Introduction

Aphasia is defined as an acquired impairment in language production, comprehension, or cognitive processes that underlie language. Aphasia is secondary to brain damage and most frequently caused by stroke ***(LaPointe, 2005)***. It is characterized by a reduction or impairment in the ability to access language form or structure, language content or meaning, language use or function, and the cognitive processes that underlie and interact with language such as attention, memory, and thinking ***(Murray and Chapey, 2001).*** Aphasia is a multimodality disorder, since it may affect listening, speaking, reading, writing, and gesturing, although not necessarily to the same degree.

Although aphasia tests have been available for many decades, standardized measures were not clinically widespread until the 1970s and 1980s. At this time, a number of comprehensive language batteries began to be used in a more pervasive way within clinical practice ***(Byng et al., 1990)***. These tests included: the Minnesota Test for Differential Diagnosis of Aphasia ***(MTDDA; Schuell, 1965)***; the Porch Index of Communicative Abilities ***(PICA; Porch, 1967)***; the Boston Diagnostic Aphasia Examination ***(BDAE; Goodglass et al., 1972, revised in 1983 and 2000)***; and the Western Aphasia Battery ***(WAB; Kertesz, 1982)***. These comprehensive language batteries are still currently in use in clinical practice.

Byng et al., in ***1990***, demonstrated in their criticism of these four major batteries currently in use-the MTDDA, PICA, BDAE, and WAB why these tests do not fulfill their role adequately. They suggested that none of these tests reveals the nature of the language impairment, as they do not control those variables known to affect aphasic performance nor do they give explicit information that the clinician can use to guide therapy from the test results alone.

A new approach to aphasia examination, the Psycholinguistic Assessment of Language Processing in Aphasia (PALPA) has been developed by ***Kay et al., 1992*** .It is a relative new-comer to the comprehensive batteries, one that was hailed as a new psycholinguistic approach to the assessment of aphasia. However, the authors stress that PALPA "is not designed to be given in its entirely to an individual" ***(Kay et al., 1996).*** Although of the undoubted usefulness, PALPA has some shortcomings that hinder its use. It is suggested that the selection of subtests for an individual aphasic patient follows the guidelines in the manual to explore in depth the specific problems presented by the individual ***(Spreen and Riser, 2003).***

A detailed language evaluation using Dysphasia test was used for Arabic-speaking patients ***(Fadly et al., 1976).*** What makes this test of special significance in Egypt is that for the first time the clinician has at hand a language and culture adapted test. This test, although already helpful in clinical practice is still at a developmental stage. The test items include:

(a) Presentation, orientation to time, place and persons, (b) Auditory memory span, (c) automatic speech, spontaneous speech and input ability, (d) Understanding written text, (e) Reading, (f) Writing, (g) Colour and form perception, and (h) Calculation.

Among the important questions to be answered is scoring. The authors feel, in accordance with many clinicians that the performance of the dysphasic patient is by no means always a yes or no phenomena. It is pouted out that the "time" parameter has to enter in the scoring system. The rating scales as regards difficulty of the subtest items and clear normative data are still needed to lessen some of the pitfalls of this test. However, further elaboration of certain subtests is thought necessary. The syntactic grammatic ability and the auditory memory span are intended to be deeply probed ***(Kotby et al., 1981).***

Therefore, the need for another test is based on a number of assumptions:

(i) Clinicians still see a need for language batteries generally. They provide the clinician with a number of crucial kinds of information: a summary of the linguistic abilities and impairments of people with dysphasia. This provides a step towards language remediation, a means of monitoring recovery and measuring outcome.

(ii) More specifically, standardized assessments give a means of accurately comparing the performance of one person with aphasia against that of another. It provides a means of communicating about the language impairment of that person with other members of the team and of making decisions regarding selection of people with dysphasia for different modes of intervention.

(iii) Current aphasia batteries are not seen as an efficient way to assess language impairment ***(David, 1990).***

(iv) Clinicians are increasingly aware of the need to attend to the disability and emotional sequelae of acquiring dysphasia. There is a perceived need for impairment-based assessment and therapy for aphasics, as the impairment itself can be a major barrier to participation within that person's life ***(Pound et al., 2000).***

Recently introduced is the "Comprehensive Aphasia Test" (CAT) which was developed by ***Swinburn et al., (2004).*** The Comprehensive Aphasia Test evaluates a wide range of language functions. It also screens for related neuropsychological deficits (which may be important during the assessment process, in planning treatment and predicting outcome).The CAT consists of 34 subtests divided into three parts: the Cognitive screen, the Language Battery, and the Disability Questionnaire.

The first two sections are designed to be used as the initial formal language assessment that the clinician would

administer once the person with aphasia is medically stable (usually within 3 to 6 weeks of having their stroke), and then to be repeated throughout the course of that person's recovery if appropriate. Care and thought need to be exercised when considering the timing and appropriateness of administration with regard to the final section, the Disability Questionnaire (DQ). The use of the DQ may well not be relevant in the early stages of aphasia.

The Disability Questionnaire enables clinicians to begin to examine the effect of the impairment on the individual's life from the perspective of the person who has aphasia. It enables the clinician to put the abilities and disabilities caused by aphasia into the context of the person's everyday life, thereby guiding where intervention should be focused. ***Pound et al. (2000)*** commented that evaluation of the impact of aphasia on individual's life is crucial. They stress that impairment-based intervention is still of considerable value within the domain of aphasia therapy.

The CAT is clinically useful, as a number of different features have been structured to make the CAT as useful and efficient as possible ***(Swinburn et al., 2004):***

1- ***It is relatively brief.*** The whole test is usually completed in 60 minutes.

2- ***It is maximally informative***. Each subtest is constructed on the basis of contemporary knowledge of factors that affect aphasic performance in that task.

3- ***IT assesses change over time***. The clinician can use the information of the assessment of the patient over the year to predict the aphasia recovery.

4- ***IT is simple to score***.

The CAT is well constructed. The scores of the CAT are based on a large standardization sample of 266 test results, from unselected English-speaking language people with aphasia. Reliability of the test is provided by test-retest reliability in people with chronic aphasia and by inter-tester reliability. Validity of the CAT was investigated using factor analysis and cluster analysis on the scores for the individual subtests.

The CAT is not exactly suitable to be applied on Arabic-speaking language patients. It should be remembered that cultural and regional difference must be taken into account when using a test that has been standardized in another country with a different language ***(Spreen and Risser, 2003).*** Therefore, the test will be translated into Arabic and some subtests will be modified to be culturally suitable for our environment and to avoid the basic differences in the grammatical structure in the two languages. Standardization and application of the CAT on Arabic-speaking patients will be helpful in diagnosis of impairment and impairment-based treatment planning.

Aim of the Work

The aim of this work is to modify and standardize the Comprehensive Aphasia Test (CAT) according to Arabic-speaking dysphasic patients in order to provide a thorough assessment of dysphasia and to target intervention towards the disability associated with dysphasia.

Language Impairments in Dysphasia

Language has three highly interrelated and integrated components: cognitive, linguistic, and pragmatic ***(Muma, 1978)*** (Figure 1). The **cognitive** component refers to the manner in which individuals acquire Knowledge about the world and in which they continue to process this knowledge. It refers to all the processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used ***(Neisser, 1967).*** Through the use of cognitive processes we achieve knowledge and command of our world; that is we process information and use it to influence people and events in our environment. High-level cognitive processing cognitive activities such as planning and organizing are governed by the executive function system ***(Hillis, 2005).***

The **linguistic** component refers to language form and content. Language form consists of three rule systems that dictate the structure of an utterance in order to convey meaning: phonology, morphology, and syntax. Language content, or semantics, is the meaning, topic, or subject matter involved in an utterance ***(Plante and Beeson, 2004).***

The **pragmatic** component refers to the system of rules and knowledge that guides the use of language in social settings ***(Bates, 1976).*** It also refers to the use, function, or purpose that a particular utterance serves.

Within this model of language, aphasia is defined as an acquired impairment in language production, comprehension, or cognitive processes that underlie language. Aphasia is secondary to brain damage and most frequently caused by stroke ***(LaPointe, 2005).*** It is characterized by a reduction or impairment in the ability to access language form or structure, language content or meaning, language use or function, and the cognitive processes that underlie and interact with language such as attention, memory, and thinking ***(Murray and Chapey, 2001).***

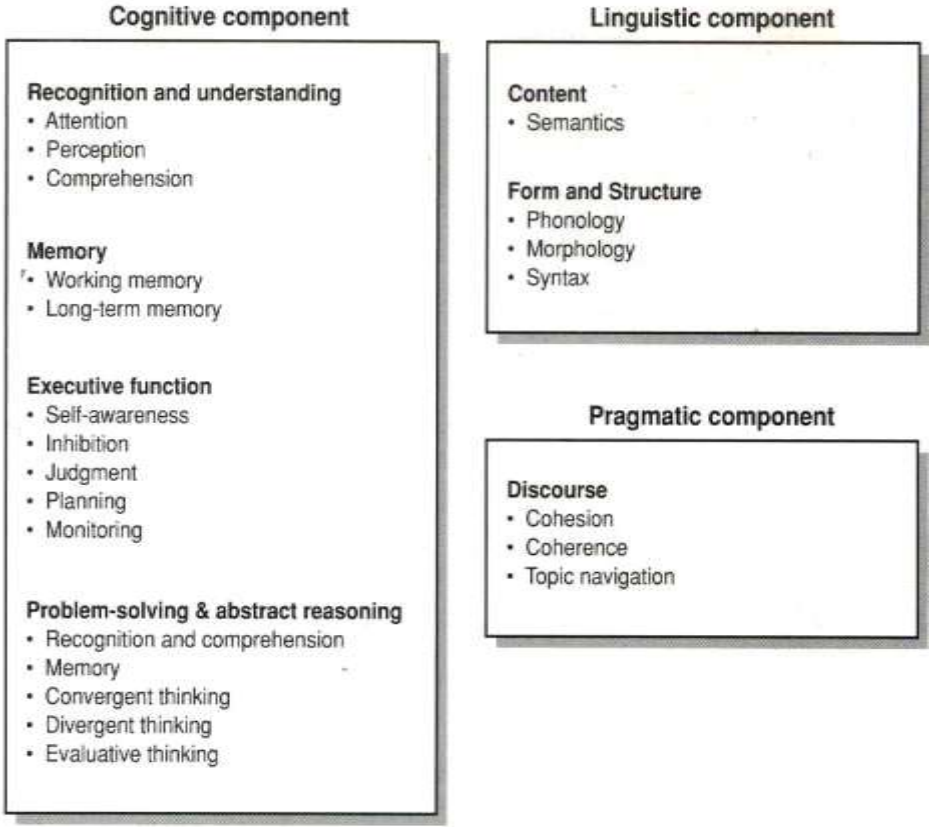

Figure (1): Language components ***(Modified from Murray and Chapey, 2001).***

Enumeration of the Impairments

A century of intensive analysis of aphasic symptoms has produced considerable agreement to the component impairments, some of which may appear in a nearly pure form, or may stand out by their severity on a background of milder impairment in the remaining language skills ***(Goodglass and Kaplan, 1972).***

Aphasic patients produce a wide range of errors in linguistic tasks. These errors have been of interest to language researchers because they provide a relatively unique window into the contents of information processing and serve as detailed constraints on theories of the normal language system. The impairments of dysphasia are summarized as following: ***(Eisenson, 1984: Chapey, 2008)***

I-Impairments in Language Expression

1-Perseveration

One type of aphasic error that is particularly interesting in this regard is the **perseveration** ***(Albert and Sandson, 1986).*** Perseveration refers to the inappropriate repetition or continuation of a previous response when a different response is expected ***(Gotts et al., 2002: Santo Pietro and Rigrodsky, 1982).*** For example, in a picture naming task an aphasic patient who correctly provided the response "dog" to a picture of a dog, might provide the same response several trials later to the picture of a horse. There is an increasing amount of research on

perseverative errors produced by aphasics suggesting that these errors are a direct result of the underlying language processing impairment ***(Moses et al., 2004).*** This leads to weakening the activation for the target word and making it more likely for previous targets to be reactivated. The perseveration of the whole word reflects the participant's breakdown at the lexical semantic level of processing, while the perseveration of phonemes reflects the breakdown at a phonological or segmental level of processing ***(Cohen and Dehaene, 1998).***

Studies of perseveration in aphasia have yielded a number of general characteristics. Perhaps the most striking of these is that a previous response may be provided again after a number of intervening stimuli or responses ***(Martin et al., 1998).*** The often delayed nature of these perseverations has led some researchers to refer to them as recurrent, distinguishing them from types that appear to be an extension or continuation of the immediately preceding response ***(Sandson and Albert, 1987).*** Recurrent perseverations may be on whole words, part words or even parts of drawings, sometimes occurring as a blend of a previous response and the current target ***(Gotts et al., 2002).*** Individual aphasic patients may perseverate on more than one task, although some patients appear to perseverate only on certain tasks ***(Papagno and Basso, 1996).***

2-Paraphasia

Critchley (1970) defined paraphasia as "the evocation of an inappropriate sound in place of a desired sound or phrase". It

is often assumed that the predominant type of paraphasic error produced by a dysphasic speaker transparently reflects the nature of that speaker's underlying impairment ***(Laine et al., 1992; Lambon Ralph et al., 2000).***

Paraphasia is considered to be any error of commission modifying the individual word (sound and morpheme substitution) which is known as *phonemic paraphasia* or of word substitution in the spoken or written production of a speaker or writer known as *semantic paraphasia* ***(Eisenson, 1984).***

Luria has tried to correlate abnormal neurological processing with paraphasic behaviour. Luria's "neurodynamic" model ***(Luria, 1972)*** is based on deranged neurodynamics. It focuses on normal and abnormal states of the cortex. During normal states of the cortex, mechanisms obey certain "rules of force" where strong or important stimuli evoke strong reactions, and where weak or unimportant stimuli evoke weak reactions. This has been referred to by Luria as the "law of strength." Under normal cortical conditions the organism is freely able to focus on and attend to target behaviours and to select from among similar behaviours.

Abnormal or pathological states of the cortex bring about changes in these neurodynamic forces; Luria refers to these deranged states as the "inhibitory phase." During pathological cortical states, strong or important stimuli evoke reactions of

the same strength as weak or unimportant ones. This state is also referred to as the "phase of equalization," since strong and weak stimuli evoke reactions of equal strength. An even more abnormal state the "paradoxical" state is characterized by a complete reversal of the "rules of force." Here, weak and unimportant stimuli begin to evoke stronger reactions than the strong or important ones.

Secondary to pathological damage one of two things may happen. If the cortex is in the phase of equalization, word-finding blocks will occur. On the other hand, if the cortex is in the "paradoxical" state, where the rules of force are exactly reversed, the "inadequate connections" give rise to paraphasias that resemble the target word either semantically or phonologically.

Caramazza and Hillis (1990) suggested that production errors including semantic and phonemic paraphasias depend on the nature and severity of dysfunction of the lexical phonologic output processing. Some individuals may have greater difficulty activating the output representations leading to semantic errors. Others may have a disturbance affecting the internal structure of representations resulting in phonemic paraphasias.

Gordon (2007) supports the hypothesis that a high incidence of phonological paraphasias is indicative of an underlying impairment in phonological encoding. However, the

distribution of semantic errors suggests that these errors are influenced by factors at the level of semantic retrieval.

3- Neologisms

When a speaker uses a neologism, he has literally "invented" a new word. Neologisms may be regarded as a form of paraphasia in which an expected (conventional) word is replaced by a new one, the meaning of which is not apparent in the utterance. There has been some overlap between phonemic paraphasia and neologism ***(Butterworth, 1979).*** It has been suggested that neologisms may be simply a severe result of breakdown which produces phonemic paraphasias, the neologism representing a modification of more than 50% of the target word. Neologisms may comprise combination of words or of morphemes that do indicate intent and meaning. Thus the word *"spork"* may be evoked for *spoon* and *fork*. However, neologisms may arise as a result of a process of association between the appropriate word and other parameters of the word. Thus the word *flower* may evoke *flose* as a contamination of *flour* (a homonym and a phonetic association), and *rose*, a semantic association ***(Eisenson, 1984).***

4-Jargon

Critchley (1970) defines jargon aphasia as "a type of speech impairment whereby the patient emits a profusion of utterance most of which is incomprehensible to the hearer, though perhaps not to the speaker."

There are essentially three kinds of jargon: semantic jargon, neologistic jargon, and phonemic jargon, the distinction among them resting largely on a difference in the predominant type of deviance found in the jargon ***(Perecman, 1989)***:

1. Semantic Jargon: is jargon characterized by semantic anomaly where there is a high proportion of semantic and unrelated verbal paraphasias.
2. Neologistic Jargon: is characterized by the prominence of neologistic utterances ***(Buckingham, 1987).*** It is to be distinguished from the unintelligible sequences that result from dysarthric distortion. Neologistic jargon tend to selectively replace nouns, verbs, and adjectives, leaving syntactic affixes and functions words (as but, and, the...etc.) intact.
3. Phonemic Jargon: These are rare cases in which speech is virtually 100% meaningless. It seems important to distinguish between neologistic jargon and phonemic jargon primarily on the basis of the fact that phonemic jargon pervades speech indiscriminately, affecting affixes and function words, while neologistic jargon leaves affixes and function words intact. Thus, in phonemic jargon, the meaning-bearing function of speech is entirely absent, and few if any recognizable words can be identified.