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Development of a Spanish version of the Main Concept Analysis for Analyzing Oral Disordered Discourse

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DEVELOPMENT OF A SPANISH VERSION OF THE MAIN CONCEPT
ANALYSIS FOR ANALYZING ORAL DISORDERED DISCOURSE

by

KARLA SIMONET

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in
Communication Sciences and Disorders
in the College of Health Professions and Sciences
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ABSTRACT

Aphasia is an acquired language impairment caused by damage in the regions of the brain that support language. The Main Concept Analysis (MCA) is a published formal assessment battery that allows the quantification of the presence, accuracy, completeness, and efficiency of content in spoken discourse produced by persons with aphasia (PWA). It utilizes a sequential picture description task (with four sets of pictures) for language sample elicitation. The MCA results can also be used clinically for targeting appropriate interventions of aphasic output. The purpose of this research is to develop a Spanish adaptation of the MCA by establishing normative data based on native unimpaired speakers of Spanish. In the pilot study, thirty-eight unimpaired Spanish participants were recruited by previous student researchers. Each participant was asked to complete a demographic questionnaire and a short form of the Cognitive Linguistic Quick Test (CLQT) was administered to rule out any unidentified language problems. The MCA was then be administered to participants and their oral description was audio recorded for later orthographic transcription. A total of 81 unimpaired participants that consisted of different genders, ages (young, middle-aged, and older groups), levels of education (high versus low), and dialect origins (e.g., Spain, Puerto Rico, Columbia) were recruited in the main study to establish a more balanced set of data. One person with aphasia (PWA) was recruited for this study. A dialect-specific scoring criteria including target main concepts and lexicons of the Spanish-MCA was developed. In the current study, a preliminary set of data using the MCA scoring criteria has been established. Similar to findings in Kong and Yeh (2015), the results of the Spanish-MCA showed age and education did impact discourse performance. Results from one-way ANOVA revealed statistical differences between age groups and education levels of the unimpaired

participants recruited. The groups of participants with a higher education conveyed more AC concepts compared to the other dialect groups. To compare data for PWA, it is suggested that a larger sample size of PWA be recruited to validate the Spanish-MCA.

DEDICATION

To my mom, who has always been there for my brother and me - thank you for being an amazing mother to your children. I'd also like to give thanks to my brother, for he has instilled me with the strength to carry on his honor to stay motivated and become a strong, hard-working student. I miss you every day and hope I am making you proud.

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TABLE OF CONTENTS

LIST OF TABLES	ix
CHAPTER ONE: INTRODUCTION	2
CHAPTER TWO: REVIEW OF LITERATURE	5
1. Previous Quantification Systems of Analysis for Oral Discourse	5
2. Main Concept Analysis	10
3. Previous MCA Studies	11
3.1. Cantonese-MCA	11
3.2. English-MCA	15
3.3. TM-MCA	17
3.4. Korean-MCA	18
3.5. Japanese-MCA	19
4. Introduction of Spanish	20
5. Summary of Existing Aphasia Assessment Batteries in Spanish	23
6. Pilot Spanish-MCA	25
7. Limitations	26
CHAPTER THREE: RESEARCH AIMS	27
CHAPTER FOUR: METHODOLOGY	29
1. Pilot Study	29
1.1. Subjects	30
1.2. Stimulus Materials	31
1.3. Procedures	32
1.4. Data analysis	33
2. Main Study	33
2.1. Subjects	33
2.2. Procedures	36
2.3. Data analysis	38
2.4. Statistical analysis	40
CHAPTER FIVE: RESULTS	42
1. Main Study	42
1.1. Summary of lexical items	43
1.2. Acceptable alternatives	45
1.3. Disordered pilot subject	47
CHAPTER SIX: DISCUSSION	51
1. Major discussion	51
2. Summary of Findings	53
3. Conclusions	56
4. Limitations	57
5. Future Directions	58

6. Clinical Implications	58
APPENDIX A: IRB PERMISSION TO TAKE PART IN HUMAN RESEARCH STUDY	60
APPENDIX B: SCORING FORM OF CENTRAL CARIBBEAN PARTICIPANTS	66
APPENDIX C: SCORING CRITERIA	68
APPENDIX D: MCA SCORING FORM OF DISORDERED SUBJECT	85
REFERENCES	86

LIST OF TABLES

Table 1 Summary of ages of unimpaired Spanish speakers in pilot study	30
Table 2 Summary of education levels in pilot study	31
Table 3 A summary of ages of unimpaired Spanish speakers in main study	34
Table 4 A summary of education levels of unimpaired speakers in the main study	35
Table 5 Examples of target main concepts	39
Table 6 Acceptable alternatives	39
Table 7 Reliability Statistics	41
Table 8 Intra-reliability measures	41
Table 9 Analysis of variance using one-way ANOVA	42
Table 10 Total number of target main concepts in English and Spanish	43
Table 11 Normative data on MCA performance of unimpaired speakers	46
Table 12 WAB and CLQT Results of disordered pilot subject	47
Table 13 MCA results of disordered participant	48
Table 14 Average MCA results of group 1 Central Caribbean participants	49

CHAPTER ONE: INTRODUCTION

Spanish is the second most spoken language in the world (Hawkes, Ameriso, & Willey, 2015). Oral discourse is fundamental to everyday communication and is an increasing focus of clinical assessment intervention and research. The damage in the regions of the left hemisphere that causes aphasia can affect the information a speaker communicates in discourse (Pritchard, Hilari, Cocks, & Dipper, 2017). This effect in monologic discourse influences social participation as well as overall communicative skills in persons with aphasia (PWA). Social participation and engagement are important to maintain to avoid loss of skills. Monologic discourse is typically elicited within aphasia treatment and research somewhat artificially using probe questions and specific resources, such as picture-description tasks (Linnik et al., 2015). Several standardized aphasia batteries, such as the Western Aphasia Battery (WAB; Kertesz, Pascual-Leone, & Pascual-Leone, 1990) or the Boston Diagnostic Aphasia Examination (BDAE; Goodglass & Kaplan, 1972) have been adopted into Spanish, but these translated tests generally do not include a comprehensive and objective measure for spoken narratives. The BDAE aims to assess verbal communication and language deficits based on stimulus books and record forms. The Main Concept Analysis (MCA; Kong 2009) is a measurement to evaluate connected speech in speakers with aphasia. The system analyzes picture stimulus-specific main concepts produced by a speaker (or a statement that contains one main verb and other pieces of essential information) to provide an outline of the gist portrayed in a particular stimulus picture (Kong, 2009, 2016). The MCA has now been validated in English (Kong, Whiteside, & Bargmann, 2015), Mandarin Chinese (Kong & Yeh, 2015), and Cantonese Chinese (Kong, 2009, 2011). Each version contains a set of culturally appropriate picture stimuli with characters and lexical items. The quantification system for the MCA involves six main concept (MC) indices that are

used to evaluate the language samples elicited by participants. The procedures from previous versions of the MCA were used to examine each language sample. The following were accounted for during evaluation: 1) Number of Accurate and Complete (AC) main concepts, 2) Number of Accurate but Incomplete (AI) main concepts, 3) Number of Inaccurate (IN) main concepts, and 4) Number of Absent (AB) main concepts. To indicate the Main Concept score, a formula of $3 \times AC + 2 \times AI + 1 \times IN$ is then applied to compute the individual's narrative performance. If the essential information was mentioned for each main concept, one point was added to the final score. An additional measure by the index of Number of AC produced per minute (AC/min) was applied to quantify the efficiency of production. The outcome of the MCA will provide tools for healthcare professionals to use when analyzing disordered spoken narratives. By having access to culturally appropriate tools, clinicians will be able to discriminate between speakers with and without aphasia and plan for language remediation (Kong, 2009). It will also increase speech accuracy and awareness in PWA.

The purpose of this two-stage study is to translate the MCA to a Spanish Main Concept Analysis (i.e., Spanish-MCA) and to also establish geographically specific norms for the four sequential picture description tasks in MCA based on unimpaired native speakers of Spanish with different dialectal origins. Stage two of this study included recruiting one person with aphasia (PWA) and application of the MCA assessment. The adaptation of a Spanish-MCA allows for the evaluation of spoken discourse and target intervention by speech-language pathologists and related healthcare practitioners. As a fundamental step, the present study involved a collection of normative data from unimpaired Spanish speakers. The data from unimpaired speakers was collected to analyze the performance and severity of aphasia in PWA and compare findings based on the speaker's gender, level of education, and age group. The

criteria for recruiting participants in this study consisted of collecting unimpaired native Spanish adult speakers with diverse backgrounds. Three age groups (18-39), (40-59), and (60+) and two levels of education (high and low) were included in the MCA study to provide a balanced set of data for participants and examine any characteristics present in a particular group. The goal of the Spanish-MCA project is to render clinician professionals an objective language evaluation battery to be utilized during clinical assessment that can assist with subsequent planning of remediation.

CHAPTER TWO: REVIEW OF LITERATURE

1. Previous English Quantification Systems of Analysis for Oral Discourse

One of the most widely used aphasia test batteries, is known as the Porch Index of Communicative Ability (PICA; Porch, 1967), is used to assess verbal, gestural, and graphic abilities in adults. It is compiled of 18 subsets and visual material used to test verbal output. The PICA utilizes a multidimensional scoring system to obtain scores based on an overall percentile of measurement. Many studies have been shown to use the PICA to obtain information based on diagnostic scores. An examination by Yorkston and Beukelman in 1977 utilized a picture description task and three measures to quantify and compare the amount of information produced by speakers with aphasia. The study involved 31 unimpaired speakers and 33 fluent and non-fluent speakers with aphasia. To obtain scores regarding the verbal output and severity of aphasia, the PICA was administered. The picture stimulus titled “Cookie Theft”, a subset from the BDAE was shown to participants to measure auditory comprehension and elicit spontaneous responses from speakers with aphasia (Goodglass, & Kaplan, 1972). Measures of scoring consisted of syllables per minute, concepts per minute, and syllables per concept, which were used to analyze the participants’ description of the Cookie Theft picture. Participants were instructed to mention what they saw in the picture stimuli presented to them. The language samples were evaluated to determine the presence of concepts. Yorkston and Beukelman accounted for each concept spoken by participants. A final list was generated to compare the performance of all speakers by counting each concept spoken by the group of unimpaired speakers and impaired speakers. It was found that the group of fluent speakers with aphasia had elicited more syllables than both normal speakers and non-fluent speakers with aphasia to convey one concept. When analyzing aphasia severity, the results of the PICA revealed the

participants with a higher severity of aphasia scored lower on measures of number of syllables per minute and concepts per minute (Yorkston & Beukelman, 1977). The system could be useful to distinguish language samples between speakers with aphasia and unimpaired speakers.

Yorkston and Beukelman conducted a study in 1980 that followed the same protocol in the (1977) version for quantification of oral discourse. The authors defined a content unit as “a grouping of information that was always expressed as a unit”. The connected speech samples of individuals with aphasia was quantified by the authors of this study. Method of quantification involved comparing the information conveyed (content units), speaking rate (syllables per minute), and the rate at which responses were conveyed (content units per minute) (Yorkston & Beukelman, 1980). Different from the previously established version in (1977), the authors refrained from measuring syllables per concept, instead calculating the content unit based on picture stimuli responses. In total, 78 normal speakers and 50 speakers with aphasia were recruited for the study. The method for evaluating language samples was found to have similar results as the study conducted in (1977). An inverse relationship was seen between severity of aphasia and the amount of information that was conveyed in the samples. It is later mentioned in Nicholas and Brookshire in (1993) that the system of measurement established by Yorkston and Beukelman in 1977 presents a limitation regarding the content units. The measurement of content units mentioned in the study were designed particular to the picture stimuli. For this reason, unless the content units are defined for other stimuli, the system is not to be used with any other elicitation stimuli.

In 1988, Shewan developed the Shewan Spontaneous Language Analysis (SSLA) system that was devised to analyze and measure unimpaired speakers and connected language spoken by speakers with aphasia. Forty-seven adult speakers with aphasia, 20 young unimpaired adults

between 19-22 years of age, and ten older adults between the age of 44-83 years of age were recruited for the study. Researchers collected data from each participant and individually presented them with a picture description task. Participants were asked to explain what they saw and responses were recorded. Approximately three to 12 months after the first data collection session, participants were retested to compare samples. Eight variables from Shewan's (1988) study were applied upon examination of language samples. Similar to the quantification system established by Yorkston and Beukelman (1977), the SSLA used variables for measurement that consisted of: content units, number of utterances, errors, time, rate, melody, articulation, and communication efficiency. The type and degree of impairment from adult speakers with aphasia were also analyzed. Both type and degree of aphasia was reported to have impacted the outcome of variables for measurement. Results showed that speakers with Broca's and global aphasia were found to have produced the least amount of errors, while individuals with anomic aphasia were revealed to have had the most amount of errors. The measures were found to be useful for evaluating connected language in speakers with aphasia.

A year later an examination was set forth by Saffran, Berndt, and Schwartz (1989) who established a Quantitative Production Analysis (QPA) that evaluated morphological and structural disruptions of narrative speech in PWA. The QPA consists of a comprehensive system and instruction for analysis that examines characteristics specific to grammatical, morphological, and structural disruptions of aphasic output. Participant recruitment included five unimpaired speakers, five non-fluent agrammatic speakers, and five non-agrammtic speakers (Saffran, et al., 1989). The group of unimpaired speakers were instructed to recite the story of Cinderella. QPA scores were generated to analyze grammar and determine severity of aphasia based on the verbal output of speakers with aphasia. For analysis of language samples 11 measures were applied.

The measures analyzed speech rate index, morphological measures, and structural measures of well-formed sentences based on the language samples of participants. Performance of all groups was examined and findings indicated noticeable differences between speakers with agrammatic aphasia and unimpaired speakers. The QPA system was found to have been able to distinguish the discourse between speakers, specifically the non-fluent agrammatic speakers with aphasia from the non-fluent agrammatic speakers with aphasia, as well as the unimpaired speakers from both of the impaired groups (Saffran, et al., 1989).

Similar to previously mentioned studies, Nicholas and Brookshire (1993) measured the informativeness of communication in adults with aphasia. A standardized scoring system was established to evaluate connected discourse through the use of various variables. An overall percentile from the PICA was established to determine the severity of aphasia. Twenty unimpaired adults and 20 speakers with aphasia were invited to partake in this study. The ages between the unimpaired and impaired speakers recruited for this study were similar to one another and ranged from 50- 73 years, and the education level of participants ranged from 10-16 years (Nicholas & Brookshire, 1993). Pretest qualifications to ensure vision was suitable for further testing in participants recruited for this study included picture tasks. Specifically, a composite line drawing from the Minnesota Test for Differential Diagnosis of Aphasia established by Schuell (1972) were presented to participants. To elicit responses, test administrators presented participants with four single pictures, two requests for personal information, and two requests for procedural information. The picture stimuli shown to participants in the study included the PICA and single picture Cookie Theft from the BDAE to determine the severity and type of aphasia. Based on data collected from the measures mentioned above, the authors concurred the presence of six speakers with fluent aphasia and 14 speakers

with fluent aphasia. Word count, correct information units (CIUs), words per minute, percent of CIUs and CIU per minute were five of the measures that were assessed during evaluation of samples. The (CIU) analysis was utilized to evaluate each language sample, in which CIU was defined as a word that was intelligible, accurate, and informative about the content of the pictures. The percentage of informative words was found to be greater in conversation discourse conditions (Nicholas & Brookshire, 1993). Interjudge reliability was examined based on the formula $[\text{total agreements} + \text{total disagreements}] \times 100$, a percentage of interjudge agreement that involved the number of words and number of CIUs in each sample. Findings for interjudge reliability of words was 99% and for CIUs was 95%. The group of unimpaired speakers were found to have produced more words and CIUs than the group of speakers with aphasia conveyed. Overall, the findings in the study indicate the procedures are found to be useful when evaluating the connected speech of adults with aphasia.

Nicholas and Brookshire conducted a study in 1995 that examined language samples from twenty unimpaired speakers and twenty adults with aphasia. The procedures from the previous study in 1993 were carried out for this investigation. The existence of main concepts in the language samples were examined by Nicholas and Brookshire (1995) based on the responses to picture sequences which included the single picture Cookie Theft from the BDAE (Goodglass & Kaplan, 1983) and “Picnic” picture found in the WAB (Kertesz, 1982). The propositions within the language output were then scored based on the accuracy and completeness of the embedded main concepts, in terms of whether each main concept was accurate and complete (AC), accurate but complete (AI), inaccurate (IN), or absent (AB). Overall, it was noticed the unimpaired group of participants conveyed more accurate and complete main concepts than the group of speakers with aphasia produced (Nicholas & Brookshire, 1995). Similarly, most of the adults with aphasia

responded to the stimuli and produced connected speech responses and the main concepts appeared to be stable from session to session (Nicholas & Brookshire, 1995). Evidence from these previous studies suggested that using picture stimuli to elicit oral responses with measures capturing the accuracy and completeness of the output can be a reliable way to measure an individual's discourse ability. Results from this study suggest measures of examining main concepts are an applicable method for assessing the informativeness and efficiency of spoken narratives.

A study conducted by Rivera, Hirst, and Edmonds (2018) used the same picture stimuli included in Nicholas and Brookshire (1993, 1995) to elicit discourse in English and Spanish bilingual speakers. The purpose of this study was to examine any impacts of language dominance on the production of main concepts in bilingual speakers with aphasia. Authors recruited 83 young adults and administered the composite line drawing single pictures from previously established study. To establish severity and type of aphasia, the PICA and single picture Cookie Theft from the BDAE were administered to participants. Discourse production of participants was assessed using measurements including the number CIUs and naming accuracy. It was found that the group of Spanish and English dominant groups of bilingual speakers produced more main concepts in their dominant language (Rivera et al., 2018). The study concluded with the mention of a high correlation between main concepts and ratings of speaking proficiency amongst participants.

2. Main Concept Analysis

The MCA has been previously validated in other languages, however a Spanish version has yet to be adapted. The MCA measures the performance of PWA to evaluate the level of aphasia and determine a baseline for intervention. Developed by Kong in 2009, the MCA analyzes the

production of main concepts based on picture sets. In the current study, a total of 81 non-brain damaged adult participants from different Spanish regions were recruited. Prequalification for recruitment included a short form of the Cognitive Linguistic Quick Test (CLQT; Helm-Estabrooks, 2001) and a questionnaire regarding the participant's region of origin and years of speaking the Spanish language. In response to the picture sets, language samples were obtained for further evaluation. The response from each participant was then transcribed and scored based on accuracy of total main concepts spoken for the MCA picture sets.

3. Previous MCA Studies

3.1. Cantonese-MCA

A preliminary report was developed by Kong (2009) to validate the MCA four sets of sequential pictorial stimuli for examination of Cantonese PWA. Ten unimpaired Cantonese speakers and 20 PWA were recruited for the study. The group of unimpaired and PWA each included 15 male and 15 female adults. The group of PWA were administered two pre-test assessments to determine the presence of any visual deficits that may hinder their ability to view picture stimuli. To begin, a Cantonese version of the WAB (CAB; Yiu, 1992) was presented to participants to determine type and severity of aphasia by the average Aphasia Quotient (AQ). Four picture stimuli found in the Cantonese Linguistic Communication Measure were shown to participants to establish pre-test scores based on their elicitations (CLCM; Kong 2006); Kong & Law, 2004). Ten of the participants were found to have fluent aphasia and the other ten had non-fluent aphasia. The participants were then placed into two different groups, fluent and non-fluent. The testing administrator presented each participant with the four detached single black-and-white line drawings from the MCA assessment. The first and second picture set contain only one

character, while the other two sets contained three characters. Including additional characters was done with the intention of eliciting more main concepts by referencing more characters than the previous set. The administration of each picture set was done in a sequential manner beginning with set 1 cooking in a kitchen, which showed an old lady cutting carrots in the kitchen. The old lady cuts her finger while cutting the carrots and she then proceeds to acquire a first-aid kit and place a bandage on her wound. Picture set 2 is titled waking up late for work, where a man is shown waking up late. In the next picture, the same man brushing his teeth and combing at the same time before getting dressed. The man then notices he is wearing a pair of socks that do not match. Picture set 3, buying ice-cream, shows a mother buying ice cream with her daughter at an ice-cream store. In the next picture, the mother pays the salesman for the ice-cream and the salesman begins preparing the ice-cream. After the salesman gives the ice-cream to the girl she is shown dropping the ice-cream on the floor and beginning to cry. The salesman sees the girl cry and gives her a new ice-cream. In picture set 4, helping an old man, the picture depicts an old man carrying a grocery bag. A father and son are shown walking on the opposite direction of the old man. The following picture reveals oranges falling from the old man's grocery bag. The son sees that the oranges have fallen and begins to help pick the oranges up. The old man acknowledges a job well done and thanks the boy for his help.

Each picture set was presented in sequential order and participants were instructed to describe what they saw in each picture. Only general probe questions were provided to elicit main concepts, such as "What's happening here?", or "Any more?" were given (Kong, 2009). The responses from participants were recorded using a voice recorder for later transcription. To obtain test-retest reliability, ten PWA returned for a retest session that occurred three weeks after the initial session of data collection. Eight speech-language pathologists a part of the study

created a list of main concepts for each picture sets. A scoring criterion based on the procedures (Nicholas & Brookshire, 1995) was followed to examine the oral production of PWA. The MCA study included a scoring criterion of 70% that was used to establish a preliminary list of main concepts. Specifically, the main concepts that were elicited by 70% or more participants were included in the final list.

The main concepts that were included by six out of eight speech-language pathologists (SLPs) were added to the final main concept list. A total of five and six main concepts were found for picture sets 1 and 2. While a total of nine and six main concepts were found for picture set 3 and 4. Findings in the current study for picture set 1 and 2 was a total of five and six main concepts. Analysis of data was based on a scoring system that determined the presence of any pieces of essential information in each language sample. Specifically all main concepts were accounted for and the score was whether the spoken essential information was accurate and complete. In order to accurately account for main concepts, six measures were implored to determine the performance of each participant. The six measures consisted of the following: number of Accurate and Complete concepts (AC), number of Accurate but Incomplete concepts (AI), number of Inaccurate concepts (IN), number of absent concepts (AB), main concept score (MC), and number of AC per minute. The MC score is computed by using the formula $(3 \times AC + 2 \times AI + 1 \times IN)$. The method of scoring was utilized to calculate accuracy of the essential information given and the completeness as well. The number of AC per minute was measured using the length of a language sample, or duration of audio recording, and converting the time to minutes. Using the four main concept measures, the performance from the aphasic and unimpaired group of participants was evaluated using one-way ANOVAs. The values from one-way ANOVAs determined the performance and allowed for comparison between unimpaired and

impaired participants. The analysis revealed the number of accurate and complete (AC) concepts were different across the stimuli for normal speakers compared to the group of PWA. The mean, standard deviation, and range were obtained based on the age and education levels of participants to compare characteristics amongst groups. The study included reliability measures of inter-rater, intra-rater, and test-retest reliability. The scoring system was shown to be a strong method of evaluation based on the results of the reliability measures. Two testing sessions took place 1-3 weeks apart. Strong correlations were revealed across both sessions.

The aim of this study was to establish a culturally appropriate assessment battery for Cantonese speakers with aphasia through the use of picture sets. The analytic method proposed by Nicholas and Brookshire (1995) motivated further examination of oral discourse between PWA and unimpaired speakers. Overall, the control group was found to have a better performance than the PWA. Amongst the group of non-fluent and fluent speakers with aphasia, it was revealed that the non-fluent group of PWA excluded one or more pieces of essential information, while the fluent group of speakers with aphasia was seen to have conveyed words that were non-specific, or names of categories in response to the picture stimuli. The findings of the current report showed the measure can be scored with acceptable inter-rater, intra-rater, and test-retest reliability for speakers with aphasia (Kong, 2009). Although a discrepancy was found between scores of absent (AB) concepts and accurate but incomplete (AI) concepts. It was revealed that only using orthographic transcriptions as analysis rather than listening to the language sample led to discrepancies between the author and the each of the raters. The study did not examine relations between main concepts that were elicited by PWA. The study is the first report in Chinese that had involved the validation of four sets of pictorial stimuli to elicit language samples from adults with aphasia in the Cantonese-speaking community.

In Kong (2011), 16 Cantonese PWA were recruited to further establish the validity of the MCA. All participants were evaluated one year after the initial testing session that occurred in the summer of 2009. Following procedures in Kong (2009), the group of PWA was administered the MCA, CAB, and CLCM to assess oral discourse. Pretests were presented to determine whether any participants presented visual deficits that may hinder their ability to scan the stimuli. None of the participants in the study were found to have any deficits with their vision. Results showed based on the CAB that all PWA maintained the same syndrome of aphasia except for one participant. Out of the 12 participants, five showed regression based on the change in the AQ value. For the group of PWA (12 men and 4 women), CAB results showed that eight participants had anomic aphasia, four participants with transcortical motor, and two participants with Broca's, and one participant with isolation aphasia (Kong, 2009). The scoring criteria developed by Kong (2006) was applied in this study. Therefore out of the 16 participants, only the scripts from ten participants that met the criteria were included in the final list. Results present correlations between MC measures and CLCM indices (Kong, 2006; Kong & Law, 2004). The analysis system was found to be useful for quantifying the linguistic performance of PWA. Reliability measures were acceptable for PWA in this study. Statistical analysis showed the non-fluent participants omitted one or more pieces of essential information accurate but incorrect (AI) concepts compared to the fluent group of participants. It was found that for the fluent group of speakers, more non-specific words were produced.

3.2. English-MCA

An English version of the MCA was developed by Kong, Whiteside, and Bargmann, in (2016) to establish normative data of native English speakers and compare the discourse

production of 60 unimpaired participants to 12 speakers with fluent aphasia, 12 with non-fluent aphasia and 13 dementia of Alzheimer's type (DAT) based on the MCA pictorial stimuli. Amongst the 24 speakers with fluent and non-fluent aphasia, there were 14 males and 10 females recruited. In the group of participants with (DAT), 9 were males and 4 were females. A control group consisting of 20 elderly individuals were also recruited in the study. Similar to the previously validated version of the Cantonese MCA (Kong, 2009), background information for all participants was collected and organized to analyze characteristics amongst the three age groups (Young: 18-39 years of age, Middle aged: 40-59 years of age, and Elderly: 60+ years of age) and two levels of education (low and high). It was reported in the study that each age group had 10 male and 10 female participants. Reported for the current study were 10 male and 10 female participants. Stimulus material for all participants consisted of subsets from the CLQT that were administered to assess any presence of language impairments. The Functional Linguistic Communication Inventory (FLCI) test devised by Bayles and (1994) was given to evaluate the communication skills from ten of the participants. After initial assessments, the MCA was presented to each participant individually in a quiet environment. The pictorial stimuli from the MCA was shown in sequential order and participants were prompted to view the pictures from left to right. The testing administrator was instructed to only provide general directions such as "Tell me what is happening in the pictures" to elicit verbal responses. Each session was audio recorded for later transcription.

To establish a culturally appropriate version of the MCA for English speakers, scores were generated based upon the identical picture description task previously established and validated by Kong (2009). The language samples from 60 native English speakers were analyzed using a scoring criterion. Following the transcription of each language sample, all pieces of

essential information were identified. As previously mentioned, procedures for the English speakers followed the protocol in Kong (2009), which included a scoring criterion of 70%. Based on this criteria, only main concepts that were mentioned by 70% or more individuals out of the total number of participants were added to the final scoring list of the main concepts. Transcripts were also measured to determine MCA scores based on the six MCA indices (AC, AI, IN, AB, MC score, and AC per min). It was found that the three groups of participants (speakers with fluent aphasia, non-fluent aphasia, and dementia) recruited in this study were all found to be different by the evaluation of one-way ANOVA. The non-fluent aphasic group was found to have produced more AB concepts and fewer AC, AI, and IN concepts. The fluent aphasic group produced fewer AB concepts and conveyed more AC, AI, and IN. Lastly, the DAT group was found to have produced fewer IN and AB concepts and more AC concepts (Kong, Whiteside, Bargmann, 2016). The version of the MCA was found to be culturally appropriate for evaluating native English speakers as well as differentiating from disordered discourse.

3.3. TM-MCA

A study was conducted by Kong and Yeh in 2015 to validate a translated version of the MCA in Taiwanese Mandarin (TM-MCA). The study involved investigating the age and education level effects on discourse based on the four picture sets found in the MCA. Language samples were collected from 46 native Taiwanese Mandarin speakers that were right-handed, 36 normal speakers, and 10 PWA were recruited for this study. Three age groups (20-39), (40-59), (60+), were created to divide participants and each group individually. Responses to the MCA and Taiwanese Mandarin Linguistic Communication Measure (TM-LCM; Kong & Yeh, 2015) were

examined. Informative words (i-words) were identified to determine each the performance between participants based on the indices in Kong and Law (2004).

MCA indices devised by Kong in 2009 were applied to the TM-MCA. The formula ($3 \times AC + 2 \times AI + 1 \times IN$) was used to determine the Main Concept Score. Based on evaluation of samples, a Taiwanese Scoring Form was developed to analyze the elicitations of PWA. Only main concepts that met the previously establish 70% scoring criteria were included in the final scoring list. To establish reliability, data was recollected from two of the recruited PWA two weeks after the first testing session. The results of the TM-MCA revealed the young group (20-39) of participants had elicited more AC main concepts than the middle age group (40-59) (Kong & Yeh, 2015). Results revealed that the age and education level had an impact on discourse performance. The Taiwanese version of the MCA was found to be appropriate for discourse measurement for native speakers. The results from this study can be used to provide clinicians with a resource to make decisions regarding diagnosis and treatment plan for PWA (Kong & Yeh, 2015).

3.4. Korean-MCA

A study was devised by Kong in 2018 to investigate the inter-rater agreement of the MCA in native Korean speakers. A total of 13 PWA were recruited for this study. To determine severity of aphasia, the WAB was administered to participants. The result of the WAB established the Aphasia Quotient (AQ) for each PWA. The six MCA indices (AC, AI, IN, and AB,) as well as the AC per minute and MC score were determined in the study. The main concept score was evaluated using the formula ($3 \times AC + 2 \times AI + 1 \times IN$). Results of a chi-square test revealed insignificant relation between picture set and accuracy of rating main concepts at 28% across

rater disagreement (Kong, 2018). In this study, there were no reported effects between picture sets and the MCA scoring. The intra-rater agreement was similar to the point-to-point inter-rater reliability in the Cantonese-MCA. However in this version of the MCA, there was no list of acceptable lexical alternatives. To determine any variances between scores, two independent raters re-analyzed and crosschecked data. Pearson Product Moment Correlation Coefficient was implored to determine a relationship between the MCA scoring disagreement and severity of aphasia from PWA (Kong, 2018). The scores in the current study were found to be inconsistent, therefore further investigation is recommended to establish final findings.

3.5. Japanese-MCA

An adaptation of the MCA was established in 2018 in Japanese by Yazu, Yoshino, and Kong. The two phase study involved 10 speech-language-hearing therapists (ST). In the first phase, researchers recruited 60 unimpaired native Japanese speakers that consisted of 20 young, 20 middle-aged, and 20 older speakers. Criteria for participant recruitment and testing procedures followed previously established MCA studies. Each participant was presented the MCA set and asked to describe each picture orally. Responses were audio recorded and later transcribed. The six MCA indices: 1) Number of Accurate and Complete concepts (AC), 2) Accurate but Incomplete concepts (AI), 3) Number of Inaccurate concepts (IN), 4) Number of Absent concepts (AB), 5) Total Main Concept Score, and 6) Number of Accurate and Complete concepts per minute were used to determine the MCA performance of each participant. Following evaluation of language samples, a list of main concepts (MC) for the set of sequential pictures was created by the STs in the study. Based on the 70% scoring criteria, if the MCs on the list were present in 70% or more of the 60 health participant's description, the MC was included in the final list. The scoring criterion of 70% has been used by Dr. Kong for past

validation of target main. Using this criterion, only main concepts that were spoken by 70% or more of the total number of participants were included in the finalized preliminary sets of the MCA scoring criteria. The second phase of the Japanese MCA consisted of examining the validity of the assessment. A sequential picture task from the Supplementary Tests (SLTA-ST; Brain Function Test Committee, Japan Society for Higher Brain Dysfunction, 1999) was applied to 14 language samples of PWA and language samples from 20 unimpaired participants. To determine inter-rater, intra-rater, and test-retest reliability, Spearman's rank correlation was calculated. The statistical analysis revealed the scores from the SLTA-ST were in high correlation with the total main concept score.

The list of finalized main concepts was used to score responses spoken by PWA. Proposed main concepts were established using the 70% scoring criterion and results revealed the Japanese MCA was found to have a total of 23 MCs. This is a smaller number compared to the English and Chinese version of the MCA that contained 26 MCs. The aim of this study was to establish a version of the MCA culturally appropriate to assess the discourse in Japanese speakers. Additional data from disordered participants will allow for examination of different severities and types of aphasia. Comparing a more balanced set of data will also determine how well the Japanese-MCA can discriminate between impaired and unimpaired participants (Kong, 2018).

4. Introduction of Spanish

The Spanish language is spoken in several countries by more than 470 million individuals worldwide (Rydgren, 2017). Within the United States, the population of Spanish speakers is expanding by the growth of immigration. Spanish is now commonly spoken in cities where English is the official language, such as Miami, New York, Los Angeles, and Orlando. The

language originally derived from Latin and about 70% of Spanish words contain Latin roots.

Many variations between meanings of lexical items are noticed in standard Spanish.

Geographical location has a significant impact on discourse. The Spanish language consists of many layers of complexity; therefore, it is necessary for an individual to have a linguistic understanding to achieve communicative competence (Arteaga & Llorente, 2009). Specific dialects are influenced from many regions that include the Central American Caribbean (i.e., Puerto Rico, Costa Rica, Honduras, Dominican Republic, and Cuba), Mexican (i.e., Mexico), Andean-Pacific (i.e., Colombia, Peru, Bolivia, and Venezuela) and Iberian Peninsula (i.e., Spain). The dialect from speakers from the Central Caribbean Spanish is influenced by the surrounding regions of Puerto Rico, Cuba, Costa Rica, Nicaragua, Honduras, El Salvador, and Guatemala. Portland State University (2019) published an article regarding Multicultural Topics in Communication Sciences and Disorders that discussed Puerto Rican Spanish. The online webpage provides information on different languages, including history of the native Puerto Rican speakers. It is mentioned that native speakers from the Central Caribbean are seen to produce discourse that is influenced by speakers from the islands, and is more casual and informal compared to other Spanish regions. The discourse elicited in Central Caribbean been seen to commonly exclude syllables and consonants. For example, words like, “comer” are seen to be elicited “comé” which means eat in English.

Linguistic analysis of Spanish discourse has provided information regarding the many variations seen specific to dialect regions. A study conducted by Brown and Cortés-Torres in 2013 examined the variation usage of “bien” and “muy” spoken by thirty native speakers from Puerto Rico. The purpose of this study was to investigate the syntactic and pragmatic usage of “bien” and “muy” in Puerto Rican speakers. It is typical for Spanish speakers to elicit modifiers

that intensify adjectives, such as “bien” (extremely or very) and “muy” (very). The word “bien” can also be defined as good in English, however it is also used in Spanish to intensify an adjective. For example, “bien bonita” means very pretty. However “muy bien” is defined as very good. In this case, the two variations “bien” and “muy” are examined to investigate the frequency in which they are individually used to modify adjectives. The procedures for assessment consisted of examining conversational speech by participants. The author analyzed 18 prerecorded interviews from (Cortés-Torres, 2005) that were spontaneous speech of 30 native speakers from Puerto Rico. An example of the usage of both adjectives is seen in a sample transcription from the study. “Pasa que está *bien bonita* la casa, la tiene *bien bonita*. (Interview 1, speaker 1)” and “Sí, están *muy bellos* los dos. (Interview 2, speaker 2)” (Brown & Cortés-Torres, 2013). When translated in English, speaker 1 elicited very pretty and speaker 2 included muy bellos to refer to the conversation regarding the appearance of a house in the language sample. The authors followed procedures to identify the accuracy of each adjective and the modifier elicited by the participant. It was anticipated that the female group elicited more intensifiers compared to the male group. To investigate whether or not this was valid, the participants were divided into groups. Three age groups (20-29), (30-59), and (60+) were included to compare similarities and differences between groups. Linguistic variables were highlighted to determine whether the phrase was singular or plural. The authors of this study also examined the characteristics of adjectives produced in each language sample. The group of women recruited for this investigation were found to have produced “bien” more than “muy” when compared to the group of men participants. The authors of the study analyzed the frequencies of each variable. Results from quantitative analysis revealed the group of women had elicited “bien” more often than men (Brown & Cortés-Torres, 2013). It was found that women overall presented

a high use of “bien” more than the group of men (86%). Due to the lack of research in dialect-specific variations in the Spanish language, the present study provided a basis for examining two variations of intensifiers to modify adjectives. Investigations related to the assessment of spoken discourse produced by native Spanish speakers are important to establish culturally appropriate stimulus material for aphasic intervention. As the population of Spanish speakers increases, an SLP must be prepared to serve diverse populations and serve the language needs of clients.

5. Summary of Existing Aphasia Assessment Batteries in Spanish

The Western Aphasia Battery (WAB; Andrew Keryesz, 1982) was created to provide clinicians with a method of measuring the level of performance in speakers with language disorders. The WAB utilizes different areas of material to assess linguistic skill that include: spontaneous speech, comprehension, repetition, naming, reading, and writing. The results of the WAB provides clinicians with information based on the type and severity of aphasia. The baseline information obtained from the WAB Aphasia Quotient results can assist with guiding treatment and management of language deficits. A translated version of the WAB was developed to serve native Spanish speakers with an acquired neurological disorder (Kertesz et al., 1975). The Spanish version of the WAB consists of translated versions of the same variables and aims to provide clinicians with a balanced set of data based upon the same variables included in the English version of the WAB.

The Bilingual Aphasia Test (BAT) established by Paradis and Libben in 1987 was formed to serve as a culturally appropriate method of assessing language in bilingual speakers with aphasia. The BAT includes various sections for examination in each language that include the following: verbal auditory discrimination, reading comprehension, spontaneous speech,

syntactic comprehension, synonyms, antonyms, word and sentence repetition, series, naming, sentence construction, semantic opposites, and listening comprehension. The aphasia battery assessment of BAT was designed to contain structure and culture universally appropriate for each language. The BAT provides instructions to obtain scores in various different languages. Each screening tests includes structure that allows administrators of testing to adapt the BAT to meet language specific needs (Paradis & Libben, 1987).

In Muñoz and Marquardt (2008), a short version of the BAT (English and Spanish) was administered to 22 adults to examine the performance of unimpaired bilingual speakers. The ages of participants ranged from 51-77 years. It was found that the group of unimpaired adults had a higher score on the English version compared to the Spanish version of the BAT. Results show the performance of the BAT were consistent with higher proficiency in English than Spanish. The authors determined the performance of bilingual speakers with aphasia was impacted by the speaker's proficiency in English and Spanish. Responses to language background measures indicated a higher score in English than Spanish. It is necessary for accounting for pre-morbid differences in language skill to properly interpret BAT results (Muñoz & Marquardt, 2008).

The Cognitive Linguistic Quick Test (Helm-Estabrooks, Nancy, 2001) is a manual measurement to assess the cognitive abilities of individuals and detect possible dysfunction amongst language deficits. A version in the Spanish language is also provided for native Spanish speakers across all dialects. The stimuli included in the Spanish CLQT is the same pictorial stimuli in the English test, with the addition of the specific Spanish Record forms and response forms used to interpret ratings of severity. The CLQT provides clinicians with general information regarding a speaker's cognitive skills. The manual offers 10 tasks that target the five cognitive domains that include attention, memory, executive functions, and visuospatial skills.

6. Pilot Spanish-MCA

Previous quantification assessments have presented a validated system used for clinical intervention of disordered output. The MCA has been previously validated in Cantonese and English; however, a Spanish version has yet been adapted. The same picture stimuli validated in Kong (2009) were administered to participants in the Spanish-MCA pilot study. Questions related to general background information of participants was acquired during testing sessions. In particular, the age, level of education, and level of fluency in English and Spanish of each participant was obtained. The pilot study constructed by Santana, Recarte, Cintron-Vargas, Ziegler, & Kong in 2017 provided a basis for constructing the Spanish-MCA. Thirty-eight unimpaired Spanish speakers were recruited in the pilot study. Based on responses to MCA pictorial stimuli, normative data was established. Characteristics of participants were examined based on the age group and education levels of participants. The Spanish-MCA study used three age groups, (18-39), (40-59), and (60+), to assess and categorize the participants recruited. The various age groups allowed for examinations of similarities amongst speakers from the same age group, as well as distinctions between different groups. Researchers administered a short form of the CLQT and MCA picture sets. The responses of participants were audio recorded for later evaluation. The pilot study was eventually expanded by a new group of researchers to process data and continue the investigation. The group of researchers worked on the second phase of the study using the language samples from participants in the pilot study. The second phase of the study involved recruiting a more diverse group of unimpaired Spanish speakers to create a balanced set of data based on the three age groups (18-39), (40-59), and (60+). Results from the pilot study were found to serve SLPs as a clinical tool to assess and plan treatment for Spanish speakers with acquired language disorders.

7. Limitations

The existing aphasia assessment batteries in Spanish offer clinicians the opportunity to serve a wider population of individuals with language deficits, however there is a lack of objective and comprehensive assessment discourse production that includes cultural specific adaptations to serve various Spanish dialects. The stimulus included in the CLQT and BAT can be found as inappropriate as the objects in the pictures are not culturally specific. There is currently little research regarding the use of the Spanish CLQT. Although the Spanish CLQT version was constructed to minimize cultural biases, it does not include cultural characteristics specific to native Spanish speakers. Instead the Spanish version is only a translated version of the original manual. The stimuli included in both the BAT and CLQT is not devised specifically for native Spanish speakers, and therefore may impact the testing performance.

CHAPTER THREE: RESEARCH AIMS

The first objective of this study was to establish a Spanish version of the Main Concept Analysis (Spanish-MCA) using the four sets of sequential pictures to allow evaluation of spoken responses by native Spanish speakers with aphasia. Due to a shortage of assessment batteries for measuring discourse in PWA, a culturally appropriate Spanish-MCA version will allow clinicians to evaluate a greater population of disordered clients. Reliability measures will be evaluated in this study. Given the variations of different Spanish dialects, researchers aimed to establish geographically-specific norms of the MCA picture description for Spanish speakers. To do so, we analyzed whether unimpaired native Spanish speakers mentioned the key content items in the picture sets. The total number of target main concepts for different dialect groups will be established, as well as any additional pieces of essential information that are found to be accurate and complete (Kong, 2009).

Subsequent to that, the second aim of this study was to investigate the age, education level, and gender effects on main concept production amongst participants based on the normative data collected. Based on previously established MCA results (Kong & Yeh, 2015), we hypothesized that frequency of accurate and complete concepts would be seen in speakers in the youngest age group (18-39). It was also hypothesized that more accurate and complete (AC) main concepts will be produced by participants with a higher level of education compared to individuals in the low educated group. Additionally, it is believed that disordered participants will produce more inaccurate concepts (IN) than the unimpaired group of speakers. The third goal was to apply the dialect-specific Spanish-MCA, with reference to the scoring criteria established from the first aim in this study, to a speaker with acquired deficits of spoken

discourse to determine how clinically useful the newly developed Spanish-MCA was for reflecting features from PWA.

CHAPTER FOUR: METHODOLOGY

1. Pilot Study

A pilot study was conducted prior to the establishment of this independent research study to collect normative data and establish geographical characteristics that are culturally distinct to native Spanish speakers recruited for this study. The original goal of this study was to have a balanced set of data for participants based on different age groups and education levels. Previous researchers recruited unimpaired Spanish speakers and interviewed each person in a quiet environment. Researchers administered all tests in Spanish. The procedures began by asking the participant a series of questions regarding the participant's demographic background. To rule out any possible neurological deficits, a short form of the CLQT was administered first. Instructions for the CLQT were provided in Spanish. The MCA was then presented to participants and each picture set was shown in sequential order. The responses were recorded for later evaluation. Researchers were prompted to not give any cues to participants and only suggest the participant to describe what they saw in each picture. Using audio recording devices, researchers were able to record each session for later transcription. Each language sample was transcribed for further evaluation.

1.1. Subjects

A total of 38 normal Spanish speakers were recruited between the ages of 18-60 years to participate in the pilot study by prior students clinicians. The dialect region of the participants was made up of Puerto Rico (n=10), Dominican Republic (n=4), Colombia (n=8), Mexican (n=9), Honduras (n=3), and Peru (n=4) (refer to Table 1). All participants were native Spanish speakers between the ages of (20-68) years old. Each participant was classified by the origin of

their dialect region. Once all regions for the pilot study were identified, 4 subgroups were created based on the geographical location. Therefore, the participants from Puerto Rico were grouped together and classified as the Central Caribbean group. The same was done for the region of Colombian, Mexican region, etc. In the pilot study, most participants from the Central Caribbean and Andean Pacific group had an average education level of 14 years, while participants from the Mexican region had an education level that consisted of 13 years. For the youngest age group (18-39), the participants in the Central Caribbean group average age was 22 years old, while for the Andean Pacific it was 21 and Mexican group average was 24. There were no (60+) year old participants from the Mexican region recruited in the pilot study (see Table 1). All participants from the Central Caribbean and Andean Pacific region had a high education, while the Mexican region had two males with a low education (see Table 2). There was also a lack of data collected from participants with a low education. The second phase of the investigation included recruiting more native Spanish speakers to establish normative data based on the number of main concepts found in the language samples in response to the MCA picture set.

Table 1: A summary of ages of unimpaired Spanish speakers in pilot study

Dialect group	Age (18-39)		Age (40-59)		Age (60+)	
Central Caribbean	Mean:	22.5	Mean:	49.1	Mean:	67.3
	SD:	5.6	SD:	4.74	SD:	0.82
	(# of males):	2	(# of males):	3	(# of males):	2
	(# of females):	3	(# of females):	3	(# of females):	2
	Range:	(20-36)	Range:	(43-58)	Range :	(66-68)
Andean Pacific	Mean:	21	Mean:	44.5	Mean:	61.5
	SD:	1.5	SD:	3.6	SD:	0.5
	(# of males):	2	(# of males):	0	(# of males):	0
	(# of females):	7	(# of females):	3	(# of females):	2

	Range:	(19-24)	Range:	(41-49)	Range:	(61-62)
Mexican	Mean:	24.5	Mean:	43.3	Mean:	0
	SD:	3.2	SD:	2.5	SD:	0
	(# of males):	2	(# of males):	2	(# of males):	0
	(# of females):	4	(# of females):	1	(# of females):	0
	Range:	(21-30)	Range:	(40-46)	Range:	0

Table 2: Summary of education levels in pilot study

Dialect group	Secondary or below (low)		Post-secondary (high)	
	Mean:		Mean:	
Central Caribbean	Mean:	0	Mean:	14.2
	SD:	0	SD:	1.8
	(# of males):	0	(# of males):	7
	(# of females):		(# of females):	8
	Range:		Range:	(12-16 years)
Andean Pacific	Mean:	0	Mean:	14.3
	SD:	0	SD:	1.70
	(# of males):	0	(# of males):	2
	(# of females):	0	(# of females):	12
	Range:		Range:	(12-16 years)
Mexican	Mean:	6.5	Mean:	13
	SD:	0.5	SD:	2.4
	(# of males):	2	(# of males):	4
	(# of females):	0	(# of females):	5
	Range:	(6-7 years)	Range:	(10-16 years)

(Data in number of years of education among unimpaired participants)

Note. SD = Standard deviation

1.2. Stimulus Materials

Picture sets developed by Kong in 2009 were administered to each participant in the present study. A description of each picture set was mentioned in the previous section.

Specifically, four sets of sequential black-and-white lined drawing pictures with a dimension of

5.51 by 8.46 inches. All the picture sets included a distinct theme to elicit spontaneous responses from participants.

1.3. Procedures

For the pilot study, a group of student researchers were instructed to recruit unimpaired native Spanish speakers. The student researchers followed previous Kong (2009) procedures and began the testing session by administering a short form of the CLQT to rule out any language deficits. Demographic information regarding the participant's age, education level, and fluency in English and Spanish was obtained. The MCA was then administered to each participant. All responses were recorded and the data from the unimpaired group of participants was cross-checked amongst fellow researchers in the study for validation. Using a spreadsheet, demographic information and language samples were listed and organized based on the participant's region of dialect.

To represent the diverse Spanish nationalities recruited for the study, each participant was categorized by the dialect zone native to each speaker (e.g., participants from Puerto Rico are grouped as the Central Caribbean). In total, four subgroups were created based on the geographical location of the regions native to participants in the study (e.g., Central Caribbean, Andean Pacific, Mexican, Iberian Peninsula). After the subgroups were established, researchers analyzed the ages and education levels of participants to determine characteristics. Three age groups (18-39), (40-59), and (60+) and two levels of education (high and low) were used to classify participants and analyze their performance.

1.4. Data analysis

Researchers transcribed the language samples and identified the essential information in each transcript. A scoring criterion used by Kong (2006) for past validation of main concepts was applied to the pilot study. Under this criterion, only the pieces of essential information that were produced by 70% or more of the total number of participants were included in the final scoring list. Six indices were assigned to determine overall MCA performance. The main concepts were scored based upon the (1) Number of Accurate and Complete (AC), (2) Number of Accurate but Incomplete (AI), (3) Number of Inaccurate (IN), and (4) Number of Absent concepts (AB), (5) Total Main Concept Score, (6) Number of Accurate and Complete concepts per minute. A score of AC was applied if the all the essential items in the main concept were conveyed by participants. An AI score was given if the essential items in the main concept were correct, but one or more item was missing. For the picture set to be scored as IN, the essential items in the main concept were incorrect. Lastly, an AB score was assigned if none of the essential items in the main concept was provided.

2. Main Study

2.1. Subjects

The current research study included the expansion of recruiting diverse Spanish speaking participants to create a more balanced set of data based on their specific age group, gender, and education level. Subject recruitment followed the same procedures as the pilot study. A new group of student researchers invited 45 more participants to the main study. Adding this to the previous data collected from researchers in the pilot study, a total of 81 language samples elicited by unimpaired native Spanish speakers and one native Spanish PWA were examined in this study. Collectively, the participants were native to the regions of Puerto Rico (n=26), Cuba

(n=4), Dominican Republic (n=4), Honduras (n=5), Colombia (n=14), Mexico (n=11), and Peru (n=4), Venezuela (n=1), and Spain (n=12).

Table 3 A summary of ages of unimpaired Spanish speakers in the main study

Dialect group	Age (18-39)		Age (40-59)		Age (60+)	
Group 1: Central Caribbean	Mean:	22.5	Mean:	51.0	Mean:	73.1
	SD:	4.7	SD:	4.82	SD:	6.60
	(# of males):	5	(# of males):	3	(# of males):	3
	(# of females):	15	(# of females):	10	(# of females):	6
	Range:	(18-36)	Range:	(44-59)	Range :	(66-86)
Group 2: Andean Pacific	Mean:	22.5	Mean:	43.6	Mean:	0
	SD:	4.77	SD:	4.72	SD:	0
	(# of males):	4	(# of males):	0	(# of males):	0
	(# of females):	8	(# of females):	3	(# of females):	0
	Range:	(19-35)	Range:	(40-49)	Range:	0
Group 3: Mexican	Mean:	24.6	Mean:	44.7	Mean:	0
	SD:	3.2	SD:	3.7	SD:	0
	(# of males):	2	(# of males):	3	(# of males):	0
	(# of females):	6	(# of females):	1	(# of females):	0
	Range:	(21-30)	Range:	(40-49)	Range:	0
Group 4: Iberian Peninsula	Mean:	25.9	Mean:	0	Mean:	0
	SD:	6.4	SD:	0	SD:	0
	(# of males):	3	(# of males):	0	(# of males):	0
	(# of females):	7	(# of females):	1	(# of females):	1
	Range:	(20-38)	Range:	(44)	Range:	(62)

Table 4 A summary of education levels of unimpaired speakers in the main study

Dialect group	Secondary or below (low)		Post-secondary (high)	
Group 1: Central Caribbean	Mean:	8.0	Mean:	15.2
	SD:	1.73	SD:	2.57
	(# of males):	2	(# of males):	12
	(# of females):	1	(# of females):	27
	Range:	(6-9 years)	Range:	(10-20 years)
Group 2: Andean Pacific	Mean:	0	Mean:	14.9
	SD:	0	SD:	1.81
	(# of males):	0	(# of males):	3
	(# of females):	0	(# of females):	9
	Range:	0	Range:	(12-18 years)
Group 3: Mexican	Mean:	6.5	Mean:	22.1
	SD:	0.70	SD:	2.6
	(# of males):	2	(# of males):	9
	(# of females):	0	(# of females):	1
	Range:	(6-7 years)	Range:	(10-16 years)
Group 4: Iberian Peninsula	Mean:	0	Mean:	17.2
	SD:	0	SD:	3.7
	(# of males):	0	(# of males):	3
	(# of females):	0	(# of females):	11
	Range:	0	Range:	(10-26 years)

Note. SD = Standard deviation

The data collected from the unimpaired group of participants in this study was then compared. The mean average was derived from the total number of participants from each region. Calculations were completed to identify any distinct characteristics amongst the age groups and education levels in this study. Amongst the participants recruited, there were a total 42 from the Central American Caribbean region, 13 from the Andean Pacific region 12

participants from the Mexican region, and 14 from the Iberian Peninsula region. Overall, there were 23 males and 58 females recruited for the study. Group 1 Central Caribbean had a total of 27 females, which was the largest sample size compared to other regions. In group 2 Andean Pacific and group 3 Mexico, there were no participants recruited for the (60+) age group refer to Table 4). Only group 1 Central Caribbean and group 4 Iberian Peninsula recruited participants for the (60+) age group in the current study. Group 1 had a total of 6 females and 3 males. In group 4 Iberian Peninsula, only 3 males and 7 females between the ages of (20-38) were recruited. Group 4 also only recruited one female in the age group (40-59), and only one female in (60+) age group. Overall, there were of 50 participants between the ages of (18-39). This age group was the largest size based on the ages of participants recruited for this study. The level of education was also examined in table 5. Group 3 Mexican had the largest mean of highly educated group of participants at 22 years. All participants in group 2 Andean Pacific and group 4 Iberian Peninsula were in the high education level. Group 2 had a mean of 14.9 years of education and group 4 has a mean of 17 years of education. Lastly, in group 1 Central Caribbean 39 participants had a high level of education, while the 3 remaining participants had a lower level of education.

2.2. Procedures

Procedures for testing occurred in a quiet environment and researchers communicated with participants in Spanish during testing sessions. Following the procedures in the previous pilot study conducted by Simonet et al. (2018), all participants were asked to complete a demographic questionnaire and the CLQT to rule out any unidentified language problems. Demographic questions included information regarding the participant's age and education level, as well as

their fluency in the languages of English and Spanish. A short form of the CLQT was presented to participants and included various tasks to elicit spoken narratives from participants and examine their performance. A translated version of the short form CLQT was provided in Spanish. The MCA picture description task was presented to participants individually. Each picture was shown to the participant in sequential order. Participants were instructed to describe what they saw in each picture. Only general prompts that consisted of “Tell me what is going on in the pictures” was communicated to participants in Spanish to elicit as many spoken narratives as possible. The responses of each participant were audio recorded for later transcription and evaluation.

Based on the collected normative samples, dialect-specific scoring criteria, including target main concepts and lexicons of the Spanish-MCA, were determined. In total, nine out of the 81 participants underwent a retest session approximately two weeks after first date of data collection to ensure test reliability of normative data collected from unimpaired participants. Participants were instructed to indicate references from the picture sets presented to them.

Step 1: Three student researchers took part in collectively interviewing each participant individually. During testing session, the student researcher sat aside the participant with a recording system and stimulus material in a quiet environment. Consent for participation was obtained from each participant (refer to Appendix A). All instructions were communicated in Spanish. The researcher was instructed to obtain information regarding the participant’s demographics, which included: age, education level, place of birth, and level of fluency in English and Spanish. A short form of the CLQT was then presented to rule out any language deficits that may hinder the performance of the participant. Instructions for the CLQT were translated from English to Spanish and were provided in the test manual. The interview was

conducted in order of the demographic questionnaire, short form of the CLQT, and lastly the MCA. Specifically, in the MCA testing, participants were asked by the student researcher to depict what they noticed was occurring in each picture set. Finally, for the PWA recruited in this study, the WAB was additionally administered which consisted of measures that examines language function by assessing the linguistic skills in content, fluency, auditory comprehension, repetition and naming, reading and writing.

Step 2: The student researchers used the scoring steps (refer to Appendix B) to examine the language samples collected in the previously established pilot study, as well as the samples from the additional participants recruited in the main study. In total, the Spanish-MCA results of 81 unimpaired Spanish speakers were analyzed. Each language sample was arranged and collectively transcribed by researchers. Following transcription, all main concepts were identified and bolded for further evaluation.

2.3. Data analysis

The data collected were transcribed and organized based on the different origins of the Spanish language. Researchers collectively tallied and counted how many main concepts were mentioned by each speaker, and what pieces of essential information were mentioned for each identified main concept. All transcriptions were cross-analyzed by the three student researchers in the main study. This procedure was done to ensure accuracy of data and performance results. A scoring criteria of 70% followed by Kong (2009) was used to determine the criteria for scoring based on the elicitations of the unimpaired group of participants. The criteria consisted of main concepts that were elicited by 70% or more of the total number of participants. An example of the criteria in the pilot study was examined in picture set 3, where more than 70% of the total number of participants conveyed main concepts that were found to be acceptable alternatives.

Compared to the English version, it was revealed that for picture set 3, less than 70% of participants as an entity used “smiling” to refer to the girl in the picture set. Instead, more than 70% of participants elicited “happy”, or “feliz” in Spanish to refer to the girl receiving a new ice cream. For the acceptable alternatives, the majority of participants in group 4 Iberian Peninsula produced various lexical items to refer to the same object or target word. There were noticeable semantic changes, such as eliciting “tirita” and “curita” to refer to the main concept of Band-Aid in picture set 1.

Table 5 Examples of target main concepts for picture set 1 of MCA in Central American Caribbean Spanish

	Target main concepts in the original MCA in English	Target main concepts in Central American Caribbean Spanish
MC1	The <u>old lady</u> is <u>cutting</u> up some <u>carrots</u>	Una <u>señora</u> estás <u>cortando</u> <u>zanahorias</u>
MC2	The <u>old lady</u> <u>cuts</u> her <u>finger</u>	La <u>señora</u> se <u>cortó</u> el <u>dedo</u> .
MC3	The <u>old lady's</u> <u>finger</u> is <u>bleeding</u>	El <u>dedo</u> de la <u>señora</u> esta <u>sangrando</u> .

Note. The action words are bolded and underlined; all the pieces of essential information are underlined.

Table 6 Lexical items that are commonly accepted as alternatives in set 1:

Old lady	(abuelita, viejita, ella, señora mayor)
Cutting	(cortando, picando)
Carrots	(vegetables, zanahorias)
Finger	(mano, dedo, dedito)
Bleeding	(botando sangre, sangrando)

The premise for scoring included the following categories: 1) Accurate and Complete (AC), Accurate but Incomplete (AI), Inaccurate (IN), and Absent (AB). The instructions for producing the MC score was calculated by using the formula ‘3 x AC + 2 x AI + 1 x IN’. The score was the

AC produced per minute (AC/min) was scored by measuring the individual's efficiency of production (Kong, 2011). The method of calculation was following the basis of three areas of discourse production: existence of essential information, accuracy of the essential information, and completeness of essential information produced. The same procedures were applied to both the unimpaired participants and PWA. An inclusion criteria of 70% was also applied to each language sample. Only the essential information that was spoken by 70% or more participants was added to the final list. Based on the collected data, dialect-specific scoring criteria including target main concepts and lexicons of the Spanish-MCA were created for each group. A scoring form was created for the Spanish-MCA (see Appendix B) to evaluate the language samples and distinguish main concepts. A previously validated scoring form by (Kong 2009) was used for this study. The title and the target main concepts (for each of the four Spanish dialect groups) of the scoring form were updated to reflect the results of the present study. For each of the four dialect groups, an updated scoring form was generated to ensure validity of scores based on each participant's dialect. In addition to the Spanish main concepts, a translated English version of the scoring criteria was provided in the scoring form.

2.4. Statistical analysis

The data from 81 unimpaired Spanish speakers was used to compare the data from the impaired Spanish speaker recruited in this study. The distribution of education level across all four dialect groups was compared. A one-way ANOVA was used to investigate the effect of age and years of education on unimpaired and impaired groups. Data from the 81 unimpaired adult speakers were used as controls while one disordered participant was used as treatment. Differences amongst the years of education were noticed, however one-way ANOVA was used to investigate the effect of

age and years of education of the unimpaired group and disordered participant impacted overall performance.

Table 7 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.890	0.895	4

To determine reliability measures, transcripts were re-examined to achieve intra-rater reliability by the author of this study. Intra-rater-reliability shows a good consistency with a Cronbach alpha coefficient of 0.89 and intra-rater reliability of 0.826 with a 95% lower bound of 0.683 and 95% upper bound of .911 (see Table 7). This shows a high interclass correlation and inter-rater reliability shows a statistically significantly difference in terms of age and level of education in the overall performance among the participants. For test-retest reliability, the group of unimpaired speakers was interviewed using the same testing material no more than two weeks after the first testing session. Due to the lack of comparable data for disordered participant, severity of aphasia was not investigated to determine differences amongst the impaired group. Therefore, a proposed method is in place to compare the aphasic data and normative data.

Table 8 Intra-reliability coefficient (Correlation Coefficient)

	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	P-value
Single Measures	0.613	.418	.774	.437	80	240	.000
Average Measures	0.826	0.683	.911	.437	80	240	.000

CHAPTER FIVE: RESULTS

1. Main Study

Results of the one-way ANOVA revealed that the unimpaired adult speakers among the four subgroups: Central Caribbean, Andean Pacific, Mexico, and Iberian Peninsula and the disordered participant recruited in the study showed statistically significant differences in terms of age $F(4, 76) = 4.182, p = .004$; and in term of year of education $[F(4, 76) = 6.524, p < 0.001]$. Amongst the group of unimpaired participants, the results of the one-way ANOVA showed no significant differences in education level or age (refer to Table 9). Intra-reliability shows a statistically significant difference in terms of age and level of education in the overall performance among the participants. The reliability measures in this study were relative to previous MCA Kong (2009) which suggested the scoring system to be reliable.

Table 9 Analysis of variance (ANOVA)

Source of variance		Sum of Squares	df	Mean Square	F	P-value
Age	Between Groups	5282.939	4	1320.735	4.182	.004
	Within Groups	24002.938	76	315.828		
	Total	29285.877	80			
Years of education	Between Groups	255.481	4	63.870	6.524	<0.001
	Within Groups	744.075	76	9.790		
	Total	999.556	80			

The total main concepts found in this study varied between 25-26 amongst the four dialect groups. For each group, results were generated to determine the number of total target main

concepts based on the elicitations that met the MCA scoring criterion (refer to Table 8).

Comparing the total MCs to the English version of 26 total main concepts spoken, only slight differences were noticed. The Andean Pacific and Mexican subgroup of participants had a total of 26 main concepts spoken which is the same as the English version of the MCA. In total, there were 25 total target main concepts spoken for the Central Caribbean and Iberian Peninsula subgroup.

Table 10 Total number of target main concepts in English and Spanish

MCA	English	Group 1 (Central Caribbean)	Group 2 (Andean Pacific)	Group 3 (Mexican)	Group 4 (Iberian Peninsula)
Set 1	5	5	5	5	5
Set 2	6	6	6	6	6
Set 3	9	8	9	9	8
Set 4	6	6	6	6	6
Total	26	25	26	26	25

1.1. Summary of lexical items

The scoring form was generated based on each participant's MCA score. It was found amongst all four dialect groups that the same main concept was spoken in picture set 1 to refer to the old lady in the pictures as “señora mayor” (see Appendix C). The same was presented for the main concept of the old lady cutting her finger. In reference to picture set 1 with the old lady, 66% of participants from the Andean Pacific and 80% of participants from group 1 Central Caribbean, used the noun “anciana” which also means old woman. Group 3 from the Iberian Peninsula refrained from including the main concept of old lady in picture set 1. Only 28% of participants from group 4 the Mexican region included the main concept. Participants across all four subgroups used the same main concept to refer to the carrots in the picture set 1.

Specifically, 83% of participants in group 3 Iberian Peninsula were seen to have mentioned “una tiritita” to refer to the Band-Aid. This alternative reference to indicate a Band-Aid was presented amongst many individuals from this region. All groups included “cortando” a common reference that means cut in Spanish, however variations of the verb “to cut” were participants in group 1 Central Caribbean and group 2 Andean Pacific regions. In group 1 Central Caribbean, 70% of participants included “cortando” and 83% of participants in group 2 Andean Pacific used the same lexical term to indicate cutting. A variation of using “cortando” and “picando” was seen in group 1 Central Caribbean to also indicate cutting up carrots in picture set 1. In total, 14% of participants from group 1 used “picando” in picture set 1. The verb “cortando” means cutting in English and although “picando” is defined as itching, it is understood in Spanish to also refer to the action of cutting a specific item.

In picture set 2, 48% participants in group 1 Central Caribbean region mentioned the lexical item brushing as “lavándose.” The term “lavándose” means washing. It was seen that 52% participants from group 1 Central Caribbean elicited “cepillando”. The same main concept was included by 75% from group 2 Andean Pacific. Both terms “cepillando” and “lavándose” are used in Spanish to reference the action of brushing or washing oneself. The term “lavándose” is commonly used by native Spanish speakers to indicate “lavándose los dientes”, which means brushing one's teeth. Usually, when “cepillando” is used, it is used regarding brush oneself or brushing one's hair. The participants included this term in the picture set 2 to indicate what the man is doing. The man does have an item, that appears to be brushing or washing; therefore, this finding was accepted and noted as an alternative variation.

1.2. Acceptable alternatives

There were multiple main concepts that contained acceptable alternatives. For picture set 1, all four subgroups elicited many alternatives that met the 70% scoring criteria. In group 1 Central Caribbean, participants were seen to have used “abuelita”, “viejita”, “ella”, “señora mayor” and “anciana” to refer to the old lady. Group 1 also presented 2 acceptable alternatives that consisted of “cortando” and “picando” to refer to cutting in picture set 1. To refer to the finger in picture set 1, group 1 included “mano”, “dedo”, and “dedito” that were all acceptable alternatives. The same was also found for bleeding. Group 1 included alternative main concepts “botando sangre” and “sangrando” that both refer to the old lady bleeding. For the first-aid box, participants in group 1 were seen to have used “botiquín”, “gabinete de la medicina”, and “equipo de primero auxilios”. Lastly in picture set 1, there were 4 alternatives that were acceptable to refer to band-aid. The following elicitations were found to be acceptable alternatives in group 1: “medicamento”, “band-aid”, “cura”, and “bandita”. These main concepts were spoken by more than 70% of participants in group 1.

Alternative variations were seen amongst participants across all dialect groups in the picture set 2. In general, 21% of participants in group 1 Central Caribbean used “despertó” and 51% of participants included “levantó” to reference the man waking up. In the Spanish language, both may refer to the same action. The remaining participants refrained from including the main concept for picture set 2. However, 36% of participants in group 2 Andean Pacific and 41% of participants from Iberian Peninsula used “despertó”. The verb “despertó” is associated with waking up, while “levantó” refers to the action of getting up, in this case, the man is getting out of bed. Participants in group 1 Central Caribbean participants were seen to have included the same main concept in the picture set 2 to refer to two socks that are different in color. The main

concept in set 2 was “medias de diferente color”, which means socks of a different color. However, less than half of the Caribbean American and Andean Pacific participants mentioned “medias equivocadas”. The acceptable alternative “medias equivocadas” is defined as the wrong socks. The remaining participants omitted the main concept and refrained from mentioning the lexical items in picture set 2. The two most commonly seen references in the picture set 3 for the main concept paying were “comprando” and “pagando”. This was common across participants from both the regions of Central Caribbean and Andean Pacific. The term “pagando” means paying, while “comprando” means buying. This alternative concept could be interpreted as the same meaning to refer to the woman paying the man in set 3. Lastly, in picture set 4, all participants used the term “da las gracias” to refer to praising the boy. However, a commonly used alternative reference in Spanish for giving thanks is “agradecido”, which means to give praise, or someone who is grateful and would like to express thanks by using the lexical item. The acceptable alternatives for the remaining dialect groups can be found in Appendix C with the associated scoring form.

Table 11 Normative data on MCA performance of unimpaired speakers

	Group 1 (Central Caribbean)	Group 2 (Andean Pacific)	Group 3 (Mexican)	Group 4 (Iberian Peninsula)
AC	22.36 (1.16), 20-24	23.23(1.17), 22-25	23.25 (1.36), 21-25	22.71 (1.27), 20-24
AI	1.71 (1.02), 0-5	1.46 (1.05), 0-3	1.75 (0.97), 0-3	1.43 (1.22), 0-4
IN	0.19 (0.63), 0-3	0.0 (0.00), 0-0	0.42 (0.79), 0-2	0.0 (0.00), 0-0
AB	0.74 (0.83), 0-2	1.31 (1.30), 0-3	0.58 (0.79), 0-2	0.86 (1.03), 0-3

Note. AC = Number of Accurate and Complete concepts, AI Number of Accurate but Incomplete concepts, IN = Number of Inaccurate concepts, AB = Number of Absent concepts. The values are listed in the order “(mean, standard deviation), range”

1.3. Disordered pilot subject

The disordered participant recruited for this study was recruited from the Share the Care center in Winter Springs, FL. The disordered participant was an 85-year-old female with dialect influence from Puerto Rico. Case history and consent for the study was obtained prior to data collection. Pretest procedures for the disordered participant consisted of WAB, short form of the CLQT, and MCA scores (see table 8). Per the CLQT assessment, the participant’s overall performance was classified as anomic aphasia. Subset scores from the WAB included 1) spontaneous speech subtest score, 2) fluency rating score, 3) auditory verbal/naming score, and 4) overall Aphasia Quotient score to determine type of aphasia. The cultural background of the PWA was Central Caribbean; therefore, the normative data from group 1 were used to compare the language samples.

Table 12 WAB and CLQT Results of disordered pilot subject

WAB		CLQT	
SS: Information content	5/10	Attention	9/215
SS: Fluency, Grammatical Competence, and Paraphasias	6/10	Memory	34/185
Auditory Verbal Comprehension	8.3/10	Executive Function	3/40

Repetition	10/10	Language	15/37
Naming	3.6/10	Visuospatial skills	2/105
AQ	65.8/100	Total severity rating for ages (70-89)	1/4

Note. SS = Spontaneous Speech AQ = Aphasia Quotient

The MCA results for the disordered participant were compared with the dialect group to compare the performance between the unimpaired and impaired group recruited for this study (see Table 12). The disordered participant was from the Central Caribbean region, therefore the MCA results from group 1 Central Caribbean group of unimpaired participants was used to examine results. The disordered participant was seen to have conveyed 2 AC concepts, while the unimpaired group of participants conveyed an average of 4 main concepts for picture set 1, 5 for picture set 2 and 3, and 6 accurate and complete concepts for set 4. The increase in accurate and complete concepts can infer the unimpaired participants referred to the additional characters in picture sets 2, 3, and 4.

Table 13 MCA results of disordered participant (from Central Caribbean participant)

MCA					
	Picture Set 1	Picture Set 2	Picture Set 3	Picture Set 4	Total
AC	0	1	0	1	2
AI	1	0	1	3	

					5
IN	0	1	1	0	2
AB	4	4	5	2	15
MC Score	2	4	1	9	16
AC per minute	3.10	2.93	2.47	2.57	11.07

Table 14 Average MCA results from group 1 Central Caribbean group

MCA					
	Picture Set 1	Picture Set 2	Picture Set 3	Picture Set 4	Total
AC	4.41	5.69	5.53	6.73	22.36
AI	0.33	0.37	0.46	0.55	1.71
IN	0.06	0.05	0.04	0.04	0.19
AB	0.19	0.21	0.18	0.16	0.74
MC Score	7	9	11	9	36

AC per minute	1.45	1.78	2.11	2.38	7.72
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CHAPTER SIX: DISCUSSION

1. Major discussion

There is currently a lack of post-sentence level assessment battery geared for Spanish speakers with acquired language disorders. Previous studies have used picture stimuli as an opportunity to bypass the higher cognitive demands and initiate intuitive processing (Gates & Yoon, 2005). The ability to elicit verbal responses spontaneously is important when measuring an individual's oral discourse. Speech-language pathologists must be able provide culturally and linguistically appropriate services. Quantitative analysis systems can be beneficial to language remediation and establishing a multitude of translations for assessments will expand the populations an SLP serves. The study was conducted to analyze the dialectal variations in the Spanish. It was determined that geographical positions should be taken into consideration for their differences in perception. Many native Spanish speakers do not share the same perception of spoken language across various countries. For example, there is an evident linguistic separation between the peninsular Spanish and the Argentinian (Fernandez, 2015). Culturally specific characteristics were taken into consideration when establishing normative data. Four scoring forms were created that were all appropriate for each dialect. The scoring criteria was based on the main concepts spoken by the unimpaired group of participants.

The importance of this study is to establish the ability to identify how far a Spanish-speaking speaker with aphasia is below the performance of the specific age group or education level. The Spanish-MCA allows for the comparison and assessment in targeting interventions for PWA. A set of normative data with acceptable alternatives for unimpaired Spanish speakers was established in the pilot study. To achieve a more balanced set of data, a main study was further investigated. The findings of the main study helped answer the question of any existing

characteristics between native Spanish speakers with different dialects. The demographic characteristics related to differences between gender, age groups, and education levels was also evaluated. The production of main concepts varied amongst the entire group of 81 participants. The current study presents a diverse sample size of unimpaired native Spanish speakers from various regions that have influenced oral discourse production.

The purpose of this study was to investigate the age, education level, and gender effects amongst native Spanish speakers from diverse regions. The average ages were similar across all four dialect subgroups. For this study, the level of education did not vary significantly. The first aim of this study consisted of adapting a culturally appropriate Spanish version of the MCA based on the spoken narratives from the group of 81 Spanish speakers recruited in the present study. The overall MCA performance for unimpaired speakers revealed a consistent number of accurate and complete main concepts amongst all four dialect groups. Participants were credited for producing the total main concept or gist of essential information within each picture set. The total accurate and complete main concepts spoken for groups 1, 2, and 3, was 23. For group 4 Iberian Peninsula, the total average of main concepts was 22. Comparing this to the English version, it was found that the Spanish-MCA had less total main concepts based on the participants recruited for this study. Among the four groups, differences were presented relevant to the target main concept spoken by participants. A total of 25 main concepts were spoken for group 1 of the Central Caribbean as well as group 4 from the Iberian Peninsula region. This total was the same as the English study by Kong (2015), however additional lexical alternative references were found in the Spanish findings. The second aim to investigate the age, education level, and gender effects was done by statistical analysis based upon the demographic

information of each participant. The data from the unimpaired participants was analyzed with the data collected from 1 PWA.

2. Summary of Findings

The present study has provided normative data of unimpaired Spanish speakers to establish a scoring criteria that can be applied to measure the oral discourse of PWA. The data collected is a basis for assessing differences between diverse dialects, gender, age, and education level. The participants from the Andean Pacific region in group 2 and the Mexican region in group 3 had an equivalence total of 26 main concepts spoken. The participants in this study who were reported to have fluency in both English and Spanish were shown to have integrated the two languages throughout the language sample. For example, in the Spanish language, it is not common for native speakers to use one universal reference to refer to a Band-Aid. Many of the native Spanish participants used “Band-Aid” to refer to the bandage. Others used a common term “cura”, often seen as “curita” as a different variation to refer to the bandage. The word “cura” and “curita” present the meaning of bandage or taking care of a wound. In picture set 1, when the old lady was placing the Band-Aid on her finger, most Spanish speaking participants used the English term to refer to the item, rather than having a distinct characterization in the Spanish language. It should also be noted that many of the participants in this study identified as having multiple countries influence their fluency in the Spanish language. This is essential information to take into consideration when establishing scoring criteria, as many regions may impact an individual’s use of discourse. To assure clarity of the examinee’s instruction, participants were asked to answer yes or no questions, and describe what they saw in the picture set provided to them.

There must be adequate assessment batteries that are culture-specific to native Spanish speakers. Based on the diverse geographical findings in this study, culture-specific assessment batteries will be beneficial to clinical intervention. Recruiting participants from more diverse backgrounds can allow for further investigation to determine whether specific influences impact an individual's performance on tasks. The participants in group 3 and 4 showed an omission of the lexical term bleeding in the picture set 1 when referring to the old lady after she cut her finger. In group 3, many participants included "sangrando," while others omitted the main concept. In the same picture set 1, participants from group 1 presented acceptable alternatives for the old lady. Both "abuelita" and "señora mayor" are accurate terms for referencing old lady. Señora mayor is a more formal term that descriptively means an old lady, while abuelita means grandmother. The variations of main concepts should be taken into consideration to establish geographically sensitive norms for native Spanish speaking PWA.

In picture set 1, participants in group 1 and 2 were the only groups that included an acceptable alternative for cutting in the picture set of cooking in the kitchen. The alternatives term commonly used by most of the participants was "cortando" and "picando". Both terms verbs can refer to the action of cutting something, however there is are distinct due to syntax and meaning. The term cortando means to cut, while picando means chopping or cutting something up. Although cortando and picando are understood to have the same meaning, there are distinct from one another. Across all dialects, participants reported having a high education spoke "da las gracias" in the picture set 4, helping an old man. The term is more formal to refer to the man giving thanks to the boy. However, many participants with a lower education from group 3 were noticed to elicit a more informal version of the lexical term, "djo bien." The term dijo bien is defined as the man told him good, or good job. Although this is not precisely praising the boy, it

is still considered an acceptable alternative as many participants with a low level of education used the main concept from the Mexican region in group 3. Group 1 was seen to have the largest sample size; however, it should be noted that many participants from this region were female. Group 1 and group 4 both had more female participants in the age group of (60+) compared to other dialect groups that had a lack of participants for this age group. Recruiting a larger sample size that includes more male participant will create a more balanced set of data.

In the present study, the MCA score averages were relative to one another, as it was found that participants across all dialect groups produced a similar number of accurate AC concepts. Group 2 Andean Pacific and Group 3 Mexican had conveyed 23 AC concepts than group 1 Central Caribbean and group 4 Iberian Peninsula group that produced 22 AC concepts. More than half of the participants recruited for this study were reported to have high education. For this reason, a larger size of lower educated participants should be recruited to analyze any evident differences within discourse production. Participants in all four dialect groups were shown to have elicited an average of 1 accurate and incomplete concept across all four dialects.(seen in Table 7). Many participants were shown to have summarized their ideas in one sentence or reference rather than eliciting a sentence that included multiple main concepts. For example, in picture set 2, the man is combing his hair. Most participants across all four dialects used “peinando” which means to comb one’s hair. The usage of “peinando” derives from the word “peinar”, which means to comb. When altering the verb tense, the lexical item “peinar” becomes “peinando”. When used as “estás peinando,” the verb to comb is used to refer to someone else combing hair. In this context, it is evident that the speaker is not referring to themselves. It was seen that although many participants did not include the full main concept, or who was combing hair, they were found to have elicited the verb “peinando” to refer to the man

in the picture set who is combing his hair. In groups 2 and 4, there were no concepts that were found to be incorrect. The small number of incorrect concepts in groups 1 and 3 may involve the misinterpretation of MCA picture sets by the participants recruited for this study.

3. Conclusions

The Spanish-MCA was the first initiative in establishing a version of the assessment that is appropriate for native Spanish speakers. Participant recruitment was inconsistent due to the limitation of a qualified PWA for this study. Previous studies have included the distinction between aphasic and unimpaired speakers (Kong and Yeh, 2015). To ensure validity, a larger sample size must be recruited to provide accurate normative data. There was a lack of sufficient disorder language samples to validate the current Spanish-MCA. In the current study, only one individual with anomic aphasia was recruited. The disordered subject recruited for this study was a female with fluency in the Spanish language. The dialect origin of the disordered participant was Central Caribbean, group 1. Therefore, the scoring form properly template for this dialect group was used to score the participant's MCA. Amongst all target main concepts, many acceptable alternatives were identified. Both age and education should be accounted for when analyzing an individual's discourse production (Kong and Yeh, 2015). It is important to note the etiology of an aphasia is a stroke and when compared to a non-Hispanic Caucasian, Hispanic individuals a much higher occurrence of stroke is seen (Dong et. al., 2012). In the current study the PWA produced more inaccurate main concepts than the control group. The culture specific scoring form for Central Caribbean participants was used to evaluate the PWA based on the individual's origin of Spanish dialect from Puerto Rico.

4. Limitations

Similar to the findings in Kong and Yeh (2015), a further investigation of recruiting more PWA should be done to determine if there are significant differences present between impaired and non-impaired groups. Despite a large size of unimpaired participants, most of the sample size consisted of young and middle-aged adults. Amongst those adults, 51% were from group 1 Central Caribbean, while the remaining groups had about 14-17% total of participants recruited. Collecting data from diverse native Spanish speakers may establish more dialect specific norms. The younger age group (18-39) of native Spanish participants in this study was reported to a higher education than those in the older age group (60+). The recruitment of participants from the older age group (60+) will allow for a more balanced set of data to be analyzed. The result of WAB, CLQT, and MCA will need to be compared with more disordered participants. The main study was an independent undergraduate project and due to the time restraint of this study, data from a larger sample size of disordered participants was unable to be obtained. Although there was a diverse group of native Spanish speakers recruited for this study, there were lower numbers of participants in groups 2 Andean Pacific, group 3 Mexican, and 4 Iberian Peninsula, compared to the largest sample size of participants seen in group 1 Central Caribbean. Evaluation of the Spanish-MCA will be best performed with a larger set of collected of data from PWA. The current study included 25-26 main concepts. The total number of main concepts found for this study was about relatively close compared to the English study which had a total of 25 spoken main concepts. The findings showed that the high educated group of participants produced more accurate and complete main concepts than the low educated group in groups 1 Central Caribbean and the Mexican group 3. However, in group 1, only 2 males and 1 female were recruited for participants with a low education. In the Mexican group 3, only 2 adult males

were recruited. Although the data was substantially useful for establishing normative data, recruiting more diverse demographic group of participants will be helpful. An expansion of diverse participants will allow for characteristics between groups to be examined. Recruiting additional disordered participants will allow for validation of the Spanish-MCA to compare data between unimpaired and impaired Spanish speakers.

5. Future Directions

Due to the lack of disordered data, the next step will include the expansion of disordered data. Recruiting a larger sample size of diverse Spanish PWA will allow for validation of the discourse assessment. Researchers will be able to establish MCA performance results based upon the use of a scoring system that is specific to the dialect of the impaired speaker. All main concept measures in the previously validated study by Kong (2009) were able to differentiate between unimpaired speakers and PWA. It is believed the adaptation of the Spanish-MCA will allow for further populations to use the assessment.

6. Clinical Implications

The results of analyzing main concepts could guide clinicians in terms of planning language remediation and directions of setting functional communication goals for PWA (Kong, 2009). Individuals with semantic aphasia have difficulty in spatial orientation, mental rotation, and assembling the individual parts of a picture into a whole (Dragoy, Akinina, & Dronkers, 2017). The use of the MCA assessment picture-description tasks allows for practitioners to evaluate discourse production systemically and objectively (Kong, Whiteside, & Bargmann, 2015). During evaluation, clinicians can utilize the MCA assessment results to recognize critical

components and address them when planning language remediation. Proper intervention and treatment for aphasia are necessary for remediation of language. The results of the Spanish-MCA results be used as a clinical tool for targeting appropriate interventions of aphasic output and assessing discourse. The Spanish version of the MCA can be used as a supplemental resource for evaluating Spanish speakers. Due to the variation in target main concepts, it is necessary to establish a comprehensive scoring criterion that includes a more balanced set of data for dialect-specific main concepts. The findings in the current study reflected a set of established normative data based on language samples from native Spanish speakers in response to picture stimuli. However, there was a shortage of disordered data. Further collection of impaired data will allow for validation of preliminary results.

APPENDIX A:

PERMISSION TO TAKE PART IN A HUMAN RESEARCH STUDY

Permission to Take Part in a Human Research Study

Page 1 of 5



Development of a Spanish version of Main Concept Analysis for analyzing disordered oral discourse: Addition of aphasic data

Informed Consent Form

Principal Investigator(s): *Anthony Pak-Hin Kong, PhD*

Co-Investigators or Sub-Investigator(s): Karla Simonet

Sponsor: N/A

Investigational Site(s): *Department of Communication Sciences and Disorders,
University of Central Florida, Orlando, FL, USA*

Document Revision Date: March 5, 2018
UCF University of Central Florida IRB
IRB NUMBER: SBE-18-14401
IRB APPROVAL DATE: 11/16/2018
IRB EXPIRATION DATE: 11/15/2019

Why am I being invited to take part in a research study?

We invite you to take part in a research study which will include up to 46 people living in the United States. You must be 18 years of age or older to participate in this study. You may read this form and agree to the project now, or take the form home with you to study before you decide.

What should I know about a research study?

- Someone will explain this research study to you.
- Whether or not you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team led by Dr. Anthony Kong at (407) 823-4791 at the UCF Department of Communication Sciences and Disorders.

This research has been reviewed and approved by an Institutional Review Board ("IRB"). You may talk to them at 407-823-2901 or irb@ucf.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

If you believe you have been injured during participation in this research project, you may file a claim with UCF Environmental Health & Safety, Risk and Insurance Office, P. O., Box 163500, Orlando, FL 32816-3500 (407) 823-6300. The University of Central Florida is an agency of the State of Florida for purposes of sovereign immunity and the university's and the state's liability for personal injury or property damage is extremely limited under Florida law. Accordingly, the university's and the state's ability to compensate you for any personal injury or property damage suffered during this research project is very limited.

Why is this research being done?

The purpose of this study is to develop a Spanish version of the Main Concept Analysis (MCA) by collecting normative data from native Spanish speakers in the U.S. and other Spanish-speaking countries/regions and establishing normative data based on native Spanish speakers.

How long will the research last?

We expect that you will be in this research study for approximately two hours.

How many people will be studied?

We expect to include about 46 participants divided in 36 Spanish speakers without aphasia and up to 10 Spanish speakers with aphasia.



University of Central Florida IRB
IRB NUMBER: SBE-18-14401
IRB APPROVAL DATE: 11/16/2018
IRB EXPIRATION DATE: 11/15/2019

What happens if I say yes, I want to be in this research?

If you agree to be in this study, the following will occur on the first session:

- a) Written consent process
- b) Presented some demographic information
- c) Language testing:
 - a. Control speakers: using a short form of the Western Aphasia Battery (WAB)
 - b. Speakers with aphasia: using a long form of the Western Aphasia Battery (WAB)
- d) Receive the MCA test, which is to provide speech samples through a picture description task

In the second session, the following will occur: Subjects will receive MCA test and provide some speech samples through a picture description task

The entire protocol will last for about two hours. When collecting data there will be an audio recording.

Audio or video taping: You will be audio recorded during this study. If you do not want to be recorded, you will not be able to be in the study. Discuss this with the researcher or a research team member. If you are audio taped, the tape will be kept in a locked, safe place. The recordings will be erased or destroyed when this proposal study is completed.

What happens if I do not want to be in this research?

Participation in research is completely voluntary. You can decide to participate or not to participate. You are free to withdraw your consent and discontinue participation in this study at any time without prejudice or penalty. Your decision to participate or not participate in this study will in no way affect your continued enrollment, grades, employment or your relationship with the individuals who may have an interest in this study.

What happens if I say yes, but I change my mind later?

You can leave the research at any time it will not be held against you. If you decide to leave the research, please let the investigators in charge know at 407-882-0466.

Is there any way being in this study could be bad for me? Will being in this study help me in any way?

The important risks and possible benefits of these alternatives include:

Risks: There are no known risks associated with this study. However, if you should become fatigued during any part of the sessions, you may ask to take a break, to leave, or to arrange an alternative day of testing.

Benefits: You will receive the results from the testing. We cannot guarantee you any benefits from participating in this study. However, the results we receive from this study may help future patients with language impairment. This is not a treatment study.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of your personal information, including research study and medical records, to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of this organization

Your consent form will be kept in a locked cabinet for a minimum of six years in Dr. Kong's office. All personal data will be coded by a number and kept separate in a locked cabinet for a minimum of



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IRB EXPIRATION DATE: 11/15/2019

Permission to Take Part in a Human Research Study

Page 4 of 5

six years at the UCF Communication Disorders Clinic. After the minimum 6 years, it will be erased or destroyed. Your name will not be associated with this project.

Can I be removed from the research without my OK?

The investigators may stop your participation in this study at any time if they decide it is in your best interest. They may also do this if you do not follow the investigators' instruction.

What else do I need to know?

All participants may request a report of the results of this study at the end of the project. They may contact the principal investigator to obtain such information. You will not receive compensation for your participation.



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IRB EXPIRATION DATE: 11/15/2019

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Page 5 of 5

Signature Block for Capable Adult

Your signature documents your permission to take part in this research.

_____ Signature of subject	_____ Date
_____ Printed name of subject	
_____ Signature of person obtaining consent	_____ Date
_____ Printed name of person obtaining consent	



University of Central Florida IRB
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IRB EXPIRATION DATE: 11/15/2019

APPENDIX B:

Scoring Form of Main Concept Analysis (MCA) for unimpaired dialect group of Central Caribbean Americans

Name: _____ Examiner in-charge: Dr. Anthony Kong
 Date of birth/Age: _____ Date of MCA testing: _____
 Gender: _____

Remarks:

Summary of MC Analysis





	AC	AI	IN	AB	MC	Time in minute	AC per minute
Set 1 <i>Cooking in a kitchen</i>	<div>i</div> <div>/5</div>	<div></div> <div>/5</div>	<div></div> <div>/5</div>	<div></div> <div>/5</div>	<div></div> <div>/15</div>	<div>ii</div>	<div></div>
	+	+	+	+	+	+	= i ÷ ii
Set 2 <i>Waking up late for work</i>	<div>iii</div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/18</div>	<div>iv</div>	<div></div>
	+	+	+	+	+	+	= iii ÷ iv
Set 3 <i>Buying ice-cream</i>	<div>v</div> <div>/8</div>	<div></div> <div>/8</div>	<div></div> <div>/8</div>	<div></div> <div>/8</div>	<div></div> <div>/24</div>	<div>vi</div>	<div></div>
	+	+	+	+	+	+	= v ÷ vi
Set 4 <i>Helping an old man</i>	<div>vii</div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/6</div>	<div></div> <div>/18</div>	<div>viii</div>	<div></div>
	=	=	=	=	=	=	= vii ÷ viii
Total	<div>ix</div> <div>/25</div>	<div></div> <div>/25</div>	<div></div> <div>/25</div>	<div></div> <div>/25</div>	<div></div> <div>/75</div>	<div>x</div>	<div></div>

APPENDIX C:

MCA Scoring Criteria





Central American Caribbean Participants Main concepts in English for picture sets 1 to 4

The main verb for each main concept is **bolded**. All the essential information within a main concept is underlined.

Set 1 (Cooking in a kitchen)	
	
	
1	The <u>old lady</u> is cutting up <u>carrots</u> Una <u>señora</u> está cortando <u>zanahorias</u> .
2	The <u>old lady</u> cuts her <u>finger</u> La <u>señora</u> se cortó el <u>dedo</u> .
3	The <u>old lady's</u> <u>finger</u> is bleeding El <u>dedo</u> de la <u>señora</u> está sangrando .
4	The <u>old lady</u> is looking for something in a <u>first-aid box</u> La <u>señora</u> está buscando algo en el <u>botiquín de primeros auxilios</u> .
5	The <u>old lady</u> is sticking a <u>Band-Aid</u> La <u>señora</u> está poniendo la <u>curita</u> .





Lexical items that are commonly accepted as alternatives in set 1:

Old lady	(abuelita, viejita, ella, señora mayor, anciana)
Cutting	(cortando, picando)
Carrots	(vegetables, zanahorias)
Finger	(mano, dedo, dedito)
Bleeding	(botando sangre, sangrando)
Looking for	(buscando, agarrando)
First-aid box	(botiquín, gabinete de la medicina, equipo de primero auxilios)
Sticking	(poniéndose, se puso)
Band-Aid	(medicamento, Band-Aid, cura, bandita)

Set 2 (Waking up late for work)	
	
	
1	The <u>man</u> wakes up El <u>señor</u> se levantá .
2	The <u>man</u> is shocked/late El <u>señor</u> está asustado/tarde .
3	The <u>man</u> is brushing his teeth El <u>señor</u> está cepillando los dientes.
4	The <u>man</u> is combing his hair El <u>señor</u> está peinando su pelo.
5	The <u>man</u> is putting on his <u>pants</u> El <u>señor</u> está poniendo su <u>pantalones</u> .
6	The <u>man</u> is wearing a pair of <u>socks</u> that are different/wrong in color El <u>señor</u> tiene <u>calcetines</u> de diferentes colores.

Lexical items that are commonly accepted as alternatives in set 2:




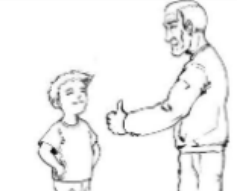
Man	(hombre, muchacho, tipo, niño, caballero, chico, el persona, señor)
Wakes up	(despertó, levantó)
Shocked	(asustado, gritando, en shock)
Late	(tarde)
Brushing	(cepillando, lavándose)
Combing	(peinando)
Putting on	(listando, cambiando, vistiendo, poniendo)
Pants	(ropa, pijamas, pantalón, los pantalones)
Two socks that are different in color	(medias de diferente color, diferentes calcetines, una media negra y una media blanca, medias equivocadas, medias a revés)

Set 3 (Buying ice-cream)	
	
	
1	The <u>mother</u> and the <u>girl</u> approach an <u>ice-cream</u> store La <u>mamá</u> y la <u>niña</u> van a comprar un <u>helado</u> .
2	The <u>girl</u> asks for/wants an <u>ice-cream</u> La <u>niña</u> pide/quiere un <u>helado</u> .
3	The <u>mother</u> is paying La <u>mamá</u> está pagando .
4	The <u>man</u> is scooping an <u>ice-cream</u> cone El <u>señor</u> está sirviendo el helado en un cono.
5	The <u>girl</u> dropped the <u>ice-cream</u> on the floor La <u>niña</u> se le cayó el <u>helado</u> en el piso.
6	The <u>girl</u> is crying/unhappy La <u>niña</u> está llorando/triste .
7	The <u>man</u> looks at the girl from behind El <u>señor</u> mira que está pasando.
8	The <u>man</u> gives the <u>girl</u> another <u>ice-cream</u> cone El <u>señor</u> le da un <u>helado</u> nuevo a la <u>niña</u> .

Lexical items that are commonly accepted as alternatives in set 3:

Mother	(mujer, señora, madre, mamá)
Girl	(hija, nena)
Approach	(fueron a comprar, mirando a comprar, tratando comprar, van a comprar)
Ice cream store	(heladería, tienda, mantecado, nieve)
Asks for	(escojiendo, mirando, pidiendo)
Paying	(comprando, dando el dinero, pagando, ordenando)
Man	(panadero, trabajador, heladero, hombre, joven, señor, tipo)
Scooping	(preparando, dando, despachando, cojiendo,, sacando, echando, areglando, sirviendo)
Crying	(media triste, llorando)
Dropped	(terminó, caído)
On the floor	(en el piso)
Looks at	(mirando, miro con preocupación, vio, dio cuenta, le interesa)
Gives	(le dio, dale, regalo, volvía)

Set 4 (Helping an old man)





			
1	The <u>father</u> and the <u>son</u> are walking on the street Un <u>papá</u> y su <u>niño</u> están caminando en la calle.		
2	The <u>old man</u> is carrying a grocery bag El <u>señor</u> está llevando sus bolsas.		
3	The <u>oranges</u> fall on the floor Se cayeron la <u>cosas</u> en el piso.		
4	The <u>boy</u> sees the incident El <u>niño</u> se dió cuenta .		
5	The <u>boy</u> is helping the old man El <u>niño</u> está ayudando al señor.		
6	The <u>old man</u> is praising the <u>boy</u> El <u>señor</u> le da las gracias al <u>niño</u> .		

Lexical items that are commonly accepted as alternatives in set 4:

Father	(hombre, abuelito, papá, señor, padre)
Son	(nene, nieto, hijo, niño)
Walking	(andando, pasando, llendo, van, salieron, caminando)
Old man	(viejo, señor mayor, hombre)
Carrying	(tiene, va con su bolsas, caminando con sus bolsas)
Oranges	(naranjas, objetas, frutas, pelotas, chinás)
Fall (on the floor)	(rompió la bolsas, salen, rompe las bolsas, cayendo)
Sees	(voltea a mirar, miró, se ve, mirando)
Helping	(ayudando)
Praising	(agradecido, feliz, le da las gracias)





Andean-Pacific Participants
Main concepts in Spanish for picture sets 1 to 4

The main verb for each main concept is **bolded**. All the essential information within a main concept is underlined.

Set 1 (Cooking in a kitchen)	
	
	
1	The <u>old lady</u> is cutting up <u>carrots</u> Una <u>señora</u> está cortando <u>zanahorias</u> .
2	The <u>old lady</u> cuts her <u>finger</u> La <u>señora</u> se cortó el <u>dedo</u> .
3	The <u>old lady's</u> <u>finger</u> is bleeding El <u>dedo</u> de la <u>señora</u> está sangrando .
4	The <u>old lady</u> is looking for something in a <u>first-aid box</u> La <u>señora</u> está buscando algo en el <u>botiquín de primeros auxilios</u> .
5	The <u>old lady</u> is sticking a <u>Band-Aid</u> La <u>señora</u> está poniendo la <u>curita</u> .

Lexical items that are commonly accepted as alternatives in set 1:





Old lady	(viejita, abuelita, ella, anciana)
Cutting	(cortando, picando)
Carrots	(zanahoria, cenoro)
Finger	(dedo, mano)
Bleeding	(sangrando)
Looking for	(sacando, buscando)
First-aid box	(botiquín de primeros auxilios, gabinete de medicina)
Sticking	(poniéndose, colocando)
Band-Aid	(una cura, una tirita)

Set 2 (Waking up late for work)	
	
	
1	The man wakes up El señor se levantá .
2	The man is shocked/late El señor está asustado/tarde .
3	The man is brushing his teeth El señor está cepillando los dientes.
4	The man is combing his hair El señor está peinando su pelo.
5	The man is putting on his pants El señor está poniendo su pantalones .
6	The man is wearing a pair of socks that are different/wrong in color El señor tiene calcetines de diferentes colores .

Lexical items that are commonly accepted as alternatives in set 2:

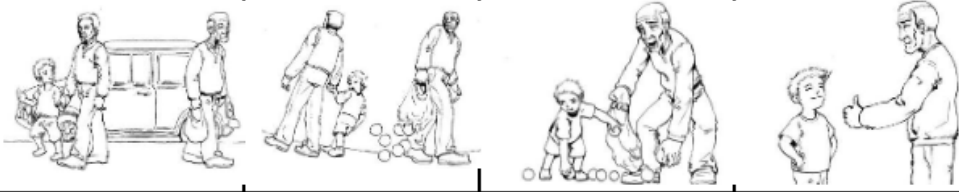
Man	(hombre, muchacho, niño, chico, el persona, señor)
Wakes up	(despertó, levantó)
Shocked	(asustado)
Late	(tarde)
Brushing	(cepillando, lavándose)
Combing	(peinando)
Putting on	(cambiando, vistiendo, poniendo)
Pants	(pijamas, pantalón, los pantalones)
Two socks that are different in color	(medias de diferente color, diferentes medias, una media de un color y la otra de otro)

Set 3 (Buying ice-cream)

			
1	The mother and the girl approach an ice-cream store La mamá y la niña van a comprar un helado .		
2	The girl asks for/wants an ice-cream La niña pide/quiere un helado .		
3	The mother is paying La mamá y la niña está comprando helado		
4	The man is scooping an ice-cream cone El señor está sirviendo el helado en un cono.		
5	The girl dropped the ice-cream on the floor La niña se le cayó el helado en el piso.		
6	The girl is crying/unhappy La niña está llorando/triste .		
7	The man looks at the girl from behind El señor mira que está pasando.		
8	The man gives the girl another ice-cream cone El señor le da un helado nuevo a la niña .		
9	The girl is smiling La niña está contenta .		

Lexical items that are commonly accepted as alternatives in set 3:

Mother	(mamá)
Girl	(hija, niña)
Approach	(fueron, van)
Ice cream store	(una heladeria)
Asks for	(pidiendo)
Paying	(pagando, compra)
Man	(señor, heladero, trabajador)
Scooping	(sirve)
Crying	(triste, llorando)
Dropped	(se cayó)
On the floor	(piso)
Looks at	(lo vió, se dió cuenta)
Gives	(dió, dando)
Smiling	(feliz, contenta)





Set 4 (Helping an old man)	
	
1	The father and the son are walking on the street Un papá y su niño están caminando en la calle.
2	The old man is carrying a grocery bag El señor está llevando sus bolsas.
3	The oranges fall on the floor Se cayeron la cosas en el piso.
4	The boy sees the incident El niño se dió cuenta .
5	The boy is helping the old man El niño está ayudando al señor.
6	The old man is praising the boy El señor da las gracias al niño .

Lexical items that are commonly accepted as alternatives in set 4:

Father	(hombre, papá, señor)
Son	(niño)
Walking	(caminando, pasando)
Old man	(abuelo, viejito, señor mayor)
Carrying	(cargando, llevaba)
Oranges	(naranjas, frutas, pelotas)
Fall (on the floor)	(cayeron, se le caen)
Sees	(miró, vió)
Helping	(ayudar)
Praising	(agradecido)





Mexican Participants
Main concepts in English for picture sets 1 to 4

The main verb for each main concept is **bolded**. All the essential information within a main concept is underlined.

Set 1 (Cooking in a kitchen)	
	
	
1	The old lady is cutting up <u>carrots</u> Una <u>señora</u> está cortando <u>zanahorias</u> .
2	The old lady cuts her <u>finger</u> La <u>señora</u> se cortó el <u>dedo</u> .
3	The old lady's <u>finger</u> is bleeding El <u>dedo</u> de la <u>señora</u> está sangrando .
4	The <u>old lady</u> is looking for something in a <u>first-aid box</u> La <u>señora</u> está buscando algo en el <u>botiquín de primeros auxilios</u> .
5	The <u>old lady</u> is sticking a <u>Band-Aid</u> La <u>señora</u> está poniendo la <u>curita</u> .





Lexical items that are commonly accepted as alternatives in set 1:

Old lady	(ella, abuelita, viejita,)
Cutting	(picando, partiendo, rebanando)
Carrots	(vegetales)
Looking for	(agarrando, tomando)
First-aid box	(maletín, caja de primeros auxilios, gabinete, gabinete de las medicinas)

Set 2 (Waking up late for work)	
	
	
1	The <u>man</u> wakes up El <u>señor</u> se levanta .
2	The <u>man</u> is shocked/late El <u>señor</u> está asustado/tarde .
3	The <u>man</u> is brushing his teeth El <u>señor</u> se está cepillando los dientes.
4	The <u>man</u> is combing his hair El <u>señor</u> se está peinando su pelo.
5	The <u>man</u> is putting on his pants El <u>señor</u> está poniendo su pantalones.
6	The <u>man</u> is wearing a pair of <u>socks</u> that are different/wrong in color El <u>señor</u> tiene calcetines de diferentes colores .

Lexical items that are commonly accepted as alternatives in set 2:

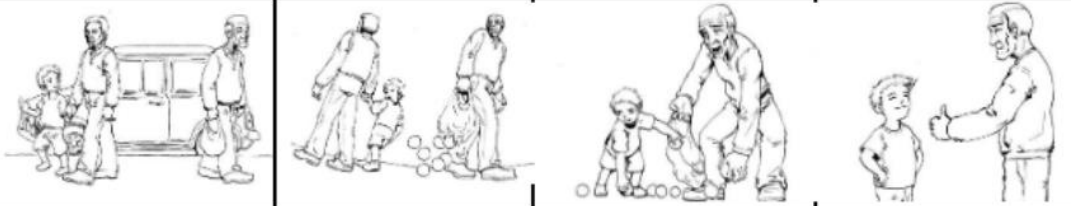
Man	(muchacho)
Wakes up	(despierta)
Brushing	(lavando)
Combing	(arreglándose)
Two socks that are different in color	(medias equivocadas)

Set 3 (Buying ice-cream)			
			
1	The <u>mother</u> and the <u>girl</u> <u>approach</u> an <u>ice-cream</u> store La <u>mamá</u> y la <u>niña</u> <u>van a comprar</u> un <u>helado</u> .		
2	The <u>girl</u> <u>asks for/wants</u> an <u>ice-cream</u> La <u>niña</u> <u>pide/quiere</u> un <u>helado</u> .		
3	The <u>mother</u> is <u>paying</u> La <u>mamá</u> está <u>pagando</u> .		
4	The <u>man</u> is <u>scooping</u> an <u>ice-cream</u> cone El <u>señor</u> está <u>sirviendo</u> el <u>helado</u> en un cono.		
5	The <u>girl</u> <u>dropped</u> the <u>ice-cream</u> on the floor La <u>niña</u> se le <u>cayó</u> el <u>helado</u> en el piso.		
6	The <u>girl</u> is <u>crying/unhappy</u> La <u>niña</u> está <u>llorando/triste</u> .		
7	The <u>man</u> <u>looks at</u> the girl from behind El <u>señor</u> <u>mira</u> que está pasando.		
8	The <u>man</u> <u>gives</u> the <u>girl</u> another <u>ice-cream</u> cone El <u>señor</u> <u>le da</u> un <u>helado</u> nuevo a la <u>niña</u> .		
9	The <u>girl</u> is happy/ <u>smiling</u> <u>Ella</u> está <u>contenta</u>		

Lexical items that are commonly accepted as alternatives in set 3:

Mother	(señora)
Girl	(hija)
Approach	(fueron a comprar)
Ice cream store	(donde venden helado)
Asks for	(escoge)
Paying	(entregándole)
Man	(hombre)
Dropped	(tiró)
On the floor	(al suelo)
Looks at	(viendo)
Gives	(regala, prepara)

Set 4 (Helping an old man)





	
1	The <u>father</u> and the <u>son</u> are <u>walking</u> on the street Un <u>papá</u> y su <u>hijo</u> están <u>caminando</u> en la calle.
2	The <u>old man</u> is <u>carrying</u> a grocery bag El <u>señor</u> está <u>llevando</u> sus bolsas.
3	The <u>oranges</u> <u>fall</u> on the floor Se <u>cayeron</u> la cosas en el piso.
4	The <u>boy</u> <u>sees</u> the incident El <u>niño</u> se <u>dió cuenta</u> .
5	The <u>boy</u> is <u>helping</u> the old man El <u>niño</u> está <u>ayudando</u> al señor.
6	The <u>old man</u> is <u>praising</u> the <u>boy</u> El <u>señor</u> <u>le da las gracias</u> al <u>niño</u> .

Lexical items that are commonly accepted as alternatives in set 4:

Father	(señor)
Son	(niño)
Walking	(van)
Old man	(viejito)
Carrying	(cargando, con)
Oranges	(fruta, pelotas, naranjas, mercancía, mandados)
Sees	(mira, ve)
Praising	(dijo bien, agradece)





Iberian Peninsula Participants
Main concepts in English for picture sets 1 to 4

The main verb for each main concept is **bolded**. All the essential information within a main concept is underlined.

<i>Set 1 (Cooking in a kitchen)</i>	
	
	
1	The <u>old lady</u> is cutting up <u>carrots</u> Una <u>señora</u> está cortando <u>zanahorias</u> .
2	The <u>old lady</u> cuts her <u>finger</u> La <u>señora</u> se cortó el <u>dedo</u> .
3	The <u>old lady's</u> <u>finger</u> is bleeding El <u>dedo</u> de la <u>señora</u> está sangrando .
4	The <u>old lady</u> is looking for something in a <u>first-aid box</u> La <u>señora</u> está buscando algo en el <u>botiquín de primeros auxilios</u> .
5	The <u>old lady</u> is sticking a <u>Band-Aid</u> La <u>señora</u> está poniéndose una <u>tirita</u> .

Lexical items that are commonly accepted as alternatives in set 1:

Old lady	(anciana)
Cutting	(cortado)
Band-Aid	(tirita)

Set 2 (Waking up late for work)	
	
	
1	The <u>man</u> wakes up El <u>señor</u> se levantá .
2	The <u>man</u> is shocked/late El <u>señor</u> está tarde .
3	The <u>man</u> is brushing his teeth El <u>señor</u> está cepillando los dientes.
4	The <u>man</u> is combing his hair El <u>señor</u> está peinandose su pelo.
5	The <u>man</u> is putting on his <u>pants</u> El <u>señor</u> está poniendo sus <u>pantalones</u> .
6	The <u>man</u> is wearing a pair of <u>socks</u> t hat are different/wrong in color El <u>señor</u> tiene <u>calcetines</u> de diferentes colores .

Lexical items that are commonly accepted as alternatives in set 2:

Man	(hombre)
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Set 3 (Buying ice-cream)



1	The <u>mother</u> and the <u>girl</u> approach an <u>ice-cream</u> store La <u>mamá</u> y la <u>niña</u> van a comprar un <u>helado</u> .
2	The <u>girl</u> asks for/wants an <u>ice-cream</u> La <u>niña</u> pide/quiere un <u>helado</u> .
3	The <u>mother</u> is paying La <u>mamá</u> está pagando .
4	The <u>man</u> is scooping an <u>ice-cream</u> cone El <u>señor</u> está sirviendo el helado en un cono.
5	The <u>girl</u> dropped the <u>ice-cream</u> on the floor La <u>niña</u> se le cayó el helado en el piso.
6	The <u>girl</u> is crying/unhappy La <u>niña</u> está llorando/triste .
7	The <u>man</u> looks at the girl from behind El <u>señor</u> mira que esta pasando.
8	The <u>man</u> gives the <u>girl</u> another <u>ice-cream</u> cone El <u>señor</u> le da un <u>helado</u> nuevo a la <u>niña</u> .

Lexical items that are commonly accepted as alternatives in set 3:

Mother	(madre, señora)
Man	(hombre)

Set 4 (Helping an old man)



1	The <u>father</u> and the <u>son</u> are <u>walking</u> on the street Un papá y su niño están <u>caminando</u> en la calle.
2	The <u>old man</u> is <u>carrying</u> a grocery bag El <u>señor</u> está <u>llevando</u> sus bolsas.
3	The <u>oranges</u> <u>fall</u> on the floor Se <u>cayeron</u> la cosas en el piso.
4	The <u>boy</u> <u>sees</u> the incident El <u>niño</u> se <u>dio cuenta</u> .
5	The <u>boy</u> is <u>helping</u> the old man El <u>niño</u> está <u>ayudando</u> al señor.
6	The <u>old man</u> is <u>praising</u> the <u>boy</u> El <u>señor</u> <u>da las gracias</u> al <u>niño</u> .

Lexical items that are commonly accepted as alternatives in set 4:

Father	(hombre)
Son	(niño)
Old man	(anciano)
Praising	(le da las gracias)

APPENDIX D:

Spanish Form of Main Concept Analysis (MCA) for disordered Central Caribbean

Participant

Name:	B.C	Examiner in-charge:	A.A + B.C + K.S. + Dr. Kong
Date of birth/Age:	85	Date of WAB testing:	4/8/19
Gender:	F	WAB AQ (and LQ):	65.8/100
Date of onset:	2015	Aphasia type:	Anomic Aphasia
Etiology:	Possible dementia	Date of MCA testing:	4/8/19
Remarks:	Family stated symptoms arose 6-7 years prior to official diagnosis in 2015		

Summary of MC Analysis

	AC	AI	IN	AB	MC	Time in minute	AC per minute
Set 1 <i>Cooking in a kitchen</i>	0/5 i	1/5	0/5	5/5	2/15	3.100 ii	0 $= i \div ii$
	+	+	+	+	+	+	
Set 2 <i>Waking up late for work</i>	1/6 iii	0/6	1/6	4/6	4/18	2.933 iv	0.341 $= iii \div iv$
	+	+	+	+	+	+	
Set 3 <i>Buying ice-cream</i>	0/8 v	1/8	1/8	8/8	3/24	2.467 vi	0 $= v \div vi$
	+	+	+	+	+	+	
Set 4 <i>Helping an old man</i>	1/6 vii	3/6	0/6	2/6	9/18	3.883 viii	0.258 $= vii \div viii$
	=	=	=	=	=	=	
Total	2/25 ix $= i + iii + v + vii$	5/25	2/25	18/25	18/75	12.383 x $= ii + iv + vi + viii$	0.162 $= ix \div x$

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