangeably by native Cebuano speakers. However, the name Visayan includes other languages or dialects spoken on Visayan Islands in central Philippines (Wolff, 1966). Visaya refers to a speaker of Visayan.

Cebuano speakers use an alphabet similar to the English alphabet consisting mainly of Roman characters. When the Spaniards conquered the Philippines, their first settlement was near Cebu city's current location (Rodriguez, 2014). Catholic missionaries came and studied the language of the people and as early as 1521, missionaries used the Roman alphabet to publish and preserve the native language (Endriga, 2010; McFarland, 2004). Spelling is separate from the phonetics and phonemics of the language. There are 16 unaspirated phonemic consonants: /b/, /k/, /d/, /g/, /h/, /l/, /m/, /n/, /ng/, /p/, /r/, /s/, /t/, /w/, /y/, and /ʔ/. The voiceless glottal stop can appear in between vowels and in all positions. Consonants that have been included in the Cebuano alphabet due to the common use of adopted words include /f/, /dʒ/, /kw/, /v/, and /ks/ (Cebuano Alphabet, 2015). The /r/ is produced with a particularly strong trill on many initial /r/ words and the /ng/ is foreign to the English alphabet.

Initially, there were three vowels in the Cebuano language: the high, back, rounded, lax /ʊ/, the high, front, unrounded, lax /ɪ/, and the open-mid, back, unrounded, lax /ʌ/ (Endriga, 2010). These vowels tend to be prolonged when they appear in an open accented syllable and short in an unaccented or closed syllable. Similar to the process and evolution of the original

Cebuano consonants, modern-day Cebuano now consists of seven vowels: /a/, /I/, /u/, /aʊ/, /aI/, /eI/, and /uI/ (Wolff, 1966).

Multisyllabic words are common in the Cebuano language (Wolff, 1966). Like English, there are consonant clusters, and diphthongs. Cebuano syntax adheres to verb-subject-object word order, but is also flexible. It is mainly an agglutinative language as morphemes are added to base morphemes. An added morpheme at the beginning of a verb commonly depicts the time the action took place. The language contains patterns that appear regularly through rise and fall of pitch. More stress is placed on a word with more phonemes and primary stress is placed on the second to last syllable (Shyrock, 1993). There are three case-marking particles in Cebuano: *ang*, *ug,* and *sa* that categorize how a subject or object is marked in a sentence (McFarland, 2004). *Ug* is an indefinite marker, while *ang* and *sa* are definite. *Mga* is the plural particle that is placed in front of the word. Cebuano also has a number of negation markers such as *wala* and *dili* that can be placed in front of a word.

Due to the limited clinical resources available for testing speech audiometry in Cebuano, there is a need for recorded and standardized speech audiometry materials in Cebuano. The purpose of this study was to develop, record, evaluate, and equate bisyllabic Cebuano word lists for use in measurement of word recognition scores.

Method

Subjects

A total of 20 native Cebuano speakers (18 female, 2 male) participated in the evaluation of the developed bisyllabic word lists in Cebuano for WRS materials. The ages of the subjects ranged from 21 to 63 years (M =38.3). Participants were bilingual, speaking English at least at a basic conversational level, with pure-tone air conduction thresholds of ≤20 dB HL at all octave and mid-octave frequencies ranging from 125 to 8000 Hz in at least one ear, which is referenced in Table 1. The mean pure tone average for the 20 participants was 5.5 dB HL. Additionally, each subject had an acoustic admittance between 0.3 and 4.3 mmhos with peak pressure between -10 and +50 daPa (American Speech-Language-Hearing Association, 1990). Subjects were recruited through phone, email, social media, and word of mouth. An informed consent document, approved through the Brigham Young University Institutional Review Board, was signed by each of the subjects. A copy of the informed consent document can be found in Appendix B.

Materials

Word lists. Bisyllabic Cebuano words were selected as the stimuli for word recognition testing. These words were selected from a corpus developed by Scannell (2007); 360 bisyllabic Cebuano words were chosen as stimuli for the word recognition materials. Two native Cebuano speakers reviewed and edited the initial lists to ensure that each list was representative of familiar, and common words in spoken Cebuano. Any words that were judged to be culturally insensitive or inappropriate were excluded from the study. This process resulted in 260 bisyllabic words for listener evaluation. A pilot study of one subject was conducted with the remaining 260 words presented at suprathreshold levels. A further 60 words were eliminated from the corpus after being rated as the most difficult to hear and understand. The remaining 200 words were used in data collection and divided into 4 full-lists and 8 half-lists.

Talkers. Initial test recordings were created using two native, male Cebuano speakers. Both self-reported to be from Cebu city in the Philippines and speak Cebuano regularly. After the initial recordings were made, a panel of six native Cebuano speakers rated the performance of each talker from best to worst based on vocal quality, Cebuano accent, and pronunciation.

Table 1

Pure-tone Threshold (dB HL) Descriptive Statistics for 20 Normally Hearing Cebuano Subjects

Frequency (Hz)	*M*	*Minimum*	*Maximum*	*SD*
125	8.3	0.0	20.0	5.7
250	5.8	0.0	20.0	5.9
500	4.8	-5.0	15.0	5.3
750	4.5	-5.0	15.0	5.6
1000	5.3	-10.0	15.0	7.0
1500	10.5	-5.0	20.0	7.6
2000	6.5	-5.0	15.0	6.5
3000	5.5	-5.0	20.0	6.5
4000	4.8	-5.0	15.0	6.0
6000	7.3	-5.0	20.0	9.2
8000	8.5	-10.0	20.0	7.6
PTA	5.5	-1.7	13.3	4.3

Note. PTA = arithmetic average of thresholds at 500, 1000, & 2000 Hz.

The highest ranked talker was designated for all subsequent recordings. The evaluation sheet for the Cebuano talkers can be found in Appendix C.

Recordings. Recordings were created in an Acoustic Systems' double-walled sound booth located on the Brigham Young University campus in Provo, Utah, USA. The sound booth exceeded standards for maximum permissible ambient noise levels for audiometric test rooms for ear uncovered conditions (American National Standards Institute, 1999). A Larson-Davis model 2541 microphone was positioned 15.24 centimeters from the talker at a 0° azimuth and was covered by a 7.62 cm foam windscreen. The microphone was connected to a Larson-Davis model PRM902 microphone preamp, which was coupled to a Larson-Davis model 2221 preamp power supply. The preamp power supply was set to 30 dB for the talker. The signal was digitized using an Apogee AD8000 24-bit analog-to-digital converter and subsequently stored on a hard drive for later editing. A 44100 Hz sampling rate with 24-bit quantization was used for all recordings, and every effort was made to utilize the full range of the 24-bit analog-to-digital converter.

During the recording sessions, the talker was asked to pronounce each target word at least four times, with a slight pause between each production. The talker was asked to speak at a natural rate with normal intonation patterns throughout each production. Any word judged to be poorly recorded (due to peak clipping, extraneous noise, etc.), mispronounced, or produced with an unnatural intonation pattern was rerecorded or eliminated from the study prior to listener evaluation.

The first and last repetitions of each word were excluded from the study to avoid possible list effects, unless it was judged to be the best pronunciation of the word by a Cebuano-speaking judge. A Cebuano-speaking judge rated the second and third repetitions of each word for perceived quality of production. The best production of each word was used in the listener evaluation. Following the word selection process, the intensity of each word to be included in the test materials was edited as a single utterance using Adobe Audition (Adobe, 2005) and Sadie Disk Editor software (SADiE, 2004). These utterances yielded the same average root mean square power as that of a 1000 Hz calibration tone, in an initial attempt to equate test word threshold audibility (Harris, McPherson, & Hansen, 2015). Finally, each of the edited words will then be individually saved as a 24-bit wav file.

Procedure

During the evaluation of the recordings, listeners were given rest periods to decrease the possibility of listener fatigue. In one session participants evaluated trisyllabic SRT words, and bisyllabic WRS words, although this researcher only evaluated data on the bisyllabic WRS words.

The presentation and randomization of the target words to the listeners was controlled by custom software. The signal was routed through the computer to the external input of a Grason Stadler model 1761 audiometer. The stimuli were then routed from the audiometer to the subject via a single TDH-50P headphone placed on the test ear.

Testing was conducted monaurally in the listener's ear that demonstrated the lowest pure tone average thresholds. If the threshold differences between the ears were minimal, the test ear was randomly determined. Testing was performed in a double-walled sound suite that met ANSI S3.1 standards for maximum permissible ambient noise levels for the ears not covered condition using one-third octave-bands (American National Standards Institute, 1999). Before each session of data collection, the external inputs to the audiometer were calibrated to 0 VU using a 1 kHz calibration tone. The audiometer was calibrated prior to, weekly during, and at the conclusion of data collection. Audiometric calibration will be performed in accordance with ANSI S3.1 specifications (American National Standards Institute, 2004).

Subjects were not familiarized with the bisyllabic words prior to testing. The 260 bisyllabic words were randomly grouped into 10 lists of 26 words each. These 10 lists were presented to the first 10 participants. The 260 words were then randomly regrouped in 10 different lists for presentation to the next group of 10 participants. In all, 10 presentation levels were selected for evaluation of the lists: -5 to 40 dB HL in 5-dB increments. One list was presented at each intensity level. Each subject listened to the presentation of the lists and the order of the words in a randomized order. Each word was presented an equal number of times at each intensity level across the entire participant population. Subjects were asked to repeat what they heard and their responses were scored as being correct or incorrect by a Cebuano-speaking judge. Prior to administering the WRS test words, the following instructions were given to the listeners:

> You will hear lists of Cebuano words at a number of different loudness levels. Each word is two syllables in length. At the very soft loudness levels it may be difficult for you to hear the words. Please listen carefully and repeat out loud the word that you hear. If you are unsure of the word, you are encouraged to guess. If you have no guess say, “I don’t know,” or wait silently for the next word. Do you have any questions?

Results

After the raw data were gathered, each bisyllabic word was assigned a difficulty ranking based on the number of times it was correctly identified across all intensity levels and subjects. The most perceptible 200 words were included in the final lists and half-lists. Words that were most frequently not understood were eliminated. The chosen 200 words were then divided into four lists of 50 words each using an s-curve distribution in order to make the lists relatively equivalent in terms of psychometric audibility. If words were to have the same number of correct responses they were randomly ordered before the s-curve was applied. The first four words in the list were assigned to separate lists. The first word was assigned to list 1 and the second word to list 2, etc. The following four words were assigned in the same manner, but in reverse order. This process was repeated until each list contained 50 words. The four equivalent Cebuano bisyllabic word lists are presented in Table 2. Appendix D contains a list of the selected 200 bisyllabic words and their definitions.

Eight half-lists of 25 words each were constructed after the creation of the four balanced 50-word lists. Two half-lists relatively equivalent in terms of psychometric audibility were formed from each full list. To do this, each list of 50 words was divided into 25 consecutive pairs. The first word from the first pair was allocated to half-list A and the second to the half-list B for each full-list. For each subsequent pair, this assignment process was reversed. The Cebuano bisyllabic half-lists are presented in Table 3.

After the creation of the bisyllabic lists and half-lists, logistic regression was used to calculate regression slopes and regression intercepts for each of the four lists and eight half-lists for the talker recordings. These regression slope and intercept values were then inserted into a modified logistic regression equation that was designed to calculate percentage of correct recognition performance at any specified intensity level. Percent correct values were then used to construct psychometric functions for each list and half-list. The logistic regression slope and intercept values for each list and half-list are presented in Table 4. The original logistic regression equation follows:

$$\log \frac{p}{1-p} = a + b \times i \qquad (1)$$

Table 2

Cebuano Bisyllabic Word Recognition Lists in Rank Order from Most Difficult to Easiest

List 1		List 2		List 3		List 4	
gayod	andam	unta	sukad	husto	bukton	dugang	wala
siglo	sulat	sanglit	yuta	tuod	namo	daplin	agi
hungtod	lokal	ngari	sumbong	kanding	daghan	gasa	bata
kinsa	awit	putli	patay	bungtod	upat	sagad	walay
kalit	tubag	tigi	walo	kami	bunga	grupo	dila
diin	minyo	gahom	kana	bulan	dili	pulos	arte
halos	daan	matang	pari	sayon	nawong	ngano	buot
sentro	gamit	bisan	utang	dali	gikan	langyaw	amo
ngadto	bukid	lagi	sayop	tawo	tunga	kaon	sulod
nasod	kabos	lawak	duol	kalag	bakak	dugay	tubig
tuig	asa	unom	isla	para	baba	nindot	mao
tanom	saksi	sagbot	usab	una	oras	kanhi	lahi
buhi	gugma	tingog	isip	halad	balik	puno	gubat
buta	ngalan	mata	unsa	gani	langgam	hapit	tiil
lamang	lawas	lana	buhat	uban	samtang	damgo	saad
lima	sala	mismo	bitaw	bahin	human	hayop	manok
dato	karon	pito	duha	dad-on	takos	klase	kita
sulti	ubos	lakip	gamay	banay	kusog	tuyo	diha
unya	bato	kuyog	sugo	kahoy	dagat	maoy	diay
pundok	sunod	kaha	ikaw	buang	hangin	angay	sama
dayon	layo	apil	ayaw	lungsod	grasya	dapit	yawa
lain	suga	tanan	gawas	labaw	usa	kilid	sakit
komiks	suba	langit	dako	tulo	kamot	baya	anak
sanga	bana	dugo	balay	ulan	buhok	bag-o	iro
balak	ako	adto	gusto	ulo	adlaw	dughan	anghel

Table 3

Cebuano Bisyllabic Word Recognition Half-lists in Rank Order from Most Difficult to Easiest

1A	1B	2A	2B	3A	3B	4A	4B
siglo	gayod	sanglit	unta	husto	tuod	dugang	daplin
hungtod	kinsa	ngari	putli	bungtod	kanding	sagad	gasa
diin	kalit	gahom	tigi	kami	bulan	grupo	pulos
halos	sentro	matang	bisan	dali	sayon	langyaw	ngano
nasod	ngadto	lawak	lagi	tawo	kalag	kaon	dugay
tuig	tanom	unom	sagbot	una	para	kanhi	nindot
buta	buhi	mata	tingog	halad	gani	puno	hapit
lamang	lima	lana	mismo	bahin	uban	hayop	damgo
sulti	dato	lakip	pito	dad-on	banay	klase	tuyo
unya	pundok	kuyog	kaha	buang	kahoy	angay	maoy
lain	dayon	tanan	apil	lungsod	labaw	dapit	kilid
komiks	sanga	langit	dugo	ulan	tulo	bag-o	baya
andam	balak	sukad	adto	ulo	bukton	dughan	wala
sulat	lokal	yuta	sumbong	daghan	namo	bata	agi
tubag	awit	walo	patay	upat	bunga	walay	dila
minyo	daan	kana	pari	nawong	dili	buot	arte
bukid	gamit	sayop	utang	gikan	tunga	amo	sulod
kabos	asa	duol	isla	baba	bakak	mao	tubig
gugma	saksi	isip	usab	oras	balik	lahi	gubat
ngalan	lawas	unsa	buhat	samtang	langgam	saad	tiil
karon	sala	duha	bitaw	human	takos	manok	kita
ubos	bato	gamay	sugo	dagat	kusog	diay	diha
layo	sunod	ayaw	ikaw	hangin	grasya	sama	yawa
suga	suba	gawas	dako	kamot	usa	anak	sakit
ako	bana	gusto	balay	buhok	adlaw	iro	anghel

Table 4

Mean Performance of Cebuano Bisyllabic Word Recognition Lists and Half-lists

List	a[a]	b[b]	Slope at 50%[c]	Slope 20-80%[d]	Threshold[e]	ΔdB[f]
1	6.27418	-0.31685	7.9	6.9	19.8	0.10
2	5.73209	-0.29092	7.3	6.3	19.7	0.00
3	5.47067	-0.27835	7.0	6.0	19.7	-0.05
4	5.53879	-0.28182	7.0	6.1	19.7	-0.05
M	5.75393	-0.29199	7.3	6.3	19.7	0.00
Minimum	5.47067	-0.31685	7.0	6.0	19.7	-0.05
Maximum	6.27418	-0.27835	7.9	6.9	19.8	0.10
Range	0.80351	0.03850	1.0	0.8	0.1	0.15
SD	0.36408	0.01740	0.4	0.4	0.1	0.07
1A	6.53278	-0.32992	8.2	7.1	19.8	0.10
1B	6.04310	-0.30517	7.6	6.6	19.8	0.10
2A	5.84946	-0.29689	7.4	6.4	19.7	0.00
2B	5.62116	-0.28529	7.1	6.2	19.7	0.00
3A	5.29089	-0.26850	6.7	5.8	19.7	0.00
3B	5.67096	-0.28929	7.2	6.3	19.6	-0.10
4A	5.84946	-0.29689	7.4	6.4	19.7	0.00
4B	5.26856	-0.26874	6.7	5.8	19.6	-0.10
M	5.76580	-0.29259	7.3	6.3	19.7	0.00
Minimum	5.26856	-0.32992	6.7	5.8	19.6	-0.10
Maximum	6.53278	-0.26850	8.2	7.1	19.8	0.10
Range	1.26422	0.06142	1.5	1.3	0.2	0.20
SD	0.41090	0.02001	0.5	0.4	0.1	0.07

[a]*a* = regression intercept. [b]*b* = regression slope. [c]Psychometric function slope (%/dB) at 50% was calculated from 49.999 to 50.001%. [d]Psychometric function slope (%/dB) from 20-80%. [e]Intensity (dB HL) required for 50% intelligibility. [f]Change in intensity required to adjust the threshold of a word to the mean PTA of the participants (5.5 dB HL)

In Equation 1, p is the proportion correct at any given intensity level, a is the regression intercept, b is the regression slope, and i is the presentation level in dB HL. When Equation 1 is solved for p and multiplied by 100, Equation 2 is obtained where P is percent correct recognition:

$$P = \left(1 - \frac{\exp(a+b\times i)}{1+\exp(a+b\times i)}\right) \times 100 \qquad (2)$$

In Equation 2, P is percentage of correct recognition, a is the regression intercept, b is the regression slope, and i is the presentation intensity in dB HL. By inserting the regression slope, regression intercept, and presentation level into Equation 2, it is possible to predict the percent correct recognition at any specified intensity level. Percentage of correct recognition was calculated for each of the bisyllabic words for a range of -8 to 40 dB HL in 2 dB increments.

Next a two-way chi-square analysis was completed to determine whether there was a significant difference among the four lists and the eight half-lists. A chi-square analysis revealed that there were no statistically significant differences among the 50% thresholds for the four Cebuano lists; $\chi^2(3, N = 20) = 2.12$, $p = .55$. No statistically significant differences were found among the slopes of the four Cebuano lists; $\chi^2(3, N = 20) = 2.05$, $p = .56$. The chi-square analysis also revealed that there were no statistically significant differences among the 50% thresholds for the eight Cebuano half-lists; $\chi^2(7, N = 20) = 3.28$, $p = .86$ nor were there statistically significant differences among the slopes of the eight Cebuano half-lists; $\chi^2(7, N = 20) = 3.32$, $p = .85$.

No significant difference was found among the four lists or the eight half-lists. Therefore no digital intensity adjustments were needed to increase the lists psychometric equivalence. The 50% threshold of all lists and half-lists was equal to 19.7 dB HL (SD = 0.1dB), the average of the list threshold. Figures 1 and 2 show list and half-lists without adjustments.

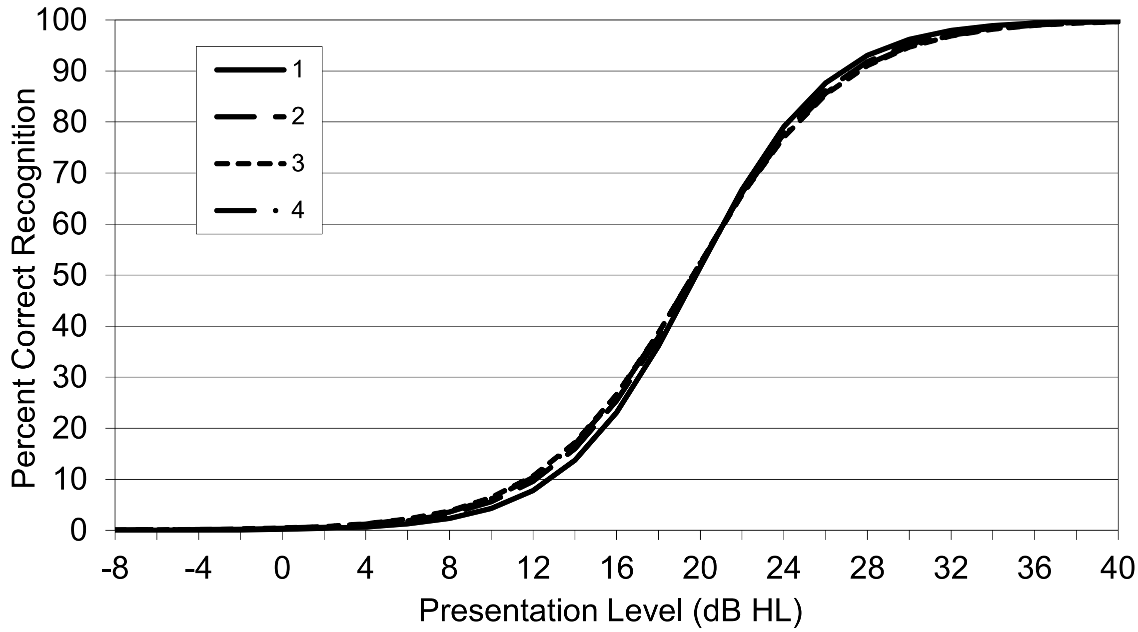

Figure 1. Psychometric functions for Cebuano bisyllabic word recognition lists.

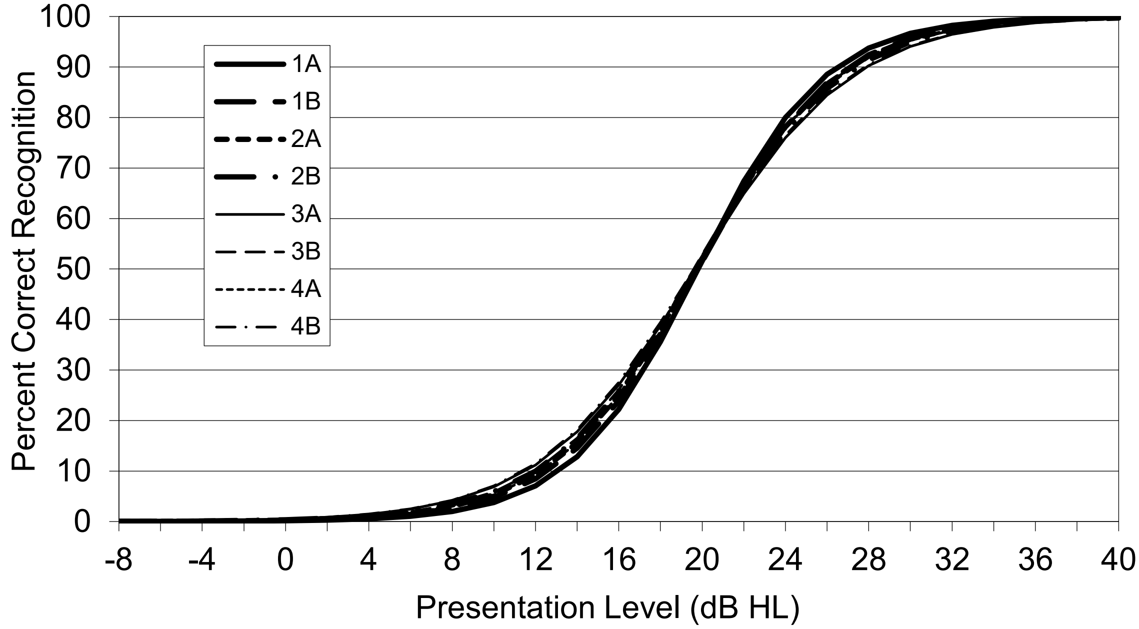

Figure 2. Psychometric functions for Cebuano bisyllabic word recognition half-lists.

Discussion

The purpose of this study was to create a set of bisyllabic Cebuano word lists and half-lists that are relatively equivalent in terms of psychometric slope and 50% threshold for normal hearing participants in order to measure word recognition ability. Results of the two-way chi-square analysis indicate that for normal hearing subjects, the lists and half-lists created are relatively homogenous with respect to audibility and psychometric function slope. The mean psychometric function slope at 50% for the bisyllabic lists and half-lists was 7.3%/dB for the talker recordings. The average psychometric function slope from 20 to 80% for the bisyllabic lists and half-lists was 6.3%/dB.

These results are comparable to those found in other languages. In another Asian language, Mandarin Chinese also used bisyllabic word lists for WRS materials. The psychometric function slope at 50% was reported as 7.3%/dB for male recordings and 8.2%/dB for female recordings (Nissen et al., 2005). Similarly, for Cantonese WRS materials, the mean slopes for male lists and half-lists at 50% were 7.5%/dB and 7.6%/dB (Nissen et al., 2011). The mean slopes for female lists and half-lists were 7.6%/dB and 7.7%/dB. For Vietnamese monosyllabic lists and half-lists, the psychometric function slope at 50% was reported as 5.1%/dB for the male talker recordings and 5.2%/dB for the female recordings (Harris et al., 2015). The average psychometric function slopes from 20 to 80% for the monosyllabic lists and half-lists was 4.4%/dB for the male recordings and 4.5%/dB for the female recordings. Russian monosyllabic WRS materials, reported the psychometric function slope at 50% was 5.8%/dB for male lists and 5.6%/dB for female lists (Harris et al., 2007). The use of both lists and half-lists provides flexibility in the clinic. Though the use of a single half-list may be adequate, multiple half-lists may be administered to a subject if there is reason for concern or doubt about the accuracy of the subject's word recognition abilities. Results of two or more half-lists may be averaged in order to obtain as accurate and representative results as possible (Penrod, 1980).

Conclusions and Future Research

This project is the first attempt to create speech audiometry materials for native Cebuano speakers. As the current study only examined performance for normally hearing participants, additional research and resources would further benefit this population. Future appendages to the current project could include administering this study to only monolingual Cebuano speakers. Many of the participants in this study spoke multiple languages due to having spent years on various islands in the Philippines where other languages were spoken. This factor may have influenced their responses.

Another area of further research to address is testing the specific population of native Cebuano speaking children. Children often possess a smaller vocabulary than the typical adult. It is likely that multiple words presented as stimuli in the study would be unfamiliar to children. This would cause their scores to be lower producing an inaccurate reflection of the children's word recognition abilities (Nissen et al., 2011). Consequently, the word lists and half-lists should be used in further research to compare WRS results of normal hearing adults with those of children.

Investigating the test-retest-reliability of these Cebuano speech audiometry materials should be an area of future research. In this current study the bisyllabic words were presented one time to each participant. In order to establish test-retest-reliability of these materials the bisyllabic words should be administered a second time to participants and results should highly correlate with the original results (Gelfand, 1998). In order for retest results to be insignificant, they must fall within the confidence limits meaning the disparity between the original scores and the retest scores could have been due to chance.

Another area of future research that deserves consideration is WRS evaluation of native Cebuano speakers with hearing impairment. The majority of WRS materials created today are produced by evaluating the word recognition scores of young adults with normal hearing. Jerger (2006) claimed that for test results to be accurate or homogenous the study must test a sample of the specific population the test is targeting. In McArdle and Wilson's study (2006) they evaluated list equivalency or homogeneity by comparing the results administered to a group of young adults with normal hearing to the results of a larger group of elderly individuals with typical sensorineural hearing loss. Both groups were administered test lists from the Quick Speech in Noise (QuickSIN) test. Results were significant and showed that all test lists administered to the young adults were homogenous. However, results from the elderly group showed that 4 of the 18 test lists appeared to be out of acceptable equivalency range for the elderly. This difference is significant and demonstrates the need for further testing with native Cebuano speakers who have a hearing impairment in order to determine homogeneity among the lists tested by individuals with normal hearing.

One further appendage to this study is word recognition materials being administered in a more realistic setting. A significant complaint associated with hearing impairment is the inability to understand speech within background noise (Wilson & McArdle, 2005). Therefore, testing that measures an individual's ability to understand speech with background noise should reflect this real life situation as closely as possible. Results gathered from this testing would also provide more accurate guidance on the most appropriate hearing amplification.

The purpose of this study was to develop, digitally record, evaluate, and psychometrically equate a set of Cebuano bisyllabic word lists and half-lists for use in the measurement of word recognition ability. A set of 4 lists and 8 half-lists of familiar Cebuano words have been created and are homogeneous with respect to audibility and psychometric function slope for word recognition testing. The audiometry materials created by this project have been produced for availability on compact disc or download. Appendix E contains a track list and definition of the final materials. The goal for this project is that these results and materials will benefit clinicians working with Cebuano speaking populations and institute a baseline for future research into Cebuano speech audiometry.

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APPENDIX A

Annotated Bibliography

American National Standards Institute. (1999). *Maximum permissible ambient noise levels for audiometric test rooms*. ANSI S3.1-1999. New York, NY: ANSI.

Summary: This is a standard specifying maximum permissible ambient noise levels allowed in an audiometric test room that produces negligible masking (≤ 2dB) of test signals presented at reference equivalent threshold levels specified in ANSI S3.6-1996. Maximum permissible ambient noise levels are specified from 125 to 8000 Hz in octave and one-third octave band intervals for two audiometric testing conditions (ears covered and ears not covered) and for three test frequency ranges (125 to 8000 Hz, 250 to 8000 Hz, and 500 to 8000 Hz).
Relevance to the Current Work: This national standard was intended for use by all persons testing hearing, as well as for distributors, installers, designers, and manufacturers of audiometric test rooms, and was therefore relevant for this study. The sound booth used for the current study exceeded the requirements set by this standard.

American National Standards Institute. (2004). *Methods for Manual Pure-Tone Threshold Audiometry*. ANSI S3.21-2004. New York, NY: ANSI.

Summary: This article discusses standardization and test-retest reliability of audiometers to maintain consistency across audiometers. Standard compliance includes requirements for safety, equipment setup, and calibration. Speech audiometry levels for calibration are specified for presentation of stimuli.
Relevance to the Current Work: The equipment used in this data collection process complied with the standards set by ANSI in this document.

American Speech-Language-Hearing Association. (1988). Guidelines for determining threshold level for speech. *ASHA, 30*(3), 85-89.

Summary: This article updated guidelines for determining the threshold level for speech, defining common terminology and recommending a standard speech threshold procedure. Speech threshold audiometry is used as a validity check for the pure-tone audiogram, due to the minimal differences between thresholds for spondaic words and averages of pure-tone thresholds. Speech threshold audiometry includes the use of an audiometer capable of speech as defined and calibrated according to established standards and a test environment that meets established criteria for background noise in audiometric rooms. Test materials should be homogeneous in terms of audibility. Selection of stimulus words may be altered for different clinical populations regarding age or language etc. Typically, clients respond by repeating the stimulus item or otherwise conveying recognition of test items. Recorded presentation of test materials is preferred to live voice, because it allows for better control of the testing environment and is standardized. Instructions for the task should be presented in the language appropriate to the client and should orient the client to the nature of the task, specify the mode of response, indicate that the test material is

speech and specify that the client should respond with only words from the test. The client should clearly understand the need to respond at faint listening levels and to guess when unsure. The client should be familiarized with the exact words in the list to ensure familiarity of words, the client can auditorily recognize each test word, and the client's responses can be accurately interpreted. During the preliminary phase of testing, one word is presented to the client at 30-40 dB above the estimated speech reception threshold. If the response is correct, then descend 10 dB decrements, presenting one spondaic word at each level until the client responds incorrectly. When one word is missed, present a second word at the same level; continue descending in 10 dB steps until two consecutive words are missed at the same hearing level. Increase the level by 10 dB; this defines the starting level. During testing, present two words at the starting level and at each successive 2 dB decrement. Continue this process if five out of the first six words are repeated correctly; otherwise, increase the starting level by 4-10 dB. The test is complete when the client responds incorrectly to five of the last six words presented. Threshold is calculated by subtracting the total number of correct responses from the starting level and adding a correct factor of 1.
Relevance to the Current Work: This standardized procedure for determining speech recognition thresholds presented information about the relationship between pure-tone and speech discrimination testing as well as parts of the testing process similar to word recognition testing.

American Speech-Language-Hearing Association. (1990). Guidelines for screening for hearing impairments and middle-ear disorders. *ASHA, 32*(Supplement 2), 17-24.

Summary: ASHA presents a series of guidelines for identifying persons with hearing impairments or ear disorders. The article primarily included examination of children and young adults. It included the importance of obtaining a case history, visual inspection of the ear, identification audiometry, and acoustic immitance measurements. Screening protocols involve the measurement of static admittance, equivalent ear-canal volume, tympanometric width. Static admittance is obtained by subtracting an estimate of the admittance of the ear-canal volume from the peak admittance. Equivalent ear-canal volume measurements exceeding the normal range of 0.6-1.5 cm3 (for adults) is strong evidence of tympanic membrane perforation. Authors note that these norms are suggested interim norms and that clinicians may wish to adjust these as needed. Acoustic reflex measures are also used in screening protocols for middle-ear disorders, though the absence of an acoustic reflex does not necessarily result from middle-ear disorder alone.
Relevance to the Current Work: The current study required subjects to participate in screening procedures, including acoustic immitance measurements before they were permitted to participate in further testing.

Beattie, R. C., Svihovec, D. A., & Edgerton, B. J. (1978). Comparison of speech detection and spondee thresholds and half- versus full-list intelligibility scores with MLV and taped presentations of NU-6. *Journal of the American Audiology Society, 3*(6), 267-272.

Objective: The purpose of this study was to answer the following questions: What is the (speech detection threshold) SDT-ST (spondee threshold) relationship in sensorineural

hearing losses? Is there substantial speech discrimination between monitored live voice and recorded presentation? The third purpose of this study is to compare half- and full-list SD's using the Auditec of St. Louis recordings of NU-6 on mild sensorineural hearing losses.
Design: Subjects participated in pure tone audiometry and a speech detection threshold was obtained. Next an 18-word spondee list was presented and thresholds were determined through monitored live voice. Speech intelligibility was assessed using NU-6 with MLV and recordings.
Study Sample: Participants included 163 males with mild sensorineural hearing loss who routinely participated in audiological evaluations. Their audiometric configurations were flat or mildly sloping and their ages ranged between 27 and 84 years old.
Results: For normal hearing participants the study yielded a similar relationship between speech detection threshold and spondee threshold. Monitored live voice did not result in a greater source of measurement error. Half-lists and full-lists had similar deviations and had no significant statistical difference.
Conclusions: According to this study, live monitored voice did not result in a greater probability of error than recorded voice. It was suggested that half-lists may be used as a reliable screening measure. Full-lists may be used for further assessment if necessary.
Relevance to the Current Work: This study provides insight and background into the use of half- vs full-lists in audiological assessment and the use of monitored live voice verses recordings.

Bell, S. (1978). Two differences in definiteness in Cebuano and Tagalog. *Oceanic Linguistics, 17*(1), 1-9.

Summary: This article discusses and compares definiteness in Cebuano and Tagalog. In Tagalog the final subject of a verb sentence is definite. Cebuano permits indefinite nouns to function as the subject of verbal sentences. Definite final objects, which are nonexistent in Tagalog are allowed in Cebuano. Final subject in Cebuano is constructed around the context. The marker *sa* is for definite final objects and *ug* is the marker for indefinite final objects. Whether or not these differences are the result of other differences between the languages is not discussed.
Relevance to the Current Work: The differences and similarities between Cebuano and other Filipino languages indicate that they are in no case the same language, as they possess different semantic or syntactic rules. This is important, as the purpose of the current work is to create audiological tests for native Cebuano speakers.

Blust, R. (1979). Coronal- noncoronal consonant clusters: New evidence for markedness. *Lingua: International Review of General Linguistics, 47*, 102-117.

Summary: This article summarizes similarities and differences between the Tagalog and Cebuano languages, specifically consonant clusters. Tagalog uses progressive and regressive assimilation and metathesis. The authors discuss the use of hemonasalic stops to coronal-noncoronal and voicing metathesis in the Cebuano language. This information leads to the idea of a universal hierarchy in unmarking, which Tagalog is more advanced in than Cebuano.

Relevance to the Current Work: This article provides information regarding differences between the Cebuano and Tagalog languages.

Bradlow, A. R., & Pisoni, D. B. (1999). Recognition of spoken words by native and non-native listeners: talker-, listener-, and item-related factors. *Journal of the Acoustical Society of America, 106*(4 Pt 1), 2074-2085.

Objective: The purpose of this study was to examine the combined effects of various talker-, item-, and listener-related factors on spoken word recognition by native listeners by using a carefully constructed multi-talker, multi-listener speech database.
Method: Ten native General American English talkers (5 male, 5 female) produced two lists of words at three speaking rates with 75 words each. One list contained lexically easy words and the other contained hard words. Speaking rates consisted of slow, medium and fast, however each talker was allowed to self-pace as long as each pace was distinct. An analysis of the word duration for each talker at each rate was used to ensure the distinct variety of the three rates. The two lists differed in word frequency, mean neighborhood density, and mean neighborhood frequency. All words had been judges as highly familiar by normal-hearing adults. All 150 words were presented in a random order to the talkers. Digital recordings were monitored and edited. The root-mean-square amplitude of each of the digital speech files was equated and converted for listener presentation. Listeners (with normal hearing) each transcribed the 150 words from one talker at one speaking rate. Words were presented in a random order at 70 dB SPL. Listeners were asked to type their response on the keyboard and accuracy included all letters included and in the correct order. Experiment two was an extension of the study to non-native listeners.
Results: This study showed that overall word intelligibility was adversely affected by lexical discriminability; easy words had higher overall intelligibility than hard words. This effect of lexical discrimination was a listener-related factor that results from knowledge on the part of the listener regarding the sound-based structure of the lexicon of the language. Faster speakers related to a decline in intelligibility this is likely due to the speaker making acoustic-phonetic adjustments as they change their speaking rate. Experience was an observed factor in listeners that made it possible for listeners to overcome other factors including speaking rate or lexical difficulty. Experiment two discovered that spoken word recognition by non-native listeners displayed the same overall patterns as for native listeners. Consistency by the talker in surface phonetic information (voice and articulation patterns) is critical for consistent intelligibility for first or second language learners. Words that are set apart in their lexical neighborhood were more accurately recognized.
Relevance to the Current Work: This study demonstrates the influence of talker consistency throughout the study and details the difficulties for non-native listeners in audiological studies.

Brandy, W. T. (2002). Speech Audiometry. In J. Katz (Ed.), *Handbook of Clinical Audiology* (5th ed., pp. 96-110). Philadelphia, PN: Lippincott Williams & Wilkins.

Summary: This resource reviews the historical development of speech testing materials and physiological, acoustic, linguistic and psychological bases of the speech signals used. The author focuses on SRT and WRS testing. The procedure for WRS testing was outlined including previous studies that have added to the standard of testing today (Hirsh (1952), Lehiste and Peterson (1959), Egan (1948), and Causey (1984), among others). Factors affecting WRS testing were addressed: materials, test environment, test equipment, recorded vs live voice, male vs female voice, using a carrier phrase or not, level of presentation, full vs partial list, and masking.
Relevance to the Current Work: Historical background and purposes of WRS testing were clearly reviewed and outlined in this resource.

Buckey, J., Fellows, A., Jastrzembski, B., Maro, I., Moshi, N., Turk, M., . . . Kline-Schoder, R. (2013). Pure tone audiometric threshold assessment with in-ear monitoring of noise levels. *International Journal Audiology, 52*(11), 783-788. doi: 10.3109/14992027.2013.821207

Objective: The purpose of this study was to define the reliability of threshold measurements without the use of a sound booth, using in-ear probes and noise-attenuating hearing protectors.
Design: A laptop-based hearing test system with a 1/3 band study was used for initial audiological tests including threshold audiometry, distortion production otoacoustic emissions, and gap detection testing.
Study Sample: Three participant groups were used: a US group, a Tanzania group, and a normal-hearing group for calibration. One hundred subjects were used for the US group (M_{US} = 39 years); Adult Tanzanian included 624 subjects (M_{AT} =39 years); Pediatric Tanzanian included 197 subjects (M_{PT} = 10 years).
Results: In-ear noise measurement results are repeatable. The in-ear noise levels met the maximum permissible ambient noise levels for uncovered ears; however, the dB SLP levels did not meet requirements for 0 dB HL between 2000-4000 Hz.
Conclusions: Audiometric tests may be conducted using in-ear measurements as well as noise-attenuating hearing protectors.
Relevance to the Current Work: Access to sound-proof facilities is rare in the Philippines. This method could be used to obtain an accurate measure of the native Cebuano speakers' dB HL without the use of a sound booth.

Canizalesa, L.-F. S. a. L. A. (2013). Dialectal Effects on a Clinical Spanish Word Recognition Test. *American Journal of Audiology, 22*, 74-83. doi: 10.1044/1059-0889(2012/12-0036)

Objective: This study evaluated how dialectal differences affect Spanish/English bilingual individuals' performance on a word recognition test in Spanish.
Method: Forty Spanish/English bilinguals participated in the study (20 dominant in each language). From each group, 10 listeners spoke the Highland dialect, and 10 spoke the Caribbean/Coastal dialect. Listeners were randomly presented 4 lists of Auditec Spanish bisyllabic words at 40 dB SL (pure-tone average). Each list was randomly assigned with a signal-to-noise ratio (quiet, +6, +3, or 0 dB, in the presence of speech-spectrum noise).

Results: Dialect and language dominance both significantly affected listener performance on the word recognition test. Higher performance levels were obtained with Highland than Caribbean/Coastal listeners and with Spanish-dominant than English-dominant listeners. The dialectal difference was particularly evident in favorable listening conditions (i.e., quiet and +6 dB SNR) and could not be explained by listeners' familiarity with the test words.
Conclusions: Dialects significantly affect word recognition of Spanish-speaking clients. Phonetic features of the dialect should be taken into consideration when scoring a client's performance.
Relevance to the Current Work: This article articulates concerns with various dialects in a language. Cebuano, like Spanish, has a number of dialects that could possibly impact the word recognition performance of some native Cebuano speakers.

Carhart, R., & Tillman, T. W. (1966). *An expanded test for speech discrimination utilizing CNC monosyllabic words: Northwestern University Auditory Test No. 6.* Brooks Air Force Base, TX: USAF School of Aerospace Medicine.

Objective: This study revised and expanded the N.U. Auditory Test No. 4 in order to create a set of speech discrimination materials using consonant-nucleus-consonant monosyllabic words.
Design: Four groups of 50 words were selected that conformed as closely as possible to the phonemic distribution advocated by Lehiste and Peterson. Lists were randomized four times to and then a 32-year-old male recorded the initial words. These words were then evaluated by listeners for inter-list equivalence and test-retest reliabilities. Each participant underwent two testing sessions. Listeners participated in SRT testing before the CNC words were tested. Discrimination scores for each list were measured by presenting the lists at six different sensation levels (-4, 0, 8, 16, 24, and 32 dB HL)
Study Sample: Twenty-four students (age19-28 years) participated in this study as the normal hearing group. The experimental group contained 12 additional participants (41-67 years) who had experienced progressive hearing loss during adulthood. All participants in the experimental group had spondee threshold hearing levels within the range of 20 to 60 dB, with a discrimination score of at least 70%.
Results: A few differences were discovered between normal hearing and hearing impaired participants. The normal hearing group's psychometric function slope was about 5.6%/dB, the hearing impaired group sloped more gradually (about 3.4%/dB). Second, the inter-subject variability in performance at and above the 8-dB sensation level was much greater for the hearing impaired group than for the normal group. Third, minor differences in group performance from list to list were found for the normal listeners; the sensorineural group had similar psychometric function slopes but were slightly displaced from one another on the sensation level scale. Good test-retest reliability was found and correlates with N.U. Auditory Test No. 4, though there was a tendency for discrimination scores to improve slightly in retest.
Conclusions: The authors found articulation functions with approximately the same slope as N.U. Test 4. Because Test 6 contains twice the vocabulary of the original test, the authors put this work forth as a useful addition to the array of available speech audiometry assessments.

Relevance to the Current Work: This study includes testing subjects who possess hearing impairment and the results may be compared for testing on Cebuano subjects results with hearing impairment. Possible concerns with the speech audiometry testing for those with hearing impairment are addressed.

Cebuano. (2016). *Ethnologue: Languages of the world* (19th edition). Retrieved from http://www.ethnologue.com/language/ceb

Summary: This website provides demographic and statistical information regarding the Cebuano language. Population and area information was discussed.
Relevance to the Current Work: This website provides information about the language of the current study and establishes validity for creating materials in Cebuano.

Cebuano Alphabet. (2015). Retrieved from http://learn101.org/cebuano_alphabet.php

Summary: This webpage includes similified lessons on how to speak Cebuano. It provides basic information regarding the Cebuano alphabet. The evolution of the language is discussed including the adoption of words from various langauges.
Relevance to the Current Work: This page provides insight into the construct of the Cebuano language and its development.

Dirks, D. D. (2004). Neighborhood Activation in Spoken Word Recognition. *Seminars in Hearing, 25*(1), 17-24. doi: 10.1055/s-2004-823044

Summary: Two fundamental parts of speech recognition include activation and competition. In order to discriminate memory and selection are involved. This article focuses on the Neighborhood Activation Model and various components. Results show that NAM may be generalized to word recognition performances of those with sensorineural hearing loss and persons for whom English is not their first language.
Relevance to the Current Work: This article provides cognitive background of what is required by the listener during word recognition testing.

Egan, J. P. (1979). Basic aspects of speech audiometry. *Ear, Nose, and Throat Journal, 58*(5), 190-193.

Summary: This article discusses the process for speech audiometry including speech recognition threshold and speech discrimination testing. Details were provided in terms of the commonly used audiometric test: CID W-22 Auditory Test. It outlined the purposes and uses of speech audiometry.
Relevance to the Current Work: Specific purposes of speech audiometry and their necessity were outlined. These include a measurement of people's ability to understand speech, ability to estimate degree of difficulty in understanding speech and determining the site of pathology whether it is conductive or sensorineural, it also determines candidacy for hearing aids and prognosis for aural rehab. Details for how speech audiometry is conducted were outlined and explained.

Egan, J. P (1944). *Articulation Testing Methods, II*. OSRD Report No. 3802. Cambridge, MA: Pscyhoacoustic Laboratory, Harvard University.

Summary: Egan's paper discussses the methods he uses for three different tests: articulation test, subjective appraisals and threshold tests. He discusses PAL monosyllabic word lists and how they evolved. He began with 24 lists of 50 words and these lists were based on phonetic composition of the first part of the word. New lists were made that ensured phonetic balance. He reported that lists of 25 words being PB were not a success, thus 50 words were used. He discussed the 6 requirements he had for each list. He also discussed communication in other testing methods and discussed them in detail including representation of fundamental speech sounds, types of test items and difficulty and reliability of test lists.
Relevance to the Current Work: Egan completed significant initial work on word lists that was foundational to how far word lists have come today. His requirements for phonetically balancecd lists is dicussed and his process of elimianting and choosing appropriate words for the word lists are discussed.

Endriga, D. A. P. (2010). *The dialectology of Cebuano: Bohol, Cebu and Davao*. University of Asia and the Pacific.

Summary: This article discusses the spoken and written Cebuano language. The grammar and phonology are also discussed in detail. History of the language and linguistic statistics are provided.
Relevance to the Current Work: Background on Cebuano's linguistic lineage is noted. Details of the language including phonological and syntactic patterns are discussed. Familiarity or popularity of the language is also considered.

Fletcher, H., & Steinberg, J. (1929). Articulation testing methods. *Bell System Technical Journal, 8*(4), 806-854.
Summary: This article discusses the methods that have been useful in determining the defects in transmission as well as production and reception of speech. Words and sentences have been used in English for testing purposes. With sentences as testing materials a new element enters- though or meaning that go along with the words in the sentence. Requirements for sentence testing are discussed.
Relevance to the Current Work: This article discusses sentence recognition testing which is another form of testing for word recognition, however, the current project does not use sentences, but words.

Fuentes, G. G. (2000). The status of implementation of the 1987 Policy on Bilingual Education in Cebuano and Hiligayon tertiary institutions. *Philippine Journal of Linguistics, 31*(2), 115-125.

Objective: This study reviewed the effects of the 1987 Bilingual Education Policy on bilingual language proficiency in English and Filipino. The policy was enacted by the National Board of Education and was a revision of the original policy written in 1974.

Design: A survey was conducted regarding the implementation of the Bilingual Education Policy in schools. Filipino language refers to Tagalog in this study.
Study Sample: A total of 24 schools from four non-Tagalog provinces, including Cebu, Negros Oriental, Negros Occidental, and Iloilo, that were originally sampled before the 1987 policy was enacted were reviewed. Two school administrators, two faculty members, and two student leaders for a total of six respondants from each school were interviewed. Four classroom observations from each school were incorporated as well: two social science classes, one math class, and a natural science class.
Results: Zero of the 24 schools surveyed were compliant with the Bilingual Education Policy standards. This lack of compliance was attributed to a lack of support from the government in implementation as the cause.
Conclusions: Cebuano speakers do not think of Filipino as a language of national identity. In addition, a significant portion of Cebuanos compared to Ilonggos and Negresnses, believed that the Bilingual Education Policy would not guarantee the development of nationalism. English is the preferred method of instruction between English and Tagalog for these populations as well, with 72% of Cebuanos resisting the use of Tagalog in the education system. English is viewed as the language of education, and allows increased chances of economic success.
*Relevance to the Current Work:*This study demonstrates the various aspects of culture that impact the Filipino languages and their commonality. This study provides further validity of the need for materials in the Cebuano language.

Gelfand, S. A. (1998). Optimizing the reliability of speech recognition scores. *Journal of Speech, Language, and Hearing Research, 41*(5), 1088-1102.

Summary: Gelfand discusses speech recognition assessment. In particular, he addresses the principles of reliable tests and he discusses the binomial model that revealed approximately 450 scorable items are needed to optimize reliability for speech recognition testing. Significance of results based on confidence intervals was discussed. He also discussed signal-to-noise ratio and phonemic scoring verses whole-word scoring. He discusses the common characteristics of speech recognition testing including real monosyllabic words, open-set, verbal response and right/wrong scoring.
Relevance to the Current Work: Test-retest-reliability is an area of future research that should be explored in regards to speech audiometry materials in Cebuano.

Ghazali, K. (1990). Nominative nominals and focus construction in Cebuano. *Philippine Journal of Linguistics, 21*(2), 51-56.

Summary: This article discusses grammatical characteristics of the Cebuano language. Cebuano is the common language used by Filipinos (between seven and 10 million) in the Visayan Islands as well as Northern and Central Mindanao. Cebuano sentences contain a topic and a predicate. There are two forms of sentences: verbal and non-verbal. Verbs are absent in non-verbal sentences and exist in many forms. As a verb-initial language, Cebuano sentences have a verb followed by nominal phrases. Although the verb begins the sentence, the subject is given the most weight in the sentence. The verb is marked for voice: active, objective, locative, and instrumental based on the subject.

Relevance to the Current Work: This article provides general information on various grammatical aspects of the Cebuano language.

Grubb, P. (1963). A phonemic analysis of half-list speech discrimination tests. *Journal of Speech and Hearing Research, 10*(6), 294-297.

Summary: This study faces the dilemma of splitting whole word lists in half for the sake of time. These researchers argue that splitting the lists cause the whole list to no longer be phonetically balanced. Included are possible types of errors that may occur during testing that are more apparent with fewer test items.
Relevance to the Current Work: This study provides background and argument toward splitting the word recognition 50-word lists in half.

Hamid, M., & Brookler, K. (2006). Speech Audiometry. *Ear, Nose, and Throat Journal, 85*(12), 810-811.

Summary: Hamid provides significant information on WRS as an essential part of comprehensive audiometric tests. Word recognition scores help otologists determine level of hearing dysfunction and whether HA's are necessary or useful. It is recommended that live voice not be used to ensure reliability, consistency and accuracy. WRS is determined at 40 dB SL and classifications are as follows: Normal 90%, fair to good 50-80%, poor <50%. A drop in WRS of more than 20% at higher presentation levels may suggest retrocochlear dysfunction. A 20% difference between two test scores is statistically significant with 50-word lists. And a disproportionate differences between PTA and WRS leads one to question a cochlear hearing loss, retrocochlear dysfunction and pseudohypoacusis.
Relevance to the Current Work: This article includes classifications for WRS scores as well as possible causes for disproportionate scores between WRS and PTA. It also regards the value of using recordings rather than live voice.

Harris, R. W., McPherson, D. L., & Hansen, C. M. (2015). Vietnamese speech audiometry materials [Compact Disc]. Provo, UT: Brigham Young University.

Objective: The purpose of this study was to develop psychometrically equivalent bisyllabic Vietnamese words for testing the speech recognition threshold.
Design: Common Vietnamese bisyllabic words (89) were selected and recorded by male and female native Vietnamese speakers. The recordings were presented to native Vietnamese listeners for evaluation in 2 dB increments.
Study Sample: Twenty, native Vietnamese speakers with normal hearing were selected for this study. Their ages ranged from 18 to 26 years.
Results: 48 bisyllabic words were found to have suitable steep psychometric function slopes. The intensities of these words were digitally adjusted to match the listeners' mean pure tone average. The mean slopes for the selected bisyllabic words were 9.1%/dB HL to 17.1%/dB HL for the female talker.

Conclusions: The bisyllabic words became homogeneous with respect to audibility and psychometric function slope after adjustments were made. They were then placed on a compact disc for future clinical use.
Relevance to the Current Work: This study provides insight into the development of bisyllabic speech audiometry materials (particularly SRT) for non-native English speakers.

Harris, R. W., Nissen, S. L., Pola, M. G., McPherson, D. L., Tavartkiladze, G. A., & Eggett, D. L. (2007). Psychometrically equivalent Russian speech audiometry materials by male and female talkers. *International Journal of Audiology, 46*(1), 47-66. doi: 10.1080/14992020601058117

Objective: The purpose of this study was to develop and evaluate speech audiometry materials that can be used to measure word recognition and SRT testing in quiet environment for native Russian speakers.
Design: Familiar monosyllabic and bisyllabic words were recorded using a female and male voice. These recordings were evaluated by native Russian speakers. The logistic regression was used and psychometric functions were calculated for all words. Monosyllabic words were digitally adjusted to create WRS lists.
Study Sample: 20 native Russian speakers were selected based upon 2 broad regions and on cultural identity and place of origin. Their ages are 16-50 years (M=25.7). Each had pure tone air- conduction threshold greater or equal to 15dB HL at octaves and mid octaves at frequencies at and between 125 Hz and 8000 Hz. Each also participated in an otoscopic screener. Each had static acoustic admittance between .3 and 1.4 mmhos with a peak pressure of -100 + 50 daPa. Their ipsilateral acoustic reflex was as high as 95 dB HL at 1000 Hz. The mean PTA was .42 dB HL.
Results: Psychometric functions were calculated with logistic regression for all words. This was done by digitally adjusting selected monosyllabic words to create words lists for WRS that were homogenous in terms of psychometric slope. To establish SRT materials steep psychometric function slopes were chosen and digitally made to match the PTA of the Russian listeners.
Conclusions: The chi-square analysis was used to show that the word lists were relatively homogenous for normal listeners. As well, they are relatively similar in psychometric function slope to speech audiometry materials in English. These materials are available in CD form.
Relevance to the Current Work: This study is very similar to the scope of the current study. It provides insight into the process of creating speech audiometry materials in another language. Many resources were sited in reference to benefits of these materials and those factors that affect the validity and reliability of speech audiometry testing.

Hirsh, I. J., Davis, H., Silverman, S. R., Reynolds, E. G., Eldert, E., & Benson, R. W. (1952). Development of materials for speech audiometry. *Journal of Speech and Hearing Disorders, 17*(3), 321-337.

Objective: The purpose of this study was to create a series of clinical audiological tests to eliminate deficiencies and replace the recorded PAL Auditory Tests 14 and 9 and Egan's

phonetically balanced (PB) lists. The resulting tests were entitled C.I.D. Auditory Test W-1, C.I.D. Auditory Test W-2, and C.I.D. Auditory Test W-22.
Design: Spondaic words (84) were selected by judges based on familiarity, recorded and then used to test listeners' threshold. Listeners repeated each word after it was played at 4, 2, 0, -2, -4, and -6 dB relative to the threshold that had been obtained for PAL Test 9. Unsuitable words were eliminated and 36 words resulted and were randomized into 6 lists. Next, experienced and inexperienced listeners were tested in order to discover words deemed to be more difficult or easy and then the mean were adjusted down or up by 2 dB. Test W-2, the same 36 words were used, but the intensity of the words was attenuated within each list of 3 dB every three words, to allow for faster test pacing. Each participant listened to all six randomizations of W-2 to obtain thresholds. Test W-22 consisted of 200 monosyllabic words divided into four 50-word lists, each of which was phonetically balanced. Five people rated the words for familiarity, resulting in a selection of 120 words. An additional 80 words were added from various sources, resulting in 200 total words. These words were checked for their common use among English words. The words were then recorded (by a male) and randomizations of each list were created. Three groups of listeners were used to assess the W-22 materials. The first group listened monaurally to all 24 lists at a high level before hearing each of the 24 lists in random order from 20 to 70 dB SPL in increments of 10 dB. The second group listened under similar conditions, except that the lists and levels were in different order and the level of 15 dB SPL was added. The third group first listened to all lists at 100 dB before listening to each word order at 50, 40, 30, 20, and 10 dB SPL. The final version of the W-22 test materials were played to 15 listeners in groups of 5 at 80 dB SPL to check the maximum articulation score and at 25 dB SPL to check scores close to threshold.
Study Sample: Six listeners (experienced and inexperienced) were used to create Test W-1 materials; each listener had normal pure-tone audiograms. The second round of testing included six experienced and six inexperienced listeners. For Test W-2, 14 listeners who listened to the W-1 disc recordings were used. To test the lists created for Test W-22, three groups of 5 listeners with normal hearing participated.
Results: For Test W-1, the absolute thresholds for inexperienced and experienced listeners were 21 dB and 20 dB SPL, respectively. For Test W-2, the mean absolute threshold for the 14 listeners was 17.7 dB SPL. Analysis of variance showed no significant differences in difficulty between the W-2 discs. Results for Test W-22 indicated no consistent differences between scores on the four different lists.
Conclusions: The results indicated that the difference between thresholds for the W-1 and W-2 tests was attributable to the number of words for each experiment. The authors concluded that the intelligibility of spondee words increases more rapidly with an increase in intensity than does the intelligibility of monosyllabic words. They also surmised that the threshold level for a list of spondees is lower than the threshold for a list of phonetically balanced monosyllabic words.
Relevance to the Current Work: This article demonstrates the early process for developing recorded and psychometrically equated speech audiometry materials.

Hudgins, C. V., Hawkins, J. E., Karlin, J. E., & Stevens, S. S. (1947). The development of recorded auditory tests for measuring hearing loss for speech. *The Laryngoscope, 57*, 57-89.

Objective: The purposes of this study were to gain further insight into problems related to speech audiometric testing, to produce a test capable of measuring all degrees of hearing loss, and to determine the possibility of differentiating between hearing loss that affects high frequencies and hearing loss that is constant across all frequencies.
Design: Certain criteria should be met when selecting stimuli for audiometric testing. These include familiarity, phonetic dissimilarity, normal sampling of English speech sounds, and homogeneity with respect to basic audibility. The authors present a series of audiological tests, including the benefits and limitations of each test, as well as instructions for administering such tests to listeners. Auditory Test No. 9 (Threshold of Hearing for Words) and Auditory Test No. 12 (Threshold of Hearing for Sentences) were selected for the second purpose of this study. Auditory Test No. 9 consisted of two lists of 42 bisyllabic spondaic words; these were found to have a uniformly high audibility compared to words with differing stress patterns.
Study Sample: Each auditory test was administered to a variety of participants; for Auditory Test No. 9, 30 participants with normal hearing were used, followed by three groups totaling 70 hard-of-hearing participants. For Auditory Test No. 12, two groups of normal participants and two groups of hard-of-hearing participants were used. The total number of normal participants was 68, and the total number of hard-of-hearing participants was 49.
Results: For Auditory Test No. 9, the standard error of measurement obtained from the normal participants was 2 dB, whereas the standard error of measurement for the three hard-of-hearing groups ranged from 2.1 to 2.8 dB. For Auditory Test No. 12, the standard errors of measurement obtained from the two groups of normal participants were 2.8 and 2.2 dB, whereas the standard errors of measurement for the two hard-of-hearing groups were 2.3 and 1.4 dB.
Conclusions: The authors concluded that a single administration of Auditory Test No. 9 would give a score falling within 2.8 dB of the subject's true score on the test, regardless of the listener's hearing ability. Instructions for administering the tests are also presented.
Relevance to the Current Work: This article provides guidelines for the creation of speech audiometry tests.

Jerger, J. (2006). Are some more equal than others*? Journal of the American Academy of Audiology, 17*(3), i-i.

Summary: Jerger discusses inter-list equivalence of speech audiometric materials. He said that "in this age of outcome measures," it is vitally important that a test of speech recognition, either in quiet or in the presence of background competition, yield the same score no matter which list of materials is used. To prevent problems such as ceiling effects low pass filters are often applied. He discussed Wilson and McArdle's study in which they administered 18 QuickSIN sentence lists to 24 young adults with normal hearing and 72 elderly individuals with presbyacusic sensorineural hearing loss. List equivalency was acceptable for the young adults, but 4 of the 18 were out of acceptable range for the elderly.
Relevance to the Current Work: Jerger discusses future research possibilities including the need to test the targeted population for accurate results.

Lanaria, L. (2009). Lawas: An anthropo-theological discourse on the body in a Cebuano-Visayan language context. *Philippine Quarterly Of Culture and Society, 37*(1), 55-82.

Summary: This article discusses the importance of expressions in the Cebuano language. The author summarizes its usage across multiple types of idioms.
Relevance to the Current Work: One aspect of the Cebuano language was discussed providing background knowledge of the Cebuano language.

Lehiste, I., & Peterson, G. (1959). Linguistic considerations in the study of speech intelligibility. *Journal of the Acoustical Society of America, 31*(3), 280-286.

Summary: This resource reviews the historical development of speech testing materials and physiological, acoustic, linguistic and psychological bases of the speech signals used. The author focuses on SRT and WRS testing. The procedure for WRS testing was outlined including previous studies that have added to the standard of testing today (Hirsh (1952), Lehiste and Peterson (1959), Egan (1948), and Causey (1984), among others). Factors affecting WRS testing were addressed: materials, test environment, test equipment, recorded vs live voice, male vs female voice, using a carrier phrase or not, level of presentation, full vs partial list, and masking. Phonemic balance was emphasized.
Relevance to the Current Work: Historical background and purposes of WRS testing were clearly reviewed and outlined in this resource.

Martin, F. N., Champlin, C. A., & Perez, D. D. (2000). The question of phonetic balance in word recognition testing. *Journal of the American Academy of Audiology, 11*(9), 489-493.

Summary: This study compared phonetically balanced lists with random words. Four lists were taken from the Northwestern University Test No. 6 and four lists were words randomly chosen from a dictionary. No clinically meaningful differences were observed among the lists.
Relevance to the Current Work: This study considers the significance of phonetically balanced lists and deduces that it is not a significant factor in determining word recognition ability through performance- intensity functions.

Martin, F. N., & Clark, J. G. (2009). Speech Audiometry *Introduction to Audiology* (10th ed., pp. 126-164). Boston: Allyn and Bacon.

Summary: This chapter provides an overview of speech audiometry. Examples of audiological equipment, ideal testing conditions, clinician and patient roles in testing, and speech-threshold testing are given. Descriptions and details on how to obtain SRT as well as comfortable listening levels are discussed. A more detailed discussion on WRS procedures is included.
Relevance to the Current Work: This source provides insight into the word recognition audiometry procedures and the history of these procedures.

McArdle, R. A., & Wilson, R. H. (2006). Homogeneity of the 18 quicksin lists. *Journal of the American Academy of Audiology, 17*(3), 157-167.

Summary: The author's study administered 18 QuickSIN sentence lists to 24 young adults with normal hearing and 72 elderly individuals with presbyacusic sensorineural hearing loss. List equivalency was acceptable for the young adults, but 4 of the 18 were out of acceptable range for the elderly. To prevent problems such as ceiling effects low pass filters are often applied. Results often show that the elderly have high variability in their recognition performance.
Relevance to the Current Work: This study emphasizes the need for future research in testing native Cebuano speakers with hearing impairment in order to ensure homogeneity among the word lists.

McFarland, C. D. (2004). The Philippine language situation. *World Englishes, 23*(1), 59-75.

Summary: This source discusses the aspects of multiple languages in the Philippines. Reasons for the number of languages and whether they are languages or dialects. Their family language origins are discussed. Their grammatical similarities and differences were noted. Grammatical differences including the use of *sa,* plural particles, and case-marking particles are addressed in the various languages.
Relevance to the Current Work: This author discussed Cebuano grammar, origin as well as similarities and differences among other Filipino languages.

Morelos, A. T. (1998). *English Loanwords in the Modern Cebuano Language: An Index of Cultural Change* Paper presented at the Philippine Quarterly Of Culture and Society.

Summary: This article describes why many English words are borrowed by Filipinos, particularly Cebuano speakers. Lists of these words and give and circumstances and culture are discussed regarding home and education etc.
Relevance to the Current Work: Further insight into the Cebuano language and its adaptability and social aspects involved are given and provide background for readers on the Cebuano language and culture.

Nissen, S. L., Harris, R. W., Channell, R. W., Conklin, B., Kim, M., & Wong, L. (2011). The development of psychometrically equivalent Cantonese speech audiometry materials. *International Journal of Audiology, 50*(3), 191-201. doi: 10.3109/14992027.2010.542491

Objective: The purpose of this study was to develop and psychometrically evaluate speech audiometry materials to measure word recognition and speech recognition testing for native Cantonese speakers.
Study Sample: Bisyllabic and trisyllabic Cantonese words, commonly spoken, were digitally recorded by native male and female talkers and then evaluated by twenty Cantonese listeners (normal-hearing).
Design: The recorded bisyllabic words were psychometrically evaluated and organized into four WR lists and eight half-lists that are relatively homogeneous in audibility. Using logistic regression, SRT materials were developed by selecting 28 trisyllabic words and digitally adjusting their intensity to match the mean pure-tone average of the listener.
Result: The mean psychometric slopes for the WR materials were 7.5%/dB for the male talker and 7.6%/dB for the female talker, with no statistically significant differences

between the lists or half-lists. At intensity levels required for 50% intelligibility, the mean psychometric slopes of the male and female talker SRT materials were 14.5%/dB and 14.9 %/dB, respectively.
Conclusions: Digital recordings of Cantonese speech audiometric WR and SRT materials were developed and authenticated in this study. These materials are available on compact disc.
Relevance to the Current Work: These speech audiometry materials created in the Cantonese language follow the same pattern for creating WR materials in Cebuano, particularly using bi-syllabic words.

Nissen, S. L., Harris, R. W., & Dukes, A. (2008). Word recognition materials for native speakers of Taiwan Mandarin. *American Journal of Audiology, 17*(1), 68-79. doi: 17/1/68 [pii] 10.1044/1059-0889(2008/008)

Objective: The purpose of this study was to select, digitally record, evaluate and psychometrically equate word recognition materials for native Taiwan Mandarin speakers.
Method: Recordings by male and female native Taiwan speakers of familiar and frequently used bisyllabic words were created and evaluated using 20 native listeners (with normal hearing) at 10 intensity levels. These levels were presented in increments of 5 between -5 and 40 dB HL.
Results: Logistic regression was used with 200 words that had the steepest psychometric slopes. These words were then divided into 4 lists and 8 half-lists. Each list was relatively equivalent in psychometric function slope. Intensity of each word was adjusted as needed to obtain a threshold that was equal to the midpoint mean threshold between male and female half-lists.
Conclusions: Digital recordings of the word recognition testing word-lists are available on CD.
Relevance to the Current Work: These speech audiometry materials created in the Taiwan Mandarin language follow the same pattern for creating WR materials in Cebuano, particularly using bi-syllabic words.

Nissen, S. L., Harris, R. W., Jennings, L., Eggett, D. L., & Buck, H. (2005). Psychometrically equivalent Mandarin bisyllabic speech discrimination materials spoken by male and female talkers. *International Journal of Audiology, 44*(7), 379-390. doi: 10.1080/14992020500147615

Objective: The purpose of this study was to develop and psychometrically equate a set of Mandarin bisyllabic word lists for word recognition testing.
Method: Familiar bisyllabic words were digitally recorded by native male and female Standard Mandarin speakers. The word recognition percentage for 20 normal-hearing subjects was measured for each word at 10 intensity levels (5 to 40 dB HL) in 5 dB increments. Using logistic regression, 200 words with the steepest logistic regression slopes were divided into four psychometrically equivalent word lists of 50 words each, and eight half-lists of 25 words each.

The intensity of each word was digitally adjusted so that the threshold of each list was equal to the midpoint between the mean thresholds of the male and female half-lists.
Results: Digital recordings of these word recognition lists are available on compact disc.
Relevance to the Current Work: These speech audiometry materials created in the Mandarin language follow the same pattern for creating WR materials in Cebuano, particularly using bi-syllabic words.

Penrod, J. P. (1980). A comparison of half- vs full-list speech discrimination scores in a hearing-impaired geriatric population. *Journal of Auditory Research, 20*(3), 181-186.

Objective: The purpose of this study was to assess the word recognition performance of hearing impaired elderly listeners when using half- and full-lists.
Design: Participants participated in pure-tone testing and impedance measures before word recognition began. Each patient's speech recognition threshold was obtained, and the test stimuli were presented to each participant at 40 dB above this threshold; all tests were given at 25 dB SL or greater.
Study Sample: All 76 participants were in the age range of 60 to 83 years and each has varying degrees of sensorineural hearing loss.
Results: The statistical analysis used in this study indicated that each half-list contributed equally to the full-list speech discrimination score. There was also a high agreement between half-lists and between half- and full-list speech discrimination scores.
Conclusions: Half-list scores obtained with elderly patients may be expected to be within 6 percentage points of the full-list scores about 85% of the time, within 8 percentage points about 91% of the time, and within 10 percentage points about 96% of the time. There is statistical support for the use of half-lists in testing geriatric populations.
Relevance to the Current Work: This article contains statistical evidence for the use of half-lists in word recognition testing.

Rimikis, S., Smiljanic, R., & Calandruccio, L. (2013). Nonnative English speaker performance on the Basic English Lexicon (BEL) sentences. *Journal of Speech, Language, and Hearing Research, 56*(3), 792-804. doi: 10.1044/1092-4388

Objective: The objective of this study was to examine speech-in-noise performance using the Basic English Lexicon (BEL) sentences for a large, group of various nonnative English listeners, and to determine whether BEL sentence lists are equated in difficulty making them appropriate for this population.
Design: Sentences from the BEL were presented to the nonnative speakers of English. These participants were familiarized with the task beforehand. The spoken English proficiency of each listener was assessed using the Versant English Test. Five hundred sentences were presented mixed with noise spectrally matched to the target sentences.
Study Sample: Nonnative speakers of English (102 participants) with normal hearing and various linguistic and cultural backgrounds. These included participants from China, South Korea, Taiwan, and Vietnam, etc. Participants ranged in age 18 to 50 years.
Results: Significant difficulty was determined from post hoc testing among the 20 lists, however, it was also determined that the lists could be divided into three groups of statistically equal performance. More proficient English listeners performed equally on

many of the BEL sentence tests, resembling closely the performance of native English speakers. Similar performance patterns were acquired for speakers with diverse native languages.
Conclusions: Using the Versant score, the authors concluded that spoken language proficiency was a highly significant predictor of sentence-recognition performance. The BEL sentences were found to be appropriate for use in testing the speech perception abilities of non-native English speakers. The results also suggested that BEL materials are not biased toward a particular native language, so these materials are appropriate for use with a variety of language backgrounds.
Relevance to the Current Work: This study demonstrates the option to use English speech audiometry materials for non-native speakers of English.

Rodriguez, R. F. (2014). Lexicography in the Philippines (1600-1800). *Historiographia Linguistica, 41*(1), 1-32. doi: 10.1075/hl.41.1.01

Summary: This source expounds on the influence of missionaries on the Filipino languages, particularly vocabulary and the Spanish influence they brought. Missionaries studied and preserved multiple languages. However, many early records remain unavailable due to limited accessibility.
Relevance to the Current Work: This article provides detail regarding the Spanish influence on Cebuano. This article compares and contrasts characteristics of Spanish and Filipino languages.

Roup, C. M., Wiley, T. L., Safady, S. H., & Stoppenbach, D. T. (1998). Tympanometric screening norms for adults. *American Journal of Audiology, 7*(2), 55-60. doi: 10.1044/1059-0889(1998/014)

Objective: The purpose of this study was to reevaluate the normative data put forth by Margolis and Heller (1987) using a strict control over participant age and gender. This study recreated the testing conditions of the ASHA tympanometric norms employing more control of age and gender.
Design: The researchers obtained measures of peak compensated static acoustic admittance, acoustic equivalent volume, and tympanometric width for each participant. These measurements were made in one ear that was randomly determined for each participant. The measurement conditions and procedures were consistent with those employed by Margolis and Heller in 1987, except that for this study pump speed was 600/200 daPa/s. Each participant also participated in a pure-tone screening.
Study Sample: Participants were 102 young adults (ages 20-30) with normal hearing and otoscopic findings; all were non-Hispanic Caucasians.
Results: Means and 90% normal ranges for each of the tympanic measures were obtained for males and females. Mean values for peak compensated static acoustic admittance and acoustic equivalent volume were found to be significantly higher for males relative to females, and mean tympanometric width values for males were found to be significantly smaller than for females. This data was compared with the adult data from the study by Margolis and Heller; significant differences were found when data for males and females were compared separately with the Margolis and Heller data. Males had higher peak

compensated static acoustic admittance values than the original data; females had lower values in this area when compared to the original data.
Conclusions: The results indicated that the original normative tympanometric data are not an accurate representation for either males or females. The authors suggested that the use of gender-specific norms may improve the sensitivity of middle ear screenings in young adults.
Relevance to the Current Work: As the current project used participants in a wide age range, however, most participants were women, the normative data obtained in this study was relevant during preliminary screenings.

Scannell, K. P. (2007). The Crubadan Project: Corpus building for under-resourced languages. *Cahiers du Central, 5*, 1-10.

Summary: Kevin Scannell presents a brief review of the Crúbadán project. The purpose of this project is to create text corpora for many under-resourced languages by crawling the web.
Relevance to the Current Work: Kevin Scannell provided the Cebuano corpus for the current project containing commonly used Cebuano words.

Shyrock, A. (1993). A metrical analysis of stress in Cebuano. *Liguana, 91*(2-3), 103-148.

Summary: This paper gives a thorough analysis of stress in the Cebuano language. Primary and secondary stress are delved into as well as the assignment of stress being right to left. Cebuano uses a quantity-sensitive stress system: the more phonemes present, the more stress given to that syllable. Primary stress is determined by the weight of the second to last syllable, although in the absence of a second to last syllable, the final syllable is awarded primary stress. Syllable structure is discussed in terms of heavy and light depending on the structure. Morphology including the prefixes, infixes, suffixes and reduplications in Cebuano are addressed.
Relevance to the Current Work: A detailed analysis of the stress in Cebuano language can be found here and is relevant as to inform the readers of the Cebuano language structure.

Tanangkingsing, M. (2013a). A study of second-position enclitics in Cebuano. *Oceanic Linguistics, 52*(1), 222-248.

Summary: This article discusses the effects of clitics – or unstressed morphemes in the Cebuano language that typically occur combined with other words, such as contractions. Most Philippine languages consider (en) clitics to be empty utterances, however, in Cebuano enclitics possess semantic content. Enclitics are not necessary syntactically.
Relevance to the Current Work: This article provided insight about enclitics in the Cebuano language and how they differ from other Philippine languages.

Taylor, B. (2012). *Development of Psychometrically Equivalent Speech Audiometry Materials for Measuring Speech Recognition Thresholds in Native Tagalog Speakers (Unpublished master's thesis).* Brigham Young University, Provo, UT.

Objective: The purpose of this study was to develop psychometrically equivalent trisyllabic Tagalog words for testing the speech recognition threshold.
Design: 90 common Tagalog syllabic words were selected and recorded by male and female native Cebuano speakers. These materials were presented to native Tagalog listeners for evaluation in 2 dB increments.
Study Sample: Twenty normal hearing subjects were selected for this study. All were native Tagalog speakers, and they ranged in age from 19 to 51 years.
Results: 34 bisyllabic words were found to have acceptable steep psychometric function slopes. These words were digitally adjusted so that their intensities would match the mean pure tone average for the listeners. The mean slopes for the selected trisyllabic words were 5.4%/dB HL to 15.1%/dB HL.
Conclusions: After digital adjustment, the trisyllabic words were labeled homogeneous with respect to audibility and psychometric function slope, which were then made available on compact disc for future clinical use.
Relevance to the Current Work: This study provides insight into the structure and organization of the Tagalog language which relates to Cebuano. The similarities between these languages also provide further insight.

Uchanski, R. R. S. a. R. M. (2006). The Development of Ilocano Word Lists for Speech Audiometry. *Philippine Journal Of Otolaryngology-Head And Neck Surgery, 21*(1-2).

Summary: These authors developed word lists in Ilocano for WRS and speech audiometry. They obtained 3000 Ilocano words from three magazine articles and then gathered roughly 400 two-syllable words which were then judged by native speakers for commonness. These words were randomized and put into 50-word lists. Syllable structure was analyzed and only words judged as being common were put into the final word-lists. The authors remind us that multiple lists are needed in order to avoid over familiarization with the words. They also noted the three main factors they considered when choosing the appropriate Ilocano words and these were: good representation of phonetic structure, of word-level syllable structure and of familiarity.
Relevance to the Current Work: The Ilocano language is the 3rd most common language in the Philippines (second to Tagalog and Cebuano). The syllable structure of the words are similar between Ilocano and Cebuano and the method for choosing word lists was similar. This provides context and confirmation for the method and words chosen in this current study.

Weisleder, P., & Hodgson, W. R. (1989). Evaluation of four Spanish word-recognition-ability lists. *Ear and Hearing, 10*(6), 387-392.

Objective: The purpose of this study was to assess an available Spanish language word recognition (WR) test regarding inter-list equivalence, word difficulty, speaker intelligibility, and percentage of increase of recognition ability per decibel increment.
Design: Four Spanish language WR lists consisting of 50 words each were recorded by a native Mexican Spanish speaking male. Word lists were presented to the participants at 8, 16, 24, and 32 dB HL. Subjects were asked to repeat the words as they were presented; a

native Spanish speaking judge recorded response accuracy. Words were ordered by number of incorrect responses.
Study Sample: The study involved 16 native Spanish-speaking participants, 10 male and 6 female, (ages 20 to 49). Each participant had a Spanish SRT of 0 dB or better, and all passed a hearing screening at 10 dB HL. The subjects originated from several countries; 9 were from Mexico, 2 from Panama, 2 from Venezuela, and one each from Spain, Honduras, and Columbia.
Results: The average psychometric function slope for the four lists was 4.3%/dB. List three appeared to have statistically different intelligibility percentage than the other lists at the 0.05 level. List three also had the poorest mean intelligibility scores for all presentation levels except 8 dB HL. Mexican participants had better scores for the low presentation levels.
Conclusions: The psychometric function slopes for this study were found to be comparable to English monosyllabic lists. The authors suggested that the presentation and not the list itself if the function of the behavior of WR lists at low intensity levels. The most frequently missed words in the evaluation were those that had the /s/ sound in one or more positions of the words. The authors considered that this effect may be a result of regional variations in the Spanish language. The materials evaluated in this study were judged to be appropriate for evaluating the word recognition ability of Spanish speakers, with the exception of list three.
Relevance to the Current Work: This study reflects the process required to obtain speech audiometry materials in languages other than English. This study also demonstrates the effect of dialect on listener performance.

Wilson, R. H., & McArdle, R. (2005). Speech signals used to evaluate functional status of the auditory system. *Journal of Rehabilitation and Development, 42*(4), 79-94.

Summary: Wilson and McArdle present a review of the history of speech audiometry. They consider background noise, the use of sentence vs. word materials and the effects of age and hearing loss on speech recognition. They recommend testing both ears, and then testing ears individually as the perception of speech deficit is not always the sample as it is for simple tones. There are multiple reasons why audiologists have not been administering tests that include background noise. These include change is hard, more time is required, standardized measures are not readily available and most audiologists have been educated to use the monosyllabic words for testing. However, the accuracy of predicting scores in background noise from scores in quiet is not high.
Relevance to the Current Work: This article provides insight into the need for future research to consider testing word recognition materials in background noise.

Wolff, J. U. (1966). *Beginning Cebuano, Part 1* (Vol. Vol Yale Linguistics). New Haven, CT: Yale University

Summary: This book provides general information on the Cebuano langauge. It attempts to teach the reader how to speak Cebuano. Beginning with discussing the nature of the language (background and regions where Cebuano is spoken), Wolff then discusses characteristics of the Cebuano language.

Relevance to the Current Work: This work provides background information on the Cebuano language.

Yu, E. S. (1975). Variations of the Cebuano Family. *Philippine Quarterly of Culture and Society*, *3*(2-3), 114-130.

Summary: This paper covered a number of culture aspects of Filipino people who live in Cebu City. Social, economic, religious and familial concerns were addressed as well as historical insights.
Relevance to the Current Work: Specific information on Cebu City was provided which addressed a few reasons why Cebuano is such a well-known, well-spread language in the Philippines. Cebu's history was discussed provided further insight into their language.

APPENDIX B

Informed Consent

Introduction
This research study is being conducted by Richard Harris, PhD at Brigham Young University; Sarah Ralph, BS Communication Disorders, Communication Disorders graduate student at BYU; and Melissa Anderson, BS Communication, Communication Disorders graduate student at BYU to evaluate a word list recorded using improved digital techniques. You were invited to participate because you are a native Cebuano speaker.

Procedures
If you agree to participate in this research study, the following will occur:

- You will receive a 15-minute hearing screening where you will hear beeps and indicate whether or not you heard them.
    - Should you do not meet the hearing requirements, you will be provided with $10, a hard copy of your test results, and a referral to a physician.
- You will listen to Cebuano words and repeat the words you hear.
- The total time commitment for the Cebuano word portion of the exam will be approximately 60 minutes.
- This will take place in a laboratory in the Taylor Building also known as the Comprehensive Clinic. The laboratory is located in room 110 of the Taylor Building on the BYU Campus.

Risks/Discomforts
There are no known risks associated with this study. The researchers will be present at all times to make sure that you are not experiencing any problems during any portion of the study. If you indicate in any way that you do not want to participate, we will stop immediately.

Benefits
The primary benefit to you is finding out whether you have normal hearing or not throughout the course of the study. There may be benefits to society in general in that this study may result in more effective treatment methods for Cebuano-speaking individuals participating in hearing evaluations.

Confidentiality
Your participation will be confidential. The data will be stored in file cabinets within locked laboratories or offices in the Taylor building on the campus of Brigham Young University. Only the researchers will have access to the data. All names will be removed from research materials. Your name will never be used in association with this research. Information will be kept for three years after the study is completed. The files will remain in a locked laboratory only accessible by the researchers. Internet data will be saved as a Microsoft Excel document with no subject identifiers. Subjects will be identified only by number with no names or any other identifying referents.

Compensation
You will receive $10 for participating in the hearing screening. If you meet the requirements for

additional testing, an additional $20 will be provided for your participation; compensation will not be prorated. You will receive a free hearing exam and you will be provided a printed copy of your hearing evaluation.

Participation

Participation in this research study is completely voluntary. You are free to decline to participate in this research study. In addition, you may withdraw your participation at any point without loss of compensation.

Questions about the Research

Please direct any further questions about the study to Richard Harris at (801) 422-6460 or richard_harris@byu.edu. You may also contact Sarah Ralph at (253) 632-3030 or Melissa Anderson at (940) 231-2343, or through email at sarahralph32@gmail.com or mdanderson.89@gmail.com.

Questions about Your Rights as Research Subjects

Should you have any questions regarding your rights as a research participant contact IRB Administrator at (801) 422-3841; A-285 ASB, Brigham Young University, Provo, UT 84602; irb@byu.edu.

Statement of Consent

I have read, understood, and received a printed copy of this entire consent document. I desire of my own free will to participate in this study.

Your Name (Printed): __________________ Signature: _____________________ Date: ______

APPENDIX C

Evaluation Sheet for Cebuano Talkers

Please rate the following talkers on the following attributes.

Circle the number that best applies 1-Worse to 5-Excellent.

Then rank order the male talkers from your favorite to least favorite assigning them a number from 1-2 (use each number only once).

Male Talker 1	**Worse**		**Fair**		**Excellent**	**Rank**
Pleasantness of Voice	**1**	**2**	**3**	**4**	**5**	_____
Intelligibility	**1**	**2**	**3**	**4**	**5**	_____
Accent	**1**	**2**	**3**	**4**	**5**	_____

Male Talker 2	**Worse**		**Fair**		**Excellent**	**Rank**
Pleasantness of Voice	**1**	**2**	**3**	**4**	**5**	_____
Intelligibility	**1**	**2**	**3**	**4**	**5**	_____
Accent	**1**	**2**	**3**	**4**	**5**	_____

APPENDIX D

Selected Cebuano Bisyllabic Word Definitions

#	Word	Part of Speech	Definition
1	adlaw	Noun	day
2	adto	Verb	go
3	agi	Verb	pass
4	ako	Pronoun	I/me
5	amo	Noun	boss/employer
6	anak	Noun	child
7	andam	Adjective	ready
8	angay	Adjective	appropriate
9	anghel	Noun	angel
10	apil	Verb	join
11	arte	Adjective	choosy
12	asa	verb/adverb	hope/where
13	awit	Noun	anthem
14	ayaw	Verb	do not
15	baba	Noun	mouth
16	bag-o	Adjective	new
17	bahin	Noun	part
18	bakak	Noun	lie
19	balak	Noun	poem
20	balay	Noun	house
21	balik	verb	return/resume
22	bana	Noun	husband
23	banay	Noun	family
24	bata	Noun	child
25	bato	Noun	rock
26	baya	Interjection	geez
27	bisan	Adverb	although/despite
28	bitaw	Adverb	anyway
29	buang	Adjective	crazy
30	buhat	Verb	create, make
31	buhi	Adjective	alive
32	buhok	Noun	hair
33	bukid	Noun	mountain
34	bukton	Noun	arm
35	bulan	Noun	month
36	bunga	Noun	fruit
37	bungtod	Noun	hill

38	buot	Noun	mood
39	buta	adjective	blind
40	daan	adjective	old
41	dad-on	verb	bring
42	dagat	noun	sea
43	daghan	adjective	many
44	dako	adjective	big
45	dali	adjective	easy
46	damgo	noun	dream
47	dapit	noun	location, place
48	daplin	noun	side
49	dato	adjective	rich
50	dayon	adverb	immediately
51	diay	adjective	here is
52	diha	adverb	there (close)
53	diin	adverb	where
54	dila	noun	tongue
55	dili	adverb	no
56	dugang	adverb	more, additional
57	dugay	adjective	lengthy
58	dughan	noun	chest
59	dugo	noun	blood
60	duha	adjective	both/ two
61	duol	adverb	around, near
62	gahom	noun	authority/power
63	gamay	adjective	little
64	gamit	noun	usage
65	gani	adverb	anyway
66	gasa	noun	gift
67	gawas	adjective	outward, outside
68	gayod	adverb	indeed
69	gikan	preposition	from
70	grasya	noun	grace
71	grupo	noun	group
72	gubat	noun	war
73	gugma	noun	love/affection
74	gusto	verb	like
75	halad	noun	dedication
76	halos	adverb	barely
77	hangin	noun	air
78	hapit	adverb	about/close
79	hayop	noun	animal
80	human	adjective	finished, done
81	hungtod	conjunction	until

82	husto	adjective	correct
83	ikaw	pronoun	you
84	iro	noun	dog
85	isip	adverb	as
86	isla	noun	island
87	kabos	adjective	poor
88	kaha	adverb	perhaps
89	kahoy	noun	wood
90	kalag	noun	soul
91	kalit	adjective	quick
92	kami	pronoun	we (exclusive)
93	kamot	noun	arm/hand
94	kana	pronoun	it, that
95	kanding	noun	goat
96	kanhi	adjective	former
97	kaon	verb	eat
98	karon	adjective	current, now, today
99	kilid	noun	edge
100	kinsa	pronoun	who
101	kita	pronoun	we
102	klase	noun	class
103	komiks	noun	cartoon
104	kusog	noun	strength
105	kuyog	noun	companion
106	labaw	adjective	more, above
107	lagi	adverb	in agreement
108	lahi	adjective	distinct
109	lain	adjective	different
110	lakip	verb	attach
111	lamang	adjective	mere
112	lana	noun	oil
113	langgam	noun	bird
114	langit	noun	heaven/sky
115	langyaw	adjective	foreign
116	lawak	noun	room
117	lawas	noun	body
118	layo	adjective	far
119	lima	adjective	five
120	lokal	adjective	local
121	lungsod	noun	town
122	manok	noun	chicken
123	mao	verb	is
124	maoy	verb	fit/is
125	mata	noun	eye

126	matang	noun	type
127	minyo	noun	marriage
128	mismo	article	same
129	namo	pronoun	our
130	nasod	noun	country
131	nawong	noun	face
132	ngadto	adverb	forward/there
133	ngalan	noun	name
134	ngano	adverb	why
135	ngari	adverb	here
136	nindot	adjective	nice
137	oras	noun	time
138	para	preposition	for
139	pari	noun	priest
140	patay	noun/verb	dead/kill
141	pito	adjective	seven
142	pulos	adverb	all
143	pundok	noun	group
144	puno	adjective	full
145	putli	adjective	pure
146	saad	noun	promise
147	sagad	adjective	common
148	sagbot	noun	grass
149	sakit	noun	illness/pain
150	saksi	noun	witness
151	sala	noun	living room
152	sama	adjective	like, same
153	samtang	adverb	meantime
154	sanga	noun	tree branch
155	sanglit	preposition	since
156	sayon	adjective	easy
157	sayop	adjective	wrong
158	sentro	noun	center
159	siglo	noun	century
160	suba	noun	river
161	suga	noun	light
162	sugo	verb	order/ command
163	sukad	adverb	since
164	sulat	noun	letter
165	sulod	adjective	indoor
166	sulti	verb	talk
167	sumbong	verb	accuse
168	sunod	adjective	next
169	takos	adjective	worthy

170	tanan	noun	everyone/all
171	tanom	noun	plant
172	tawo	noun	person
173	tigi	verb	compete
174	tiil	noun	leg
175	tingog	noun	voice/sound
176	tubag	noun	answer
177	tubig	noun	water
178	tuig	noun	year
179	tulo	adjective	three
180	tunga	noun	center/half
181	tuod	adverb	actually
182	tuyo	noun	purpose
183	uban	noun	companion
184	ubos	adjective	down/below, all gone
185	ulan	noun	rain
186	ulo	noun	head
187	una	noun	first
188	unom	noun	six
189	unsa	pronoun	what
190	unta	adverb	may something happen
191	unya	adjective	then, later
192	upat	adjective	four
193	usa	noun	one
194	usab	verb	change/ again
195	utang	noun	credit/debt
196	wala	adjective	no/without
197	walay	adjective	no/without
198	walo	noun	eight
199	yawa	noun	devil
200	yuta	noun	dirt/earth

APPENDIX E

Description of BYU Cebuano Speech Audiometry Materials CD

Track 1 1 kHz calibration tone.

Track 2 Trisyllabic words for use in measuring the SRT in alphabetical order for familiarization purposes.

Track 3 Trisyllabic words for use in measuring the SRT in random order, repeated in blocks for a total duration of 5 minutes.

Track 4 Speech Discrimination List 1 – 50 monosyllabic words in random order.

Track 5 Speech Discrimination List 2 – 50 monosyllabic words in random order.

Track 6 Speech Discrimination List 3 – 50 monosyllabic words in random order.

Track 7 Speech Discrimination List 4 – 50 monosyllabic words in random order.

Track 8 Speech Discrimination List 1A – 25 monosyllabic words in random order.

Track 9 Speech Discrimination List 1B – 25 monosyllabic words in random order.

Track 10 Speech Discrimination List 2A – 25 monosyllabic words in random order.

Track 11 Speech Discrimination List 2A – 25 monosyllabic words in random order.

Track 12 Speech Discrimination List 3A – 25 monosyllabic words in random order.

Track 13 Speech Discrimination List 3B – 25 monosyllabic words in random order.

Track 14 Speech Discrimination List 4A – 25 monosyllabic words in random order.

Track 15 Speech Discrimination List 4B – 25 monosyllabic words in random order.

Track 16 **Ikaw makadungog og sinumpay-sumpay nga mga pulong nga nagkalain-laing ang kalanogon. Palihog isulti og balik ang mga pulong kong imo na kining madungog. Kung dili ka sigurado sa pulong, puwede kang mutag-na.**

Instructions for speech reception threshold—verbal response: **You are going to hear a series of words that may vary in volume. Please repeat each word as soon as you hear it. If you are not sure of the word that you heard, you may guess.**

Track 17 **Ikaw makadungog og sinumpay-sumpay nga mga pulong nga permamnente ang bolyum. Palihog isulti og balik ang mga pulong kong imo na kining madungog. Kung dili ka sigurado sa pulong, puwede kang mutag-na.**

Instructions for speech discrimination—verbal response: **You are going to hear a series of words that will be given at a constant volume. Please repeat each word as soon as you hear it. If you are not sure of the word that you heard, you may guess.**

Track 18 **Kining bahin sa test ikaw makadungog og saba sa pikas nga dunggan og mga pulong sa pikas. Ibaliwala ang saba og usba og sulti ang matagpulong kong imo na kining madungog.**

Instructions for speech audiometry, masking in nontest ear—verbal response: **During this part of the test you will hear a noise in one ear and words in the other. Ignore the noise and repeat each word when you hear it.**

Track 19 **Ikaw makadungog og sinumpay-sumpay nga mga pulong nga permanente ang bolyum. Palihog og suwat sa mga pulong kong imo na kining madungog. Kung dili ka sigurado sa pulong, puwede kang mutag-na.**

Instructions for speech audiometry—written response: **You are going to hear a series of words that will be given at a constant volume. Please write each word as soon as you hear it. If you are not sure of the word you heard, you may guess.**

Track 20 **Kining bahin sa test ikaw makadungog og saba sa pikas nga dunggan og mga pulong sa pikas. Ibaliwala ang saba og isuwat ang matagpulong kong imo na kining madungog.**

Instructions for speech audiometry, masking in nontest ear—written response: **During this part of the test you will hear noise in one ear and words in the other. Ignore the noise and write each word when you hear it.**

Track 21 **Ikaw makadungog og sinumpay-sumpay nga mga tuno nga may nagkalain-laing ang gitas-on nga tingog. Kung madungog nimo ang tuno, ipata-as dayon ang imong kamot. Ibutang ang imong kamot kon muobos na ang tuno. Ipata-as ang imong kamot kung sa imong pagtu-o nadungog nimo ang tuno, bisan og dili ka sigurado.**

Instructions for pure tone audiometry—hand raising: **You are going to hear a series of tones that will vary in pitch. When you hear the tone, immediately raise your hand. Put your hand down as soon as the tone goes off. Raise your hand if you think you hear the tone, even if you are not sure.**

Track 22 **Kining bahin sa test ikaw makadungog og saba sa pikas nga dunggan og mga tuno sa pikas. Ibaliwala ang saba og ipata-as ang kamot kong imong madungog ang tuno.**

Instructions for pure tone audiometry, masking in nontest ear—hand raising: **During this part of the test you will hear noise in one ear and tones in the other. Ignore the noise and raise your hand when you hear a tone.**

Track 23 **Ikaw makadungog og sinumpay-sumpay nga mga tuno nga may nagkalain-laing ang gitas-on sa tingog. Kung madungog nimo ang tuno, tulpoka dayon ang buton. Undang sa**

pagtulpok kon muhunong na ang tuno. Tulpoka ang buton kung sa imong pagtu-o nadungog nimo ang tuno, bisan og dili ka sigurado.

Instructions for pure tone audiometry—button pressing: **You are going to hear a series of tones that will vary in pitch. When you hear a tone, immediately press the button. Stop pushing the button when the tone goes off. Push the button if you think you hear the tone, even if you are not sure.**

Track 24 **Kining bahin sa test ikaw makadungog og saba sa pikas nga dunggan og tuno sa pikas. Ibaliwala ang saba og tulpoka ang buton kong imong madungog ang tuno.**

Instructions for pure tone audiometry-masking in nontest ear—button pressing: **During this part of the test you will hear noise in one ear and tones in the other. Ignore the noise and press the button when you hear a tone.**