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Validity and Reliability of Communication Activities of Daily Living- Second Edition (CADL-2) and Assessment of Language-Related Functional Activities (ALFA) Tests: Evidence from Arab Aphasics

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Abstract

Background: Validation of communication activities of daily living-second edition (CADL-2) and assessment of language-related functional activities (ALFA) tests is a critical investment decision, and activities related to language impairments often are underestimated. Literature indicates that age factors, and gender differences may affect the performance of the aphasics. Thus, understanding these influential factors is highly important to psychoneurolinguists and speech language pathologists (SLPs).

Purpose: The goal of this study is twofold: (1) to in/validate CADL-2 and ALFA tests, and (2) to investigate whether or not the two assessment tests are reliable.

Design: A comparative study is made between the results obtained from the analyses of the Arabic versions of CADL-2 and ALFA tests.

Settings: Al Khars hospital in Al Ahsa'a, Kingdom of Saudi Arabia (KSA).

Participants: The communication activities of daily-living and language-related functional activities were assessed from the obtained results of 100 adult aphasics (50 males, 50 females; ages 16 to 65).

Procedures: Firstly, the two translated and standardized Arabic versions of CADL-2 and ALFA tests were introduced to the Arab aphasics under investigation. Armed with the new two versions of the tests, one of the researchers assessed the language-related functional communication and activities. Outcomes drawn from the obtained analysis of the comparative studies were then qualitatively and statistically analyzed.

Main outcomes and Results: Regarding the validity of CADL-2 and ALFA, it is found that …. Is more valid in both pre-and posttests. Concerning the reliability of the two tests, it is found that ….is more reliable in both pre-and-posttests which undoubtedly means that …..is more trustable. Nor must we forget to indicate here that the relationship between age and gender was very weak due to that no remarkable gender differences between the two in both CADL-2 and ALFA pre-and-posttests.

Conclusions & Implications: CADL-2 and ALFA tests were found to be valid and reliable tests. In contrast to previous studies, age and gender were not significantly associated with the results of validity and reliability of the two assessment tests. In clearer terms, age and gender patterns do not affect the validation of these two tests. Future studies might focus on complex questions including the use of CADL-2 and ALFA functionally; how gender and puberty influence the results in case the sample is large; the effects of each type of aphasia on the final outcomes, and measurements' results of imaging techniques.

Keywords: CADL-2, ALFA, comparison, language test, Arab aphasics, validity, reliability, psychoneurolinguistics

1. Introduction Chapter

1.1 Introduction

Increasing number of assessment tools, notably those relating to adults throughout the world have created an urgent need for intensive investigations and strategies that clinicians and speech language Pathologists (SLPs) use to meet the highest standards and criteria of diagnosis. Research has shown that stacked-wave-V auditory brainstem response (ABR) requires a masking technique that may not be readily available to the clinician. Moreover, relatively high-level noise is required and may be annoying to the patient requires a masking technique that may not be readily available to the clinician. Since the only alternative choice was tone-bursts assessment tool, there was a need for more research to compare the merits and demerits of the two tools. Philibert, et al., (2003) have undertaken a comparative study between the two assessment tools. The overall objective of the researcher was "to explore a possible alternative approach, particularly one that might be both more accessible to the clinician, regardless of evoked potential test instrument used, and perhaps more acceptable to the patient." (Philibert, et al., 2003:p.2)

Neuropsycholinguistically speaking, aphasia refers to language disorders marked by impairments in language abilities and communication skills, and is associated with cognitive impairment and deficits in adaptive functioning. Evaluative tests have consistently demonstrated that aphasics with language impairments have deficits in both language areas and cognitive motor. Attempting to examine the validity and reliability of them, Brogden (2008) undertakes a study on the tests administered for aphasics to identify to what extent these tests could be used to test gender. Cross-sectional design and five dynamic indicators of basic early literacy skills measures have been identified as two valid assessment tools to test oral reading fluency in both sexes (Below, et al., 2010).

Is dysphagia short questionnaire (DSQ) valid or not. ? Today it is widely believed, among the neuropsycholinguists, SLPs and experts alike, that the questionnaire of the aphasics is linked with better knowledge of aphasia's type (Skeppholm, et al., 2012). Is this notion correct or yet another stereotype? To address this question, the validity of DSQ, as assessed by SLPs, is considered. A new perspective was taken in this research by controlling for age, which is one of the principal psychoneurolinguistic characteristics that interacts with the questionnaire itself, in order to clarify how it affects the diagnosis process. The DSQ was constructed in collaboration with a group of ear-nose-and-throat specialists. In a first validation study, 45 patients with stationary dysphagia for various reasons completed the DSQ twice 2 weeks apart. To evaluate the utility of the DSQ, a second validation study was performed, where 111 subjects undergoing anterior cervical spine surgery for degenerative disk disease completed the form preoperatively and at 4 weeks, 3 months, and 1 year after surgery. Results initially reported that the DSQ is considered a validated tool for the assessment of dysphagia in anterior cervical spine surgery patients.

Hurkmans, et al., (2012)'s experiment investigated whether or not modified diadochokinesis test has a strong internal consistency and adequate psychometric properties. Outlined results show that the test can be used to measure changes in speech motor control during treatment for apraxia of speech. Again, the aim of Marshall, et al., (2012)'s study was to in/validate a new technique designed for assessing and evaluating aphasics with different types of language deficits. The findings indicate a positive interaction and response to the new technique which conform its validity and reliability.

The validity and reliability of stroke aphasic depression questionnaire (SADQ) to assess aphasics of both sexes was also investigated. The new technique has been used to assess a165 aphasics of both sexes and found to be a valid and reliable observational screening measure of depressive symptoms for stroke patients with aphasia (Cobley, et al., 2012). The researchers recommend the test, not only for aphasics, but also "for identifying patients who require further evaluation." (Cobley, et al., 2012: p.373)

Attard, et al., (2012) compare the validity and the reliability of two evaluative techniques, namely constraint-induced aphasia therapy-plus and multi-modality aphasia therapy to identify to what extent they assess aphasics' language abilities. The research team found that both techniques can be used as means of evaluating aphasics' linguistic abilities. Another experimental study examined reliability and validity of Dutch version of the life satisfaction

questionnaire is undertaken by Boonstra, et al., (2012). The team used the test to assess 159 adult aphasics (over 18 years of age). Results of the team show that unlike the discriminate validity of the test which was good, the test's reliability was moderate.

Aphasics' language-related functions and communication skills were assessed by trail making test. Allen, et al., (2012) who aim to measure the reliability and validity of the test, administered it for the first time to assess 242 aphasics (121 with sustained TBI and 121 normal control participants). Findings demonstrate that the comprehensive trail making test is sensitive to TBI and overall demonstrates classification rates that are comparable with some other versions of the test. In developing a test of language-related functions and communication skills for aphasics, the focus is usually on the reliability and validity of the test that will make the test "*usable*". Examining the validity and reliability of the national institutes of health stroke scale, Okubo, et al, (2012) used the scale to assess 50 adult aphasics of both sexes (range 26-91 years). According to Okubo and his colleagues, the scale is highly sensitive (88%) and specific (85%) in detecting language impairments.

The study of von Steinbuechel, et al., (2012) employed the measures of global assessment to examine a 6-item QOLIBRI overall scale, and identify whether or not it could provide an index of HRQoL after traumatic brain injury (TBI). Seven hundreds and ninety-two subjects with TBI were included in the study, matched for age, education level and intelligence quotient (IQ), but not for language (6 different languages). Results showed that the reliability of the QOLIBRI-OS was good and similar in participants with higher and lower cognitive performance. Factor analysis indicated that the scale is uni-dimensional. Additionally, the findings indicate a satisfactory fit with this model. The QOLIBRI-OS, according to the research analysis, correlates highly with the total score from the full QOLIBRI scale (r=0.87). Furthermore, moderate to strong relationships were found among the QOLIBRI-OS and the extended glasgow outcome scale, short-form-36, and hospital anxiety and depression scale (r=0.54 to -0.76). Such outcomes demonstrate that the QOLIBRI-OS showed good construct validity in the TBI group. Functional connectivity stability was found in the results. These results underline the importance of the QOLIBRI-OS as a means through which clinicians, SLPs and experts in the field can easily assesses a similar construct to the QOLIBRI total score and can be used as a brief index of HRQoL for TBI. Moreover, the study requires further investigation in larger and longitudinal studies.

Traditionally, validation research focusing on the brain included only one age group. Recently, inclusion of multiple -based group research has shown that significant differences in age groups contribute to unique profiles of cognitive, emotional, and neuropsychological dysfunction, as well as dimorphic patterns of structural brain damage and recovery. The study of Sadeq et al., (2013) employed ABR of 30 Arab infants with different auditory impairments and demographically-similar number of children participants to explore the validity and reliability of ABR to measure hearing problems in both Arab infants and children. Statistical analyses revealed that ABR is valid and reliable when measuring Arab infants and children suffering from hearing problems.

1.2 Aims of the Study

Recent research indicates no differences in the results obtained from the analysis of CADL-2 pre-and-posttest when it was applied to gender aphasics speaking English, but little is known about the validity and reliability of the test when it is used to test Arabic patients of two sexes who are suffering from different types of language deficits. The current study used CADL-2 to determine whether or not it is valid and reliable. Specifically, we aim to crucial answers for the following questions:

1. Can CADL-2 test what it was supposed to test?

2. Are the results obtained from the analysis of CADL-2 pre-and-posttest similar? To what extent these results are significantly the same/ different in light of gender differences?

1.3 Methodology

One of the two researchers took part in administering CADL-2 pre-and-posttest sessions to 100 gender aphasics (50 male and 50 females) who receive their therapeutic treatment at Al Khars hospital in Al Ahsa'a city, Kingdom of Saudi Arabia (KSA). The age of the participants ranges between 16 and 65 years old. The analysis was performed in several steps. The test was translated into Arabic language and Arabic translated version was standardized by three Arabic language specialists. The Arabic version of the CADL-2 was then presented in the first week as (a pre-test) to the participating aphasics who responded to the tester questions and instructions. After 21 days (3 weeks), a second test (posttest) was given to the same participants. Examiner record booklets and patients' response booklets were then collected. The data were analyzed using qualitative and statistic content analyses. The researchers performed independent preliminary analyses, which were further developed and intensively discussed between them.

2. Analysis

2.1 Validity and Reliability of CADL-2

2.1.1 Validity of CADL-2 (Arabic version)

2.1.1.1 General Validity of CADL-2

The past 5 years has seen a rapid expansion in the number of studies using new methods, strategies and/ or techniques to investigate maturational changes in the human brain. Designers of assessment tools, notably those of language tests like CADL-2 improved the test with the passage of time. Comprehensive targets almost covered all aspects of language activities. This can be clearly seen in the new version of CADL-2 which included all necessary categories mentioned in the first edition. Compare:

Table 1. CADL 1 and CADL-2: Comparison:

CADL 1 categories (aspects)	*CADL-2 categories (aspects)*
Role playing	

Social convention	Social interaction
Speech acts	
Divergences	Divergent communication
Utilize context	Contextual communication
Sequential relationships	Sequential relationships
Nonverbal/symbolic	Nonverbal communication
Deixis	
Reading, writing, and using numbers	Reading, writing, and using numbers
Humor/ metaphor/ absurdity	Humor/metaphor/absurdity

As can be clearly seen, Table 1 illustrates how role playing is eliminated due to the unimportance it occupies when assessing aphasics' communicative activities. Clearly, role playing plays no pivotal role, especially when dealing with old patients with different types of language deficits. Social interaction covers all distinctive features of speech act along with social convention. The same thing applies to nonverbal communication which includes both nonverbal/ symbolic communication and deixis (time and place). Adding the term *communication* to the categories: divergence and utilize context gives an indication that the designers aim to use the term technically and functionally. Due to the ultimate importance of the language skills and language paralinguistic elements, the designers of CADL-2 keep them as they are in the second edition.

2.1.1.2 Specific Validity of CADL-2

In this section, the researchers reviewed the questions of CADL-2. The purpose was to prove that CADL-2 questions test what they are expected to test. This can be obviously seen in light of some random questions. Consider item 3 for example: (أليس (إسم خطأ) هو إسمك أول نرى, دعنا كذلك؟), 'let's see, your first name is (wrong name), isn't- it?' Evidently, the question prompts the patient to mouth up; therefore, it is consider as a challenge for Broca's aphasics, for example, who suffer from language production. A rapid view on the multiple choices given to the patient reveals that the designers of CADL-2 almost cover all alternatives anticipated about the type of selection the patient's response might fall into. Consider the three alternatives:

1- (يتفق المريض مع الخطأ), 'The patient agrees with the miscommunication.' (0= Wrong answer).
2- (يشير المريض إلى أن الإسم غير صحيح لكنه لا يصوّب الخطأ), 'The patient indicates that the name is incorrect but does not supply the correct name.' (1= Adequate answer).
3- (يصوّب المريض للمختبِر الإسم), 'The patient corrects the examiner.' (2= Correct answer).

Evidently, the designer nearly brings all probable choices the examinee (patient) may think of. In other words, the patient's answer will not be out of the above three mentioned choices.

One more example can be brought from item 20 where the examiner asks the patient to do something (perform an activity). Consider:

Examiner: (عبّئ هذه الإستمارة من فضلك), 'Please fill out this form.' Here the examiner examines

the ability of the patient to write which means that the patient has to write. However, only those who are suffering from dysgraphia or agraphia will not be able to write and/ or compose. Such expectations are better in/validated with reference to the three alternative choices. Consider:

1- (يكتب المريض باستخدام إصبعه/ها), 'The patient writes with his or her finger.' (0= Wrong answer).
2- (المريض يشير بأنه/ها لا تستطيع ملئ الإستماره لكن لا يذكر لماذا), 'The patient indicates that he or she cannot fill out the form but does not indicate why.' (1= Adequate answer).
3- (يطلب المريض/ه قلم رصاص (بتحريك اليد أو غيرها) أوقد يستخدم قلمه/ ها), 'The patient requests a pencil (verbally or nonverbally) or gets his or her own.' (2= Correct answer).

Obviously, the examiner does not leave any other choice for the examinee. Additionally, the question tests what is supposed to test (the linguistic and non-linguistic abilities of the aphasic).

2.1.2 Reliability of CADLE-2 (Arabic version)
2.1.2.1 Pre-test

The pre-test consists of forty-nine (49) questions. Designers of CADL-2 listed them as follows:

Item 1: (حيّي المريض بالقول أهلاً بالسيّد فُلان أوبالسيّدة فُلانه), 'Greet the patient by saying, "Hello, Mr/Ms……..."

Item 2: (ناولني القلم الرصاص لو سمحت), 'Would you mind hand me that pencil, please?"

Item 3: ((دعنا نرى, أول إسمك هو (إسم خطأ) أليس كذلك؟)), 'Let's see, your first name is (wrong name), isn't-it?'

Item 4 : (أريد أن أفحص بعض المعلومات في سجلّك. هل عنوانك (عنوانٌ صحيح)؟), 'I want to check some information in your chart. Is your address (correct address)?'

Item 5: (ما نوع العمل الذي كنت تعمله؟), 'What kind of work have you done?'

Item 6: (كيف حدث أن أُصبت بصعوبةٌ في الكلام؟), 'How did your speech difficulty come about?'

Item 7: (ما أفضل وقتٍ هنا لتناول طعام الغداء؟), 'What's the best time here for eating lunch?'

Item 8: (هاك قائمة الطعام. جد قسم المأكولات. ما الذي ترغب في أكله على وجبة الغداء؟), 'Here's a menu. Find the lunch section. What would you want for lunch?'

Item 9: (إليك الجدول الخاص بالباص. ما هو الوقت في فترة ما بعد الظهيره الذي يغادر فيه الباص رقم 3 المدينه الرئيسيه؟), 'Here is a bus schedule. What time in the afternoon does bus #3 leave Maintwon?'

Item 10: (ما الذي يتوجّب عليك ارتداؤه أو استخدامه في يومٍ كهذا؟), 'What should you wear or use on a day like this?'

Item 11: (كيف تُشعر أحدهم أنك بارد), 'How would you let someone know that you're cold?'

Item 12: (أنظر إلى هذه الصور. أي واحدة منها تجدها مضحكه؟), 'Look at these pictures. Which one is

funny?'

Item 13: (إليك دعوةٌ لحضور حفلة عيد ميلاد. حّددها في هذا التقويم), 'Here's an invitation to a birthday party. Mark it on this calendar.'

Item 14: (إليك الساعه. إنها الآن تشير إلى الخمس الدقائق بعد العاشره)كم بقي على موعدك؟), 'Here's the clock. It's now five minutes after ten. How long until your appointment?'

Item 15: (تفضّل الدليل الخاص بالعماره. أي طابق يوجد به مكتب السيد كلارك), ' Here is a building directory. What floor is Dr. Clark's office on?'

Item 16: (تذكّر أن مكتب الدكتور كلارك في الطابق الثالث وهذا هو المصعد فما الذي ستفعله بعد صعوده؟), 'Remember, Dr. Clark's office is on the third floor. Here's the elevator. What do you do after you step into the elevator?'

Item 17: (لنقل أنك دخلت غرفة الإنتظار بمكتب السيد كلارك ورأيت هذا. إلام توحي إليك هذه الإشاره فعله), 'Let's say that you walk into Dr. Clark's waiting room and see this. What does that sign tell you to do?'

Item 18: (لو سألتك موظفة الإستقبال "بم أخدمك ؟" بم كنت لتجيب؟), 'If the receptionist asked, 'May I help you?' what would you say?)

Item 19: (لو سألتك موظفة الإستقبال عن بعض وثائق الثبوتيه, فما الذي كنت ستُريها ؟), 'If the receptionist asked for some kind of identification, what would you show her?'

Item 20: (من فضلك عبّئ هذه الإستماره؟), 'Please fill out this form.'

Item 21: (المريض يعبّئ الإستماره), 'Patient fills out the form.'

Item 22: (كيف ستصف مشكلتك للطبيب ؟), 'How would you describe your problem to the doctor?'

Item 23: (لوسألك الدكتور كلارك, "هل سبق وأن عانيت من الكلازموبسيا دوستونّيا؟" بم كنت ستُجيبه؟), 'If Dr. Clark asked you, 'Have you been experiencing Clasmopsia dotinnia?' what would you say?'

Item 24: (بحسب هذا الميسم, كم مقدار الأدويه الخاصة بالبرد يتوجّب عليك أخذها ؟), 'According to this label, how much cold medicine should you take?'

Item 25: لو أخبرك الدكتور كلارك بأن تُدخّن ثلاث علب من السجائر وتشرب قارورةً من المسكّر القوي في اليوم, ما (كنت لتقول ؟), 'If Dr. Clark told you to smoke three packs of cigarettes and drink a bottle of gin a day, what would you say?'

Item 26: (لو احتجت إلى استخدام الحمّام, فأيّ واحدٍ كنت ستختار؟), 'If you needed to use the restroom, which one would you choose?'

Item 27: (أ ترى هذه (صوره). ما الذي يجري ؟), 'You see this. What's happening?'

Item 28: (ما الذي يتوجّب على السائق فعله؟), 'What should you the driver do?'

Item 29: (أيّ رمزٍ يصف هذه الصوره ؟), 'Which symbol describes this picture?'

Item 30: (أكتب قائمه لثلاثة أشياء قد تحتاجها من البقاله؟), 'Make a list of three things you might need from the grocery store?'

Item 31: (تتوقّف عند بقالةٍ لشراء علبةٍ من حساء الطماطم. ما الذي ستختاره ؟), 'You stop a grocery store. You want to buy a can of tomato soup. Which will you pick?'

Item 32: (أيٌ من هذه تتماشى مع هذا الرمز؟), 'Which of these go with this symbol?'

Item 33: (وهذه آلة بيع سفري. أرني كيف ستحصل على مشروب ؟), 'And here is a vending machine. Show me how you would get a drink?'

Item 34: (لو احتجت إلى الدواء, أيّ نوع كنت لتشتريه بما تبقّى لديك من نقود؟ سعر كل واحدةٍ مذكورٌ هنا), 'If you needed medicine, which one could you buy with the money you have left? The price for each is listed here?'

Item 35: (إليك صورةً لمتجر. أين القسم الذي يمكنك أن تجد فيه دفتراً؟), 'Here is a picture of a store. Where's the section where you could find a notebook?'

Item 36: (تحتاج إلى أربطة حذاء, لكنك لا تستطيع إيجادها. فلو أن البائع سألك: " أتريد خدمه؟" بم كنت لتجيب؟), 'You need shoelaces, but you can't find them. If a clerk asked, ' May I help you?' what would you say?'

Item 37: (تريد أربطة حذاء بيض- فقط أربطة حذاء بيضاء لاسواها. أين هي؟), 'You want white shoelaces- only white shoelaces. Where are they?'

Item 38: (إليك الخارطه. كيف بإمكانك الوصول من البنك إلى مكتب البريد ؟), 'Here's a map. How do you get from the bank to the post office?'

Item 39: (جد أين هي محلات إصلاح السيارات مدرجةً في هذه الصفحات الصفراء؟), 'Find where car repair shops are listed in these Yellow pages?'

Item 40: (جد الرقم (الخاص بأحد محلات إصلاح السيارات), 'Find the number.'

Item 41: (أماكن الإتصال (بمحلات إصلاح السيارات), 'Places call.'

Item 42: (المريض يخبر المختبِر بالمعلومات السالفة الذكر؟), 'Reports to examiner?'

Item 43: (لو نظرت في الشارع ورأيت حريقاً. ما كنت ستفعل ؟), 'If you looked across the street and saw a fire, what would you do?'

Item 44: (لواتصلت بـ911, ما الذي كنت ستخبر به عاملة الهاتف؟), 'If you called 911, what would you tell the operator?'

Item 45: (ما الذي يجري في هذه الصوره؟), 'What's happening in this picture?'

Item 46: (أي عنوانٍ في الصحيفه يتحدّث عما تراه في هذه الصوره ؟), 'Which newspaper headline tells what you see in this picture?'

Item 47: (دوّنت شيئاً ما في التقويم منذ فترةٍ ليست بالبعيده. أيٌ من هذه المدونات كان ذلك الشيئ المدوّن ؟), 'You scheduled something on the calendar a little time ago. Which one of these was it?'

Item 48: (المختبر إليك بعض الصور. أرني الوجه الأسعد (المختبر منتظراً للإجابه) أي صورةٍ تقول: " كن هادءً؟" (المختبر منتظراً للإجابه) في أيٍ صورةٍ يقول الشخص: " لا أعرف." (المختبر منتظراً للإجابه)), ' 'Here are some pictures. "Show me the happy face" Wait for response. "Which picture says, 'Be quiet"? Wait for response. "In which picture is the person saying, 'I don't know '?" Wait for response. '

Item 49: ("أرني الرسمة التي تتماشى مع مقولة "ضرب السقف"), 'Show me the drawing that goes with the saying 'He hit the ceiling.''

As it is clearly seen, the above mentioned questions address a number of linguistic and non-linguistic activities relating to aphasics. Functional activity is an important component of aphasic social life throughout his/ her life. Theoretical models and empirical data from psychoneurolinguistics, cognitive linguistics, and speech language therapy suggest that aphasics tend to do self-similar activities thy used to do before they become aphasic patients, and that such activities biases increase the adaptive value (e.g., self-relevance) of learned information. It is unclear, however, what neural mechanisms underlie people's tendency to perform certain activities be it linguistic tasks or non-linguistic challenges. Obviously, the above listed questions focused on the communication activities of daily living, a pervasive bias thought to be important for gender identity development. While undergoing CADL-2, participants found themselves face-to-face with their linguistic disabilities. Such challenge makes it easy for the researchers to identify which –ia each aphasic suffers from (e.g., dyslexia, dysgraphia, anomia, dyscalculia, etc.). Moreover, researchers have clearly identified how aphasics sign their language and/ or use meaningless hand signs when necessary. A statistical analysis of the participant's response demonstrated that the striatal region preferentially activated by language tasks is selectively activated by classical reward tasks in the literature. Taken together, these findings reveal a neurobiological mechanism associated with the type of aphasia and demonstrate a novel role of reward-processing neural structures in daily life's activities. However, such analysis can be clearly understood with reference to the participants' pre-test's scores that are listed in the following table. Consider:

Table 2. Participants' scores in CADL-2 pre-test

Participant's Number	*Participant's Name*	*Gender*	*Age*	*Raw Score*	*Percentile*	*Stanine Score*
1	Y A U	M	64	44	10	2
2	A Y K	M	59	90	89	7
3	S A Y	F	37	3	<1	1
4	S S A	M	61	68	35	4
5	S I F	F	60	78	55	5
6	S B K	F	28	65	29	4
7	M S U	F	37	98	99	9
8	M O D	M	32	87	81	7
9	S M A	F	61	56	20	3
10	F S C	F	64	45	10	2
11	A S O	M	59	12	<1	1
12	Y M H	F	52	34	5	2
13	A J A	M	29	2	<1	1
14	A G I	M	25	76	51	5

15	A S E	M	39	8	<1	1
16	A A S	F	63	9	<1	1
17	H A W	F	68	34	5	2
18	F A S	M	17	98	99	9
19	H A A	F	62	88	84	7
20	M A C	M	29	67	32	4
21	O M C	M	17	58	21	3
22	A S O	F	54	92	93	8
23	H S N	M	56	19	1	1
24	A B H	M	61	82	65	6
25	S H U	F	64	73	45	5
26	M A N	F	19	36	6	2
27	S B D	M	47	36	6	2
28	A B R	F	60	45	10	2
29	A B E	M	45	54	19	3
30	N S D	F	46	63	26	4
31	A S S	M	43	73	45	5
32	N S P	F	53	28	2	1
33	A S S	M	25	91	90	8
34	A M S	F	47	10	<1	1
35	M A S	M	31	19	1	1
36	A L	M	48	92	93	8
37	A A S	M	29	28	2	1
38	A M A	M	53	83	67	6
39	K A	M	27	47	11	2
40	N A	F	25	64	27	4
41	S A S	M	55	50	16	3
42	S A S	M	57	11	<1	1
43	M B A	M	29	61	24	4
44	A K A	F	49	60	23	3
45	A L A	F	24	61	24	4
46	S U	M	48	4	<1	1
47	A A L	M	50	8	<1	1
48	A Y A	F	26	61	24	4
49	A M A	F	52	23	2	1
50	A A A	F	54	55	20	3
51	A M J	F	20	89	86	7
52	R G A	F	63	88	84	7
53	A R	F	64	45	10	2

54	H M	F	21	33	4	1
55	B D A	M	20	79	57	5
56	P A	M	64	99	<99	9
57	B R	M	17	76	51	5
58	B R A	F	49	55	20	3
59	T R Q	F	59	28	2	1
60	T M H	M	31	23	2	1
61	T H A	M	16	76	51	5
62	H D A	M	65	89	86	7
63	S A S	F	49	11	<1	1
64	A D K	F	19	4	<1	1
65	S D Q	F	48	5	<1	1
66	H N A	F	45	34	5	2
67	K M L	F	34	65	29	4
68	H J R	F	61	88	84	7
69	H M S	F	65	56	20	3
70	R S D	F	29	43	9	2
71	O M	M	17	6	<1	1
72	A S R	M	64	77	54	5
73	A L I	F	54	32	4	1
74	M H D	M	33	45	10	2
75	M T H	M	55	21	1	1
76	A Y M	M	49	56	20	3
77	A D H	M	47	43	9	2
78	A Y H	F	64	66	31	4
79	N R	M	30	43	9	2
80	N J B	M	22	12	<1	1
81	T F Q	M	20	78	55	5
82	R D A	F	62	98	99	9
83	W F A	F	38	78	55	5
84	W J D	M	25	65	29	4
85	H N A	F	19	56	20	3
86	S N S	F	59	55	20	3
87	A S N	F	44	43	9	2
88	A N S	M	61	12	<1	1
89	O M R	M	65	69	38	4
90	A M J	F	63	44	10	2
91	H S N	M	17	31	3	1
92	A B J	M	21	56	20	3

93	K L D	F	18	72	43	5
94	S T N	F	56	44	10	2
95	R H M	F	23	78	55	5
96	A B L	M	34	52	18	3
97	T M A	M	17	33	4	1
98	N Q S	F	60	89	86	7
99	N M Z	F	45	33	4	1
100	N M H	M	55	16	<1	1
Total number of participants		100 (50 males and 50 females)				
Mean of ages		43.94				
Mean of raw scores		53.64				
Mean of CADL-2 percentiles		28.83				
Mean of CADL-2 Stanine score		3.38				

The qualitative discussion based on the statistical analysis is used in many studies to estimate volumes of anatomical structures in an unbiased fashion. Such procedure is a rapid, inexpensive approach that provides a correct outcome using outlined results obtained from the numbers. In Table 2, the researchers assessed the participants' communication activities of daily living. CADL-2 pre-test has been used here in light of age-sex-related changes. Forty nine (49) questions were asked by one of the researchers who followed the instructions of Cadl-2 examiner's manual. To estimate pre-test, it can be said that out of the one hundred participants whose mean of ages is 43.94, there was a marked improvement in males' performance with raw scores surging 2724 with a mean 54.48. On the other hand, aphasic females scored 2640 with a mean 52.8 which means that the functional communicative activity of aphasic males is higher than that of the aphasic females. Regardless the score achieved by both males and females, they both fall in the same percentile due to the fact that the mean for raw scores of both sexes is 53.64 which means that men's raw score as well as females' raw score is 28.83 on CADL-2 percentile. The same thing applies to CADL-2 Stanine scores where both males and females fall in the slot 3.38.

2.1.2.2 Posttest

Posttest is administered at the end of the third week. The purpose was to compare the participant's performance with that of the pre-test. Strictly, information listed in Table 2 becomes clearer in view of CADL-2 posttest illustrated in the following table. Consider:

Table 3. CADL-2 posttest: Performance of aphasic participants

Participant's Number	*Participant's Name*	*Gender*	*Age*	*Raw Score*	*Percentile*	*Stanine Score*
1	Y A U	M	64	47	11	2

2	A Y K	M	59	95	96	8
3	S A Y	F	37	4	<1	1
4	S S A	M	61	64	27	4
5	S I F	F	60	82	65	6
6	S B K	F	28	61	24	4
7	M S U	F	37	97	98	9
8	M O D	M	32	89	86	7
9	S M A	F	61	60	23	3
10	F S C	F	64	41	9	2
11	A S O	M	59	13	<1	1
12	Y M H	F	52	31	3	1
13	A J A	M	29	4	<1	1
14	A G I	M	25	77	54	5
15	A S E	M	39	5	<1	1
16	A A S	F	63	11	<1	1
17	H A W	F	68	38	7	2
18	F A S	M	17	99	>99	9
19	H A A	F	62	89	86	7
20	M A C	M	29	65	29	4
21	O M C	M	17	59	22	3
22	A S O	F	54	90	89	7
23	H S N	M	56	21	1	1
24	A B H	M	61	80	60	5
25	S H U	F	64	73	45	5
26	M A N	F	19	39	8	2
27	S B D	M	47	34	5	2
28	A B R	F	60	42	9	2
29	A B E	M	45	50	16	3
30	N S D	F	46	61	24	4
31	A S S	M	43	73	45	5
32	N S P	F	53	25	2	1
33	A S S	M	25	90	89	7
34	A M S	F	47	11	<1	1
35	M A S	M	31	19	1	1
36	A L	M	48	91	90	8
37	A A S	M	29	32	4	1
38	A M A	M	53	85	77	6
39	K A	M	27	49	14	3
40	N A	F	25	66	31	4

41	S A S	M	55	54	19	3
42	S A S	M	57	8	<1	1
43	M B A	M	29	66	31	4
44	A K A	F	49	56	20	3
45	A L A	F	24	68	35	4
46	S U	M	48	1	<1	1
47	A A L	M	50	5	<1	1
48	A Y A	F	26	70	40	4
49	A M A	F	52	18	<1	1
50	A A A	F	54	55	20	3
51	A M J	F	20	79	57	5
52	R G A	F	63	89	86	7
53	A R	F	64	49	14	3
54	H M	F	21	37	7	2
55	B D A	M	20	78	55	5
56	P A	M	64	97	98	9
57	B R	M	17	68	35	4
58	B R A	F	49	60	23	3
59	T R Q	F	59	24	2	1
60	T M H	M	31	20	1	1
61	T H A	M	16	70	40	4
62	H D A	M	65	84	72	6
63	S A S	F	49	7	<1	1
64	A D K	F	19	4	<1	1
65	S D Q	F	48	7	<1	1
66	H N A	F	45	40	8	2
67	K M L	F	34	71	41	5
68	H J R	F	61	81	62	6
69	H M S	F	65	44	10	2
70	R S D	F	29	54	19	3
71	O M	M	17	9	<1	1
72	A S R	M	64	67	32	4
73	A L I	F	54	38	7	2
74	M H D	M	33	54	19	3
75	M T H	M	55	23	2	1
76	A Y M	M	49	49	14	3
77	A D H	M	47	43	9	2
78	A Y H	F	64	69	38	4
79	N R	M	30	43	9	2

80	N J B	M	22	17	<1	1
81	T F Q	M	20	79	57	5
82	R D A	F	62	98	99	9
83	W F A	F	38	78	55	5
84	W J D	M	25	65	29	4
85	H N A	F	19	60	23	3
86	S N S	F	59	60	23	3
87	A S N	F	44	41	9	2
88	A N S	M	61	22	2	1
89	O M R	M	65	76	51	5
90	A M J	F	63	47	11	2
91	H S N	M	17	26	2	1
92	A B J	M	21	43	9	2
93	K L D	F	18	66	31	4
94	S T N	F	56	41	9	2
95	R H M	F	23	85	77	6
96	A B L	M	34	42	9	2
97	T M A	M	17	38	7	2
98	N Q S	F	60	89	86	7
99	N M Z	F	45	33	4	1
100	N M H	M	55	21	1	1
Total number of participants		100 (50 males and 50 females)				
Mean of ages		43.94				
Mean of raw scores		48.78				
Mean of CADL-2 percentiles		28.69				
Mean of CADL-2 Stanine score		3.37				

In Table 3, it was found that significant decreases in the performance of males in comparison to their performance in the pre-test (2509 vs. 2724, accordingly). Such remarkable decrease does not emerge as a result of increasing age, because the time between the two tests (pre-and-posttest) is limited (one week). This remarkable alteration can be clearly observed in view of the mean of raw scores for both males and females (50.18 vs. 52. 18, respectively). Likewise, the mean of CADL-2 percentiles and Stanine score in both tests is not different (28.83, 28. 69, 3.38 and 3.37 accordingly). The legitimate question that poses itself is the following: Does such significant differences affect the general evaluation of both men and women at hand? Furthermore, does this result affect the validity of CADL-2 in general and reliability of the test in particular? To address these questions, one needs to go back to the percentiles of CADL-2 where we find that both raw scores of pre-and-posttests fall in the same percentile category (24-40). Therefore, the two percentile scores of the two tests

(pre-and-posttest) in addition to the Stanine scores of them are the same which undoubtedly means that CADL-2 is both valid and reliable.

2.2 Validity and Reliability of ALFA

2.2.1 Validity of ALFA (Arabic version)

There is an increasing interest to in/validate language tests for characterizing spatial and temporal aspects of cortical processing and measuring the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests. However, a valid test normally tests what it is supposed to test (what it was designed for). In order to dis/ prove that, one has to examine the subjects as well as the questions of the tests. Consider:

2.2.1.1 ALFA Main Subjects

ALFA main subjects are focused on the following issues:

1. Telling time.
2. Counting money.
3. Addressing an envelope.
4. Solving daily math problem.
5. Writing a check and balancing a checkbook.
6. Understanding medicine labels.
7. Using a calendar.
8. Reading instructions.
9. Using the telephone.
10. Writing a phone message.

Psychoneurolinguistically speaking, these topics deal with daily life's issues. Moreover, they are investigating language-relating functional activities that aphasics do in their everyday life. For example, telling time requires both comprehension and production. Comprehending questions and requests including: What time is it? Time please? Excuse me; do you mind tell me what time is it now?, etc. It also requires understanding times, time adverbs, hours, and numbers and this is relating to other questions including those of counting and/ or calculating. This is evidence that all questions are linked to each other. Taken together, they deal with linguistic disorders like Broca's aphasia, Wernicke's aphasia, dysgraphia/ agraphia, dyslexia/alexia, dyscalculia, anomia and ao forth.

2.2.1.2 ALFA Questions

ALFA questions, as the name implies, question the aphasic patient about the language-related functional activities and this was the strategy of the designers from the first edition of the test. The added questions in the following editions and versions made this viewpoint practical. Specifically for questions that require the patient to practice something (move one of his organs like mouth, hand, etc.), the effect of the questions on the patients' response was remarkably nonlinear. Therefore, we used the single-subject responses to construct data analysis and obtained notably higher sensitivity natural answers than with conventional stimulus-based programmed results. Such viewpoint can be clearly explained in light of the ALFA questions themselves in the examiner's manual. Consider:

(ماري وبيرون بارنز), ‘Mary and Byron Barnes.’

(جادّة هوني كريك– 2912),’2912 Honeycreek Rd.’

(ولاية شيكاغو), ‘Chicago.’

(مدينة إلينوى),‘Illinois.’

(60626),‘60626.’

The above mentioned address is an example given by the designers. Now, let us see how the analysis is run based on the patient’s response:

Table 4. Sample of the analysis in light of the patient’s response (1)

Item	*Score*	*Explanation for score*
Mary and Buurs	0	“Mary and” are correct; “Byron” is omitted; “Branes” is misspelled and illegible.
2912 Honeycreek Rd	1	Accurate, correctly spelled, legible.
Chicago	1	Accurate, correctly spelled, legible.
Illonis	0	Misspelled
62654	0	Inaccurate

Table 5. Sample of the analysis in light of the patient’s response (2)

Item	*Score*	*Explanation for score*
Mary and Byron Brnes	0	“Mary and” are correct; the “a” in “Branes” is illegible.
2912 Hordysooerd	0	“2912” is correct; “Honeycreek RD” is illegible.
Chicago	1	Accurate, correctly spelled, legible.
elle	0	The “I” in “Illionois” is illegible; the abbreviation instead of the whole word is in accurate.
616	0	Illegible

Table 6. Sample of the analysis in light of the patient’s response (3)

Item	*Score*	*Explanation for score*
Mary and Byran Burne	0	“Mary and” are correct; the “o” in “Byron” is illegible; “Branes” is misspelled.
2912 Honey creek Drive	0	“2912” is correct; “Honeycreek”

		is inaccurate because it is divided into two words; "Drive" instead of "RD" is inaccurate.
Chcg	0	The "i" is not dotted; the "a" and the "o" are illegible; no comma after the word "Chicago" is inaccurate.
Iilnois	0	Misspelled
600	0	Illegible, inaccurate

Table 7. Sample of the analysis in light of the patient's response (4)

Item	*Score*	*Explanation for score*
Mary & Byron Barnes	0	"&" substituted for "and" is inaccurate.
2912 Honeycreek Rd	1	Accurate, correctly spelled, legible.
Chicago	1	Accurate, correctly spelled, legible.
Illois	0	Misspelled
60026	0	Inaccurate

Table 8. Sample of the analysis in light of the patient's response (5)

Item	*Score*	*Explanation for score*
Mary and Byron Barna	0	"Mary and" are correct; the "rn" in "Barnes" is illegible, "e" looks like "a" (there is no scoring penalty for the writing slant toward the upper right corner)
2912 Honeyweek Road	0	"2912: is correct; "Honeycreek" is misspelled and illegible; "Road" instead of "Rd." is inaccurate.
Checago	0	Inaccurate.
Illenais	0	Illegible, the second "I" looks like "e"; "o" looks like an "a".
606226	0	The extra 2 is inaccurate.

These above mentioned question samples indicate that questions were made in a way that makes evaluation process very simple. Such evaluations, in turn, make the test valid.

2.2.2 Reliability of ALFA (Arabic version)

The reliability of a test is known to make it acceptable and trusted by SLP/Ts,

psychoneurolinguists and other people in the field, but little is known as to whether or not unremarkable significant differences affect the reliability of the test. Methodologically speaking, the test is valid when the results do not significantly change if we administer it under the same or at least similar conditions. In others, it gives the same outcome every time we use it. In order to dis/prove such characteristic, the researcher administered pre-and-posttest.

2.2.2.1 Pre-test

As it is mentioned in the methodology of this study, the participating subjects were 50 male aphasics comparable to 50 female aphasics who underwent ALFA test in the first day of the first week. Fear conditioning and extinction anxiety occurred in the time before the test. However, the testers made it clear to the subjects in question that the test is easy and that they (participating subjects) have to relax. Table 6 illustrates the performance of the subjects under investigation. Consider:

Table 9. Participants' scores in ALFA pre-test

Participant's number	*Participant's name*	*Gender*	*Age*	*Subset 1: Telling time*	*Subset 2: Counting money*	*Subset 3: Addressing an envelope*	*Subset 4: Solving daily math problem*	*ubset 5: Writing a check and balancing a checkboo*	*Subset 6: Understanding medicine labels*	*Subset 7: Using a calendar*	*Subset 8: Reading Instructions*	*Subset 9: Using the telephone*	*Subset t 10: Writing a phone message*
1	Y A U	M	64	9	*5*	*6*	5	3	4	7	6	5	11
2	A Y K	M	59	5	3	1	6	5	4	7	5	1	12
3	S A Y	F	37	4	4	9	7	2	5	3	6	8	9
4	S S A	M	61	10	7	8	8	9	8	2	7	0	13
5	S I F	F	60	9	9	7	4	3	9	8	3	9	10
6	S B K	F	28	8	8	5	9	7	3	9	7	5	8
7	M S U	F	37	6	5	4	7	5	4	2	8	4	6
8	M O D	M	32	7	4	2	8	4	6	1	9	3	8
9	S M A	F	61	2	7	5	10	9	8	5	4	6	9
10	F S C	F	64	3	6	9	10	8	9	6	5	7	12
11	A S O	M	59	7	1	8	8	3	6	9	7	2	11
12	Y M H	F	52	5	2	7	9	10	10	7	9	1	10

13	AJA	M	29	4	8	9	4	9	3	8	2	7	10
14	AGI	M	25	10	9	8	5	8	4	0	3	8	11
15	ASE	M	39	9	6	5	7	6	7	9	8	9	11
16	AAS	F	63	9	4	4	8	3	9	2	9	7	13
17	HAW	F	68	8	3	3	2	2	5	9	6	5	14
18	FAS	M	17	6	7	9	3	9	6	5	5	4	14
19	HAA	F	62	6	8	8	8	5	7	4	4	3	15
20	MAC	M	29	6	9	4	9	4	8	5	7	7	10
21	OMC	M	17	8	3	5	7	9	3	3	8	8	9
22	ASO	F	54	7	4	8	4	8	4	6	9	2	11
23	HSN	M	56	9	8	7	5	2	8	3	2	0	13
24	ABH	M	61	9	7	3	9	3	9	7	3	2	14
25	SHU	F	64	10	6	4	10	9	9	3	4	9	14
26	MAN	F	19	8	5	5	6	0	5	2	5	1	14
27	SBD	M	47	9	8	9	7	1	6	9	9	8	13
28	ABR	F	60	6	9	0	3	6	6	0	8	9	15
29	ABE	M	45	5	10	2	4	8	5	2	9	9	11
30	NSD	F	46	4	7	1	8	7	5	1	7	8	12
31	ASS	M	43	7	6	4	9	9	5	7	7	2	10
32	NSP	F	53	6	5	3	5	9	5	9	6	1	10
33	ASS	M	25	9	8	10	4	10	2	8	6	7	9
34	AMS	F	47	10	9	8	7	7	3	0	8	8	12
35	MAS	M	31	5	10	6	8	4	7	9	9	4	12
36	AL	M	48	6	10	9	9	5	8	7	4	3	14
37	AAS	M	29	8	10	6	5	9	9	5	3	7	15
38	AMA	M	53	9	10	4	6	8	10	3	5	5	12
39	KA	M	27	5	3	3	7	3	3	1	6	9	10
40	NA	F	25	3	4	9	8	9	3	1	7	8	9
41	SAS	M	55	1	7	8	3	7	5	4	8	2	12
42	SAD	M	57	6	6	7	2	8	6	3	9	3	8
43	MBA	M	29	7	5	5	4	4	7	9	2	6	10
44	AKA	F	49	8	8	6	6	3	8	8	2	5	11
45	ALA	F	24	9	7	3	8	5	2	10	10	4	15
46	SU	M	48	5	9	2	9	6	9	10	2	9	15
47	AAL	M	50	4	5	8	5	7	0	0	8	8	9
48	AYA	F	26	9	4	9	4	8	1	8	9	7	11
49	AMA	F	52	8	2	5	10	10	4	9	10	5	13
50	AAA	F	54	5	7	3	10	8	6	8	3	9	12
51	AMJ	F	20	4	8	7	9	7	9	7	4	2	10

52	R G A	F	63	8	9	6	9	1	3	6	7	7	8
53	A R	F	64	9	5	3	3	2	4	5	8	8	12
54	H M	F	21	10	6	9	4	0	8	9	9	9	9
55	B D A	M	20	9	4	8	5	9	9	7	10	9	11
56	P A	M	64	5	3	10	2	8	5	4	9	9	15
57	B R	M	17	8	2	10	4	2	4	3	8	1	12
58	B R A	F	49	7	5	10	5	3	8	8	1	5	8
59	T R Q	F	59	3	6	9	8	4	9	7	6	8	13
60	T M H	M	31	9	7	8	9	6	10	4	7	6	9
61	T H A	M	16	7	8	6	9	7	9	5	8	6	14
62	H D A	M	65	8	0	5	5	9	8	0	9	2	10
63	S A S	F	49	9	2	4	6	8	6	9	10	1	11
64	A D K	F	19	10	3	3	4	8	3	0	10	2	12
65	S D Q	F	48	8	4	1	7	7	4	10	10	5	11
66	H N A	F	45	9	5	9	8	6	6	1	2	5	15
67	K M L	F	34	5	6	8	3	2	8	4	4	6	12
68	H J R	F	61	4	7	7	2	3	9	5	6	9	9
69	H M S	F	65	8	9	5	4	4	3	7	9	9	8
70	R S D	F	29	6	2	4	6	5	4	8	7	0	12
71	O M	M	17	9	3	2	8	9	5	2	5	0	7
72	A S R	M	64	8	8	9	9	8	6	9	6	1	11
73	A L I	F	54	5	6	8	10	6	2	8	10	6	13
74	M H D	M	33	4	5	7	4	3	1	7	5	3	14
75	M T H	M	55	1	3	4	5	2	2	4	6	9	14
76	A Y M	M	49	9	7	9	8	10	4	5	8	7	14
77	A D H	M	47	8	8	8	9	9	6	9	9	6	14
78	A Y H	F	64	10	2	6	5	7	8	8	3	7	8
79	N R	M	30	1	2	7	4	5	9	7	4	7	9
80	N J B	M	22	9	5	9	7	3	5	1	5	7	9
81	T F Q	M	20	9	8	8	8	2	6	7	9	1	15
82	R D A	F	62	5	9	7	9	9	7	3	10	4	8
83	W F A	F	38	4	9	4	10	7	8	4	10	4	8
84	W J D	M	25	8	2	2	10	6	3	8	10	1	8
85	H N A	F	19	7	3	4	10	5	4	9	9	8	9
86	S N S	F	59	6	6	5	6	3	2	4	9	8	12
87	A S N	F	44	9	6	6	7	4	3	8	9	1	15
88	A N S	M	61	8	7	8	8	9	8	7	7	1	14
89	O M R	M	65	9	7	7	8	8	9	5	5	7	12
90	A M J	F	63	10	7	9	9	6	7	10	3	6	9

91	H S N	M	17	9	8	9	9	10	6	9	4	3	10
92	A B J	M	21	7	9	8	9	9	3	4	8	2	10
93	K L D	F	18	5	9	5	9	8	2	3	9	9	12
94	S T N	F	56	2	8	4	1	3	1	8	2	8	14
95	R H M	F	23	10	5	3	3	4	0	7	3	7	15
96	A B L	M	34	9	6	8	5	9	5	6	8	6	9
97	T M A	M	17	8	5	7	6	8	6	7	9	1	12
98	N Q S	F	60	7	5	6	7	7	7	6	10	2	13
99	N M Z	F	45	6	6	5	9	6	8	5	2	4	15
100	N M H	M	55	5	6	9	9	7	3	6	5	3	15

Total number of participants	100 (50 males and 50 females)
Mean of ages	43.94
Total of scores	6993
Mean and level of telling time's scores	6.9 (Level 2)
Mean and level of counting money's scores	6.98 (Level 2)
Mean and level of addressing an envelope's scores	6.03 (Level 2)
Mean and level of solving daily math problems' scores	5.66 (Level 2)
Mean and level of writing a check and balancing a checkbook's scores	5.97 (Level 2)
Mean and level of understanding medicine labels' scores	5.62 (Level 2)
Mean and level of using a calendar's scores	5.64 (Level 2)
Mean and level of reading instructions' scores	6.54 (Level 2)
Mean and level of using the telephone's scores	5.12 (Level 3)
Mean and level of writing a phone message's scores	10.95 (Level 3)
General mean of number correct	6.541
General mean of independent functioning rating (levels)	2.1
Hypothetical mean	699.3

The results obtained from the analysis of the aphasics' performance are scores known to be qualitatively and statistically reliable. We used the record of scores and the independent functioning ratings to determine in which level the performance of the aphasics under investigation falls. Table 6 reveals some of the results where nearly most results fall into the second level. With the exception of scores of the category entitles: "writing a phone message." which overpass the standard followed by other categories due to statistical considerations, other scores registered the same level (2) except for those related to *using the telephone* category which fell in the third level. In details, subsets can be divided into two groups: Group one consist of scores below 6. Under this group, one can clearly find subsets of solving daily math problems, writing a check and balancing a checkbook, understanding medicine labels, using a calendar, and using the telephone. Note here that the subset entitled: "using the telephone", falls into this group although it belongs to level three (3).

On the other hand, group 2 contains all those scores above 6. This includes the following subsets: Telling time, counting money, addressing an envelope, and reading instructions. Generally, scores relating to the first group are more than those of the second one. Regardless the differences between the scores themselves, it can be said that both group are close it each other which means that the differences are not significant or remarkable. It is for this reason, however, that they nearly belong to the same level and also the same mean (2 and 2.1, respectively). Likewise, general mean of number correct scores and hypothetical mean nearly fall into the same category (6). Strictly, these findings will be clearer in light of the participant's performance in the posttest.

2.2.2.2 Posttest

This is one of the first ALFA studies in the Arab world to test the validity and reliability of this test between Arab aphasics with different types of language impairments. The results of the pre-test may suggest another test to confirm them. It is for this reason, however, that the researchers administer posttest. As it is mentioned somewhere throughout the research, the posttest was administered at the end of the third week of this experimental study. Table 7 summarizes the performance of the participating subjects. Consider:

Table 10. ALFA posttest: Performance of aphasic participants

Participant's number	*Participant's name*	*Gender*	*Age*	*Subset 1: Telling time*	*Subset 2: Counting money*	*Subset 3: Addressing an envelope*	*Subset 4: Solving daily math problem*	*ubset 5: Writing a check and balancing a checkboo*	*Subset 6: Understanding medicine labels*	*Subset 7: Using a calendar*	*Subset 8: Reading Instructions*	*Subset 9: Using the telephone*	*Subset t 10: Writing a phone message*
1	Y A U	M	64	1	*6*	*5*	3	8	8	9	9	7	14
2	A Y K	M	59	2	1	1	2	9	5	9	8	8	15
3	S A Y	F	37	1	1	9	2	9	9	9	9	10	13
4	S S A	M	61	2	0	4	2	7	8	8	9	9	14
5	S I F	F	60	1	1	3	3	8	9	9	8	10	15
6	S B K	F	28	9	0	3	2	9	8	8	9	9	12
7	M S U	F	37	2	2	4	2	8	8	8	10	9	13
8	M O D	M	32	2	2	2	3	9	6	9	9	10	15

9	SMA	F	61	1	1	2	1	8	7	10	9	9	13
10	FSC	F	64	2	0	3	1	9	9	10	8	9	14
11	ASO	M	59	1	0	8	2	8	6	10	6	10	13
12	YMH	F	52	9	1	3	4	9	10	9	9	10	14
13	AJA	M	29	9	0	2	1	8	10	9	7	9	14
14	AGI	M	25	8	3	2	1	9	10	10	9	10	14
15	ASE	M	39	2	2	1	2	9	8	10	7	10	13
16	AAS	F	63	9	2	1	2	9	9	9	10	9	13
17	HAW	F	68	9	2	2	2	9	9	10	9	9	14
18	FAS	M	17	9	1	2	2	9	10	9	7	9	15
19	HAA	F	62	3	2	1	2	8	10	9	6	10	13
20	MAC	M	29	9	0	2	3	8	9	10	9	10	15
21	OMC	M	17	10	1	2	2	8	7	10	8	9	13
22	ASO	F	54	0	2	2	1	9	8	10	8	9	15
23	HSN	M	56	9	9	2	3	9	9	9	8	10	14
24	ABH	M	61	8	1	2	9	9	9	9	8	9	15
25	SHU	F	64	1	0	2	10	9	8	9	8	10	15
26	MAN	F	19	6	1	3	3	10	8	8	6	9	15
27	SBD	M	47	8	0	2	2	10	8	8	10	9	15
28	ABR	F	60	9	1	0	3	10	8	10	9	10	15
29	ABE	M	45	0	1	4	1	10	10	9	9	10	14
30	NSD	F	46	0	3	1	2	10	9	10	8	9	14
31	ASS	M	43	0	2	3	3	8	8	9	9	9	13
32	NSP	F	53	0	4	2	3	9	9	10	6	10	14
33	ASS	M	25	6	3	1	5	10	8	9	7	9	15
34	AMS	F	47	9	3	2	4	9	9	10	8	9	15
35	MAS	M	31	1	2	0	3	9	9	10	9	9	14
36	AL	M	48	1	7	0	3	9	9	8	8	9	15
37	AAS	M	29	1	1	0	3	9	10	9	8	9	15
38	AMA	M	53	7	10	0	2	8	9	10	8	10	15
39	KA	M	27	2	2	0	3	7	9	10	8	9	14
40	NA	F	25	1	1	9	0	9	10	10	9	9	14
41	SAS	M	55	9	0	5	2	7	9	8	9	10	14
42	SAD	M	57	9	2	6	2	8	9	7	9	7	15
43	MBA	M	29	9	3	7	4	8	10	10	9	9	14
44	AKA	F	49	1	1	5	3	7	9	9	8	9	15
45	ALA	F	24	2	1	5	4	6	9	10	10	9	14
46	SU	M	48	9	2	4	4	6	10	10	9	10	15
47	AAL	M	50	2	2	3	4	7	9	9	9	9	14

48	A Y A	F	26	1	2	3	6	9	9	9	9	9	14
49	A M A	F	52	3	0	3	1	9	10	8	10	9	14
50	A A A	F	54	2	0	5	1	6	9	9	9	10	15
51	A M J	F	20	1	0	5	2	7	10	7	9	9	14
52	R G A	F	63	2	0	6	1	6	9	8	8	9	15
53	A R	F	64	9	1	6	1	6	9	8	9	10	14
54	H M	F	21	1	2	5	1	6	9	8	9	10	15
55	B D A	M	20	1	2	4	5	8	10	8	10	10	14
56	P A	M	64	2	3	1	1	8	7	9	9	9	15
57	B R	M	17	2	2	1	2	8	9	8	9	10	14
58	B R A	F	49	1	3	8	3	9	7	9	9	10	14
59	T R Q	F	59	2	2	8	3	6	8	9	10	10	15
60	T M H	M	31	1	1	3	3	7	9	10	9	9	14
61	T H A	M	16	3	2	1	4	7	8	9	9	9	14
62	H D A	M	65	5	1	0	5	6	7	9	9	9	15
63	S A S	F	49	3	2	0	6	6	9	10	10	10	15
64	A D K	F	19	1	2	0	4	6	8	9	10	10	14
65	S D Q	F	48	3	3	0	4	7	7	9	10	8	15
66	H N A	F	45	2	3	2	3	8	7	10	9	7	15
67	K M L	F	34	1	5	1	3	8	9	9	7	8	14
68	H J R	F	61	2	0	2	2	9	9	9	8	10	15
69	H M S	F	65	3	1	5	3	8	8	10	9	9	15
70	R S D	F	29	2	0	2	0	9	8	9	9	9	14
71	O M	M	17	1	1	3	0	5	8	10	8	8	15
72	A S R	M	64	2	1	2	0	8	10	10	9	9	14
73	A L I	F	54	0	2	1	10	9	9	9	10	7	14
74	M H D	M	33	0	2	3	0	6	9	9	8	9	15
75	M T H	M	55	0	2	4	0	8	9	9	8	8	14
76	A Y M	M	49	0	2	2	1	9	9	10	9	9	14
77	A D H	M	47	0	2	4	2	9	9	10	10	7	15
78	A Y H	F	64	1	3	2	3	7	9	9	8	10	12
79	N R	M	30	0	4	3	3	9	9	6	8	10	15
80	N J B	M	22	0	3	2	4	9	9	10	8	10	14
81	T F Q	M	20	0	6	1	5	9	9	9	9	10	15
82	R D A	F	62	0	5	2	7	9	9	9	10	9	13
83	W F A	F	38	9	0	2	0	6	9	8	10	9	15
84	W J D	M	25	9	1	2	1	6	10	9	10	10	13
85	H N A	F	19	9	1	1	1	6	10	10	9	9	11
86	S N S	F	59	9	3	1	7	6	10	9	10	9	15

87	A S N	F	44	0	2	2	5	6	10	10	10	10	13
88	A N S	M	61	0	1	3	6	8	10	9	10	10	14
89	O M R	M	65	1	2	3	5	8	10	9	9	9	15
90	A M J	F	63	1	3	4	3	10	9	9	9	9	15
91	H S N	M	17	2	0	2	6	9	9	10	10	8	11
92	A B J	M	21	2	0	2	5	9	7	9	9	9	14
93	K L D	F	18	1	0	2	5	9	6	8	10	10	12
94	S T N	F	56	2	9	2	6	9	9	9	9	9	15
95	R H M	F	23	1	9	3	2	8	6	9	10	9	15
96	A B L	M	34	2	3	2	5	8	9	8	9	9	13
97	T M A	M	17	3	3	1	3	9	7	9	10	10	14
98	N Q S	F	60	3	3	2	3	9	8	8	10	9	14
99	N M Z	F	45	3	4	2	2	9	9	7	8	10	15
100	N M H	M	55	2	4	2	7	8	9	9	9	9	15

Total number of participants	100 (50 males and 50 females)
Mean of ages	43.94
Total of scores	6898
Mean and level of telling time's scores	3.26 (Level 3)
Mean and level of counting money's scores	2.1 (Level 3)
Mean and level of addressing an envelope's scores	2.7 (Level 3)
Mean and level of solving daily math problems' scores	3.01 (Level 3)
Mean and level of writing a check and balancing a checkbook's scores	8.12 (Level 1)
Mean and level of understanding medicine labels' scores	8.7 (Level 2)
Mean and level of using a calendar's scores	8.92 (Level 1)
Mean and level of reading instructions' scores	8.79 (Level 1)
Mean and level of using the telephone's scores	9.2 (Level 1)
Mean and level of writing a phone message's scores	14.18 (Level 2)
General mean of number correct	6.898
General mean of independent functioning rating (levels)	2
Hypothetical mean	689.8

The researchers conducted a literature review of various language tests' studies, published between January 2000 and June 2013, reporting on the effects of these tests in the assessment of language tasks. In the absence of any ALFA test studies in the Arab world, this review was supplemented by original data analyses focusing on the performance of aphasics, taking into consideration sex-by-diagnosis interactions on patterns of brain activation obtained during tasks of working memory, incentive decision-making, and facial affect processing. Compared with their performance in the posttest, the performance of the participating subjects in the pre-test shows sharp increase (6993 vs. 6898). This increase is not only limited to the total

scores of the participating subjects in all subsets, it extends to include means of each subset's scores, levels and hypothetical mean. Compare:

Table 11. Means and levels of all subsets in both pre-and-posttests

Item	*Pre-test*	*Posttest*
Mean and level of telling time's scores	6.9 (Level 2)	3.26 (Level 3)
Mean and level of counting money's scores	6.98 (Level 2)	2.1 (Level 3)
Mean and level of addressing an envelope's scores	6.03 (Level 2)	2.7 (Level 3)
Mean and level of solving daily math problems' scores	5.66 (Level 2)	3.01 (Level 3)
Mean and level of writing a check and balancing checkbook's scores	5.97 (Level 2)	8.12 (Level 1)
Mean and level of understanding medicine labels' scores	5.62 (Level 2)	8.7 (Level 2)
Mean and level of using a calendar's scores	5.64 (Level 2)	8.92 (Level 1)
Mean and level of reading instructions' scores	6.54 (Level 2)	8.79 (Level 1)
Mean and level of using the telephone's scores	5.12 (Level 3)	9.2 (Level 1)
Mean and level of writing a phone message's scores	10.95 (Level 3)	14.18 (Level 2)
General mean of number correct	6.541	6.898
General mean of independent functioning rating (levels)	2.1	2
Hypothetical mean	699.3	689.8

Table 12. Total and mean of scores in all subsets in both pre-and-posttests

Subsets	*Total and mean of scores*			
	Pre-test		*Posttest*	
	Males	*Females*	*Males*	*Females*
Subset 1	352	333	173	153
Mean of subset 1 scores	35.2	33.3	17.3	15.3
Subset 2	307	290	111	99
Mean of subset 2 scores	30.7	29.0	11.1	9.9
Subset 3	325	282	121	149
Mean of subset 3 scores	32.5	28.2	12.1	14.9
Subset 4	326	336	149	152
Mean of subset 4 scores	32.6	33.6	14.9	15.2
Subset 5	321	280	410	402
Mean of subset 5 scores	32.1	28.0	41.0	40.2
Subset 6	290	273	438	432
Mean of subset 6 scores	29.0	27.3	43.8	43.2
Subset 7	269	288	441	451
Mean of subset 7 scores	26.9	28.8	44.1	45.1
Subset 8	323	331	435	444
Mean of subset 8 scores	32.3	33.1	43.5	44.4

Subset 9	236	283	457	463
Mean of subset 9 scores	23.6	28.3	45.7	46.3
Subset 10	575	560	712	706
Mean of subset 10 scores	57.5	56.0	71.2	70.6

3. Conclusion

While the importance of assessing aphasics' communication activities of daily living is increasingly underscored by recent literature, conventional assessment tools and evaluative language tests obscure potentially important regional variations in the speech language therapy. The objective of this study was to measure the validity and reliability of CADL-2 when using the test as an assessment tool to assess aphasics' functional communicative activities. It is seen how qualitative and statistical analyses are able to identify the validity and reliability of CADL-2. For the validity of CADL-2, it is found that the questions of the test were carefully designed for assessing different types of aphasia that gender adult aphasics normally suffer from. Alternative choices describing the response of aphasics (raw scores) were calculated and analyzed in decided to the examiner's manual. Clearly, each alternative choice presented a precise diagnosis of the type of aphasia gender participants suffer from. Aphasia's assessment criteria describing the communication activities of daily living distribution were estimated using practical analysis evaluated and analyzed by the designers of ACDL-2. Questions of the test were defined based on the functional activities to quantify regional parameter variation. Subjects were categorized by gender, and age for analysis. To guarantee the validity of the test, the researchers followed the instructions and guidelines in the attached booklets of CADL-2 step by step. In general, the responses of the participants in hand showed no significant variations in the pre-test as compared with the posttest which demonstrate that they tested what they were expected or supposed to test. Again, this indicates that the test is valid.

At both tests (pre-and-posttest) participants' performance (with respect to raw scores' distribution) provided evidence of the reliability of CADL-2. Comparing women to men, unimportant differences in the mean of raw scores, percentiles and Stanine scores were most pronounced and observed in both tests. Compare:

Table 13. Gender's scores: Comparison

Items	*Pre-test*		*Posttest*	
	Males	*Females*	*Males*	*Females*
Raw scores	2724	2640	2505	2639
Mean of raw scores	43.94	52.8	50.1	52.78
Mean of CADL-2 Percentile	29.5	28.16	28.6	28.78
Mean of CADL-2 Stanine scores	3.4	3.38	3.32	3.38

Table 4 explains in details the mean of percentages for raw scores, CADL-2 percentiles, and CADL-2 Stanine scores of both males and females. Regardless the differences that one can easily observe, it can be said that such percentages do not affect the general results of the participants' performance in both tests. Figures 1 and 2 below summarize the outcomes. Compare:

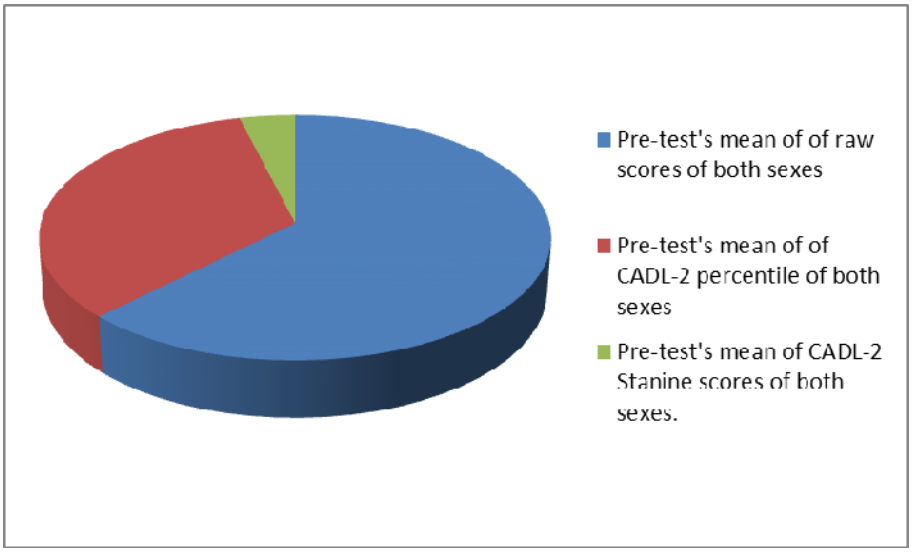

Figure 1. Pre-test general outcomes

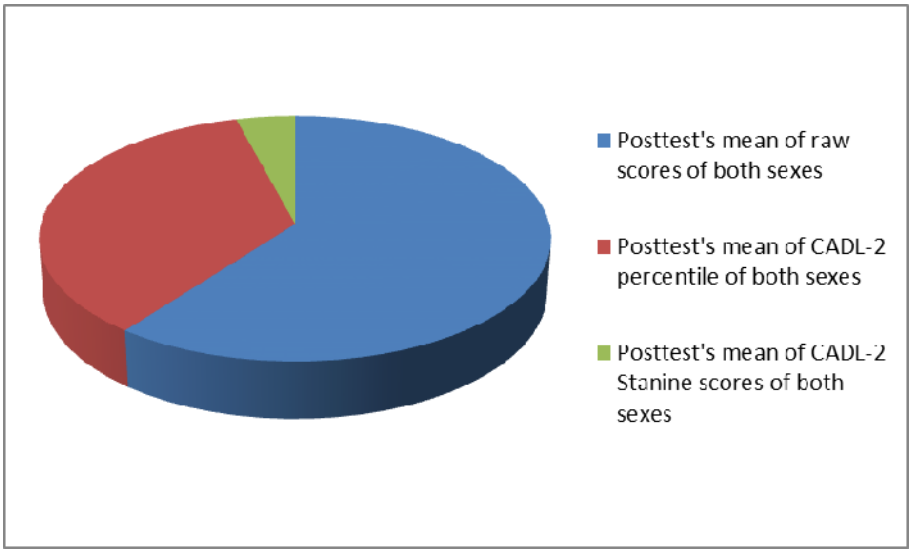

Figure 2. Posttest general outcomes

Comparing pre-test (Figure 1) to posttest (Figure 2), no significant differences were pronounced between the two. This is strong evidence that the two tests are similar if not almost the same which indicate that the CADL-2 is reliable. Note here that the level of the

communication activities is, according to CADL-2 criteria is low. These results suggest that CADL-2 is important in studies of communication activities of daily living and assessment effects, particularly where participants are adult aphasics of both sexes. Therefore, the researchers recommend it for assessing such functional communicative activities in Arab aphasics. A better understanding of the processes of scores' interpretation may help to distinguish the functional activities of adult aphasics of both sexes.

The researchers also found a strong support for the validity and reliability of ALFA test. Evidence regarding all types of aphasic diseases is limited, but points to complex interactions between sex and diagnosis with therapeutic and pathological factors within impaired regions. Gender-by-diagnosis interactions were noted in the scores of the tests which reflect the general performance of the subjects under investigation. Such outcomes indicate a potential sex-by-diagnosis interaction influencing the performance of the patient to respond to the treatment. Our data suggest that the test is valid and reliable; therefore, is recommended to be used for Arab aphasics of both sexes. The following figure summarizes this result. Consider:

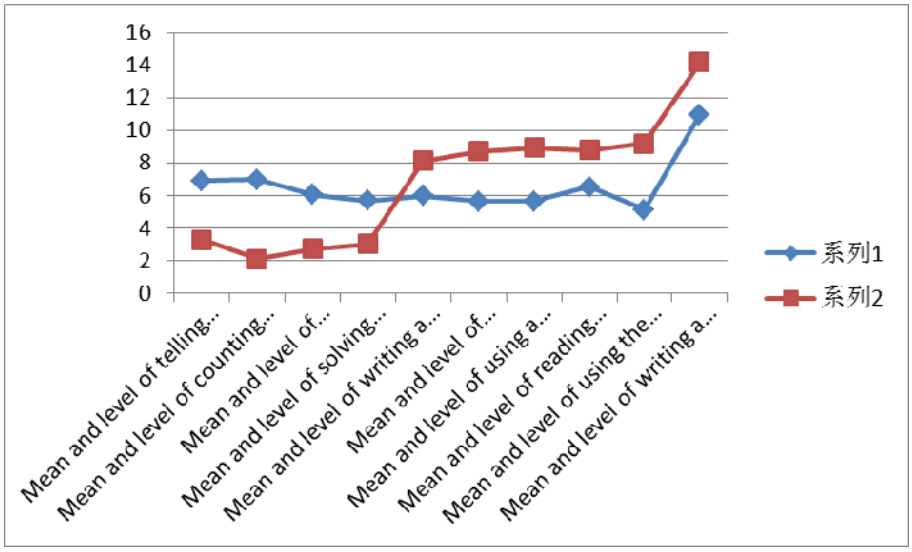

Figure 3. Validity and Reliability of ALFA test in both pre-and-posttests

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Glossary

ABR (Auditory Brainstem Response) It is a neurologic test of auditory brainstem function in response to auditory (click) stimuli. First described by Jewett and Williston in 1971, ABR audiometry is the most common application of auditory evoked responses. The resulting recording is a series of vertex positive waves of which I through V are evaluated. These waves, labeled with roman numerals in Jewett and Williston convention, occur in the first 10 milliseconds after onset of an auditory stimulus. ABR is a helpful tool in determining a child's ability to hear. The test uses a special computer to measure the way the child's hearing nerve responds to different sounds (Eggermont, et al., 2007: p. 3).

ALFA (Communication Activities of Daily Living, Second Edition) The test assesses the functional communication skills of adults with neurogenic communication disorders. The ALFA is given individually in about 30 minutes and contains 50 test items that assess communication activities in seven areas: Reading, writing, and using numbers; Social interaction; Divergent communication; Contextual communication; Nonverbal communication; Sequential relationships; and Humor/metaphor/absurdity. Original CADL items that required role playing, use of an audiocassette for identification of environmental sounds, and certain props were eliminated to ease test administration and reduce total test time.

The updated norming sample included 175 adults with neurogenic communication disorders resulting primarily from left- or right-hemisphere stroke or traumatic brain injury. Level of care spanned the full continuum of acute care to sub-acute, long-term, home, and outpatient care. The sample was stratified to approximate the 1997Statistical Abstract of the United

States (U.S. Bureau of the Census). Reliability coefficients were: .93 coefficient alpha, .85 test-retest, and .99 inter-scorer. The ALFA also was found to be valid as a functional communication test for adult neurogenic populations. Complete ALFA Kit includes: Examiner's Manual, Picture Book, 25 Examiner Record Booklets, and 25 Patient Response Forms, all in a sturdy storage box (http://www.proedinc.com/ customer/ ProductView.aspx?ID=1533&sSearchWord=).

CADL-2 (Communication Activities of Daily Living, Second Edition) The test assesses the functional communication skills of adults with neurogenic communication disorders. The CADL-2 is given individually in about 30 minutes and contains 50 test items that assess communication activities in seven areas: Reading, writing, and using numbers; Social interaction; Divergent communication; Contextual communication; Nonverbal communication; Sequential relationships; and Humor/metaphor/absurdity. Original CADL items that required role playing, use of an audiocassette for identification of environmental sounds, and certain props were eliminated to ease test administration and reduce total test time.

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DSQ (Dysphagia Short Questionnaire) This questionnaire is considered to be a validated tool for the assessment of dysphagia in anterior cervical spine surgery patients (Skeppholm, et al., 2012: pp.996-1002).

IQ (intelligence quotient) It is a score derived from one of several standardized tests designed to assess intelligence. The abbreviation "IQ" comes from the German term Intelligenz-Quotient, originally coined by psychologist William Stern. When modern IQ tests are devised, the mean (average) score within an age group is set to 100 and the standard deviation (SD) almost always to 15 (Neisser, 1997: pp. 440-447).

QOLIBRI (Quality of Life after Brain Injury) is the first instrument specifically developed to assess health-related quality of life (HRQoL) of individuals after traumatic brain injury. Disease or condition-specific HRQoL instruments are assumed to be more sensitive to particular health conditions and therefore give more focused and more precise information than generic ones (http://www.qolibrinet.com/).

SADQ (Stroke Aphasic Depression Questionnaire) This questionnaire was developed to assess the depression in aphasic stroke patients. It is a 21-item questionnaire developed based

on observable behaviors thought to be associated with depressed mood. It is completed by the client's caregiver on behalf of the client (Sutcliffe & Lincoln, 1998: pp. 506-513).

SLP/Ts (Speech-Language Pathologists/ Therapists) They are specialized in communication disorders as well as swallowing disorders. They are also called Speech Pathologists (Block et al., 1993: p. 23)

TBI (Traumatic Brain Injury) It occurs when an external force traumatically injures the brain. TBI can result when the head suddenly and violently hits an object, or when an object pierces the skull and enters brain tissue (Rehman et al., 2008: pp.1-7).