



NEURO-COGNITIVE PROFILE OF APHASIA

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INTRODUCTION:

Language plays an important role to communicate with other human beings. It is a powerful development tool for learning and an aid to understanding. Language is a vehicle for educational development and is important for apprehension and acquisition of knowledge (Hillman, D. C, 1999). Language is also embedded in cognition. Many neurobiological and computational processes are involved in language processing. Expression requires motor cortical areas, basal ganglia and cerebellum. Language comprehension is carried by several language sub systems such as phonological, semantic syntactic sub systems and is supported by memory and attentional processes (Hickok & Poeppel, 2004). Aphasia is an acquired language deficit which occurs due to brain damage (Code & Petheram, 2011).

i) Concept:

Aphasia is an acquired language disorder in cognitive and communication skills (Drummond 2006). It includes problems of comprehending spoken language, expressing language or both (ASHA, 2014). Actually, it is originated from the Greek word "aphatos" which means speechless, etymologically, it means cognition-communication deficit related to damage involving the left hemisphere of the brain (ASHA, 2005). LaPointe (2005) states that aphasia is distinctly an acquired disorder that can be caused by a Cerebro Vascular Accident (CVA or stroke), Traumatic Brain Injury (TB), or a brain tumor. Another possible cause is neurodegenerative diseases such as Alzheimer's disease, or Parkinson's disease. These diseases give deficit in specific language functions such as memory, reasoning, and judgment.

ii) Types of Aphasia:

There are seven types of aphasia namely; 1) Broca's aphasia, 2) Wernicke's aphasia, 3) Conduction aphasia, 4) Anomic aphasia, 5) Global aphasia, 6) Transcortical motor aphasia and 7) Transcortical sensory aphasia. Some other related aphasias are: i) Anomia, ii) Acalculia and iii) Agraphia (ASHA, 2014).

i) *Broca's aphasia*: Broca's aphasia is characterized by deficit in language production. In this, languages production is not fluent. Individual with Broca's aphasia use only keyword, they express nouns in singular verbs in participle. Individual with Broca's aphasia often eliminates articles, adjectives and the adverbs altogether.

ii) *Wernicke's aphasia*: Wernicke's aphasia is characterized by deficit in comprehension. Sometimes, individuals with wernicke's aphasia may use wrong word or are wrong combination of words (paraphasia), but speech is fluent, language has normal rhythm and melody. Sometimes, they make new words (neologisms), it means neologistic or word paraphasia distortions mostly occurred in Wernicke's aphasia.

iii) *Conduction aphasia*: It was predicted by Wernicke. Lesions in arcuate fasciculus give conduction aphasia. Arcuate fasciculus runs in the white matter and connects Wernicke's as well as Broca's areas. Conduction aphasia is having certain characteristics which are consistent with this separation of Broca's and Wernicke's area. Here, naming is severely impaired. Reading aloud is abnormal. Writing may also be disturbed. Spelling is very poor.

iv) *Anomic aphasia*: In Anomic aphasia, the only disturbance is a difficulty in finding the correct words. This is an unusual form of aphasia that follows lesions in the posterior aspect of the left inferior temporal lobe. Individual with a Anomic aphasia has defect in the right superior quadrant visual field.

v) *Global aphasia*: Individual with Global aphasia is unable to speak or comprehend language; they cannot read, write, repeat or name objects. It includes deficit in Broca's area, Wernicke's area and the arcuate fasciculus.

vi) *Transcortical motor aphasia*: It gives rise to a non-fluent aphasia in

which the individual cannot produce creative speech. Individual with Transcortical aphasia will attempt conversation but can utter only a few syllables.

vii) *Transcortical sensory aphasia*: It gives rise to fluent aphasia with defective comprehension, defective thinking or remembering the meaning of words.

Anomia is also associated with aphasia. It is characterized by problems recalling words, names and numbers. Individual with an Anomic aphasia is knows what to do with an object, but still not be able to give a name to the object. There are three type s of Anomia namely – (1) Word selection anomia, (2) Semantic anomia and (3) Disconnection anomia. Individual having more word selection anomia, knows how to use an object, but cannot name the object. For example, individual with word selection anomia can distinguish between colors but cannot identify them by naming the object. An individual semantic anomia has naming deficit which is accompanied by a recognition deficit. Disconnection anomia may exhibit modality-specific anomia, where the anomia is limited to a specific sensory modality, such as hearing. Agraphia includes severe form of writing deficits and Acalculia includes severe form of inability in doing calculations.

iii) Symptoms of Aphasia:

The symptoms of aphasia are not the same in every case. They occur in an unique patterns and cluster. Individual with aphasia has deficit in four language modalities namely; i) auditory comprehension, ii) reading comprehension, iii) verbal expression, and iv) written language. Auditory comprehension deficits consist of difficulties such as understanding speech, providing inaccurate answers to "yes/no questions, inability to understand complex grammar, and not being aware of their errors. Reading comprehension deficits include difficulty in comprehending written information, difficulty in identifying words by sight, replacing associated words for the word itself, and difficulty in reading function words (e.g., to, from or the). Verbal expression deficits include communicating in fragmented phrases, difficulty in finding words, talking with single words, putting words in the wrong order. Written language deficits include difficulty in writing run-on sentences, and writing sentence with correct grammar, or copying letters, words, and sentences systematically.

Aphasia symptoms are not limited to the speech and language, but also in areas that affect quality of life. Those with aphasia are unable to develop social and personal relationships because these relationships are dependent on the ability to communicate. Depression is the psychological symptom of aphasia (Samo, 2004; ASHA, 2014). A person with aphasia may also have difficulty with tasks such as traffic signals. Townend et al (2007) have listed some of the general characteristics of aphasia such as: i) Lack of understanding, ii) Lack of producing spoken languages (e.g., conversations) and 3) Reading & writing problems. Finally, aphasia seems to have direct impact on personal relationships, employment, and social rehabilitation.

iv) Causes of Aphasia:

Greener et al (2008) reports that 1/3rd of people left with communication disorder (aphasia) following stroke. Greener et al (2008), Backheit et al (2007), Van der Gaag (2005), RCSLT (2008) reports that aphasia is caused by damage to an area of brain responsible for language. Speakability (2000) listed out that statistically 85% of people with aphasia have suffered from stroke. At all events, the main causes for Aphasia are:

1. Stroke
2. Head/Brain injury
3. Brain tumor
4. Neurosurgery
5. Brain infection (encephalitis)
6. Neurological diseases (e.g. Alzheimer's disease, Parkinson's disease, multiple sclerosis).

7. Drug misuse
8. Dementia
9. Migraine

The stroke association (2008) depicts that stroke is the common cause of aphasia and it is associated with family history, heart disease, life style, presence of obesity, diabetes and high blood pressure. Life style issues include high cholesterol, smoking, heavy drinking and fatty diet.

v) Assessment, Treatment and Intervention of Aphasia:

1) Assessment:

If signs and symptoms of aphasia are identified after a screening is done, the SLP (Language Speech Pathologist) is responsible for performing a more comprehensive assessment of the individual. His or her accountability is to analyze the receptive and expressive abilities within the four modalities of language, which are speaking, listening, reading, and writing (Elbaum & Benson, 2007). There are several steps performed in a typical assessment of aphasia (ASHA, 2014). The SLP will review the case history and learn about the medical status, education level, and occupation of the individual.

2) Treatment:

Treatment varies among people with aphasia depending on their specific language deficits. Treatment programs may be developed based on the type of aphasia that the individual is diagnosed with, or treatment may be centered on the primary signs and symptoms exhibited by aphasics. Treatment includes: a) Language deficit-based treatment b) Activities/Participation Based Treatment. Language deficit-based treatment helps to adjust features of the language impairment. This approach attempts to restore language and modify the impairments themselves (Byng, Pound, & Parr 2000). Some main types of impairment-based therapies include: computer based treatment, *Constraint Induced Language Therapy* (CILT), *Melodic Intonation Therapy* (MIT), reading treatment, syntax treatment, treatment of underlying forms, verb network strengthening treatment, word finding treatment, and writing treatment (ASHA, 2014).

Computer-based therapy can be beneficial in treating attention, concentration, visual localization, visual scanning, visual tracking, reaction time, memory, hand-eye coordination, and specific cognitive tasks (Adamovich, 2005). *Melodic intonation therapy* (MIT) is a treatment method that takes advantage of the musical abilities of the right hemisphere of the brain. This type of therapy is best known for the rehabilitation of nonfluent aphasics who demonstrate deficits in verbal output (Basso, 2003). *Reading treatment* is designed to improve the ability to decode and comprehend written language (ASHA, 2014). It is a belief that repetition of oral reading will initiate quick and automatic comprehension of written text. Syntax treatment focuses primarily on improving grammatical deficits in spoken utterances (ASHA, 2014). *Treatment of Underlying Forms* (TUF) is a treatment method that builds on complicated sentence forms. This tactic, based on linguistic theory, is intended to develop sentence production in aphasics with agrammatism (ASHA, 2014). *Verb Network Strengthening Treatment* (VNeST) is focused on improving the ability to understand and produce meaningful speech. This treatment has a goal of increasing retrieval content words when producing sentences (Edmonds, Nadeau, & Kiran, 2009). There are different types of *word finding treatments*, including word retrieval cueing strategies, gestural facilitation of naming, response elaboration training, and semantic feature analysis treatment (ASHA, 2014). *Writing treatment* is a program aimed at improving expressive language skills through the use of written language (ASHA, 2014).

Activities/Participation Based Treatment includes Multimodal Treatment, Partner Approaches, Pragmatic Treatment, Reciprocal scaffolding, and Script training. Intervention that targets activities and participation has been shown to greatly to improve the quality of life of many individuals who have aphasia. *Multimodal treatment* focuses on using alternative forms of communication in an effective and efficient way. As indicated by ASHA (2014), multimodal treatment can include *Augmentative and Alternative Communication* (AAC), visual action therapy, *Promoting Aphasics' Communication Effectiveness* (PACE), and *Oral Reading for Language in Aphasia* (ORLA). *Partner approaches* include conversational coaching, *Supported Communication Intervention* (SCI), and social and life participation effectiveness (ASHA, 2014). *Pragmatics* are the rules that regulate how we use language when communicating with others. This includes using language to comment, request, warn or acknowledge in conversation. This area of communication involves using both linguistic and non-linguistic strategies to start and continue a conversation, and to take turns speaking while having good-eye contact and facial expressions that are appropriate within the context of communication (Wright & Newhoff, 2005). *Reciprocal scaffolding* is a treatment approach that facilitates interactive and natural communication between the aphasic and their

communication partner. Script training is a treatment in which people with aphasia rehearse a personalized dialogue or monologue script until it becomes automatic, allowing aphasics to communicate about a topic they are interested in (ASHA, 2014).

Treatment efficacy depends on many factors, aside from the treatment itself. Research has shown that the effectiveness of therapy is based on the quantity and intensity of therapy (Basso et al., 2011). The above treatments are most often provided by SLPs with the primary purpose of recovering speech and language abilities. However, aphasia treatment is not exclusively designed for the rehabilitation of the language modalities. Complications from acquired brain injuries are multifaceted, thus the knowledge and skills of several professionals from different disciplines are necessary to maximize positive outcomes in aphasics (Joint Committee, 2007). SLPs must be aware of their responsibilities on an interdisciplinary team in order to focus on the recovery of language abilities in aphasics.

3) Intervention:

Specifically for aphasia, the basic goal of intervention is to improve a person's ability to communicate (NIDCD, 2008). Intervention for aphasia treatment should begin as soon as possible because the most positive changes can occur early after the onset of aphasia (ASHA, 2011).

- 1) *Counseling*: The SLPs responsibilities extend beyond treatment directly through language therapy. Counseling in these situations would focus more on instilling acceptance of the disorder and fostering realistic and positive expectations (Holland, 2007). Counseling is meant to assist individuals and to decide on appropriate goals that take advantage of strengths and address weaknesses that affect communication. Counseling is also intended to help individuals learn to change and adapt to their environment in order to effectively communicate.
- 2) *Collaboration & Management*: The SLP is responsible for collaborating effectively to develop and apply strategies of assessment and intervention. Case management and collaboration skills also include the ability to manage the use of resources sensibly based on the long-term or immediate needs of aphasics, and their family members or caretakers. Collaboration is a key aspect of assessing cognitive impairments and planning for rehabilitation (ASHA, 2003).
- 3) *Education*: Proper education can help aphasia individuals break down barriers of communication (Toner & Shadden, 2002). Information must be conveyed to aphasics in a way that they can understand; education should be personalized so that can comprehend their disorder and the options they have in treatment and other rehabilitation services (Cameron, 2013).
- 4) *Advocacy*: Advocacy for these aphasics can be done at the local, state and national levels (Elman, R.J., Ogar, & Elman, S. H., 2000).

It is very important for professionals in the field of Education, Psychology, Linguistics, Language Education, Medicine and Nursing to raise awareness, to cultivate positive expected behaviours and reducing psychosocial isolation among individuals with aphasia.

Relevance of Aphasia:

Primary Education is a basic foundation for language acquisition and learning. The main objective of the primary education is to achieve 3R's (reading, writing and arithmetic) among primary school children. Language is an effective tool to attain not only reading and writing skills but also speaking skills. The quality of primary education is also reflected on language learning skills through effective curriculum. Curriculum for primary education should focus on learning by doing for attaining language skills. There is research evident that many of the children at school level have been suffering from language deficits. Some of the children have language expression deficits and some of them have language comprehension deficits. Hence, it is necessary for primary teachers to know about language deficit which is known as aphasia. And teachers have to identify children with aphasia and provide necessary intervention for those children to achieve success academically as well as socially. Teachers have to follow suitable teaching strategies for children with aphasia for their motor, cognitive and social development. At all events, primary school teachers have to cultivate conscious behaviour on aphasia. Subsequently, they have to frame desirable perceptual behaviour on aphasia so that they can provide appropriate teaching-learning activities to various types of aphasics.

There has been an increase in the interest of aphasia by many fields such as neuropsychology, neuro-linguistics and speech-language pathology (Tesak & Code, 2008). Tabi (2012) has reported that aphasia is described as missing speech. It is common especially amongst elderly people due to some age related factors. Person with aphasia has lots of communication difficulties. Hillis (2007) states that classification of aphasia has shifted from primarily describing

impaired language skills to describing the impaired cognitive functions in language processing. Parr (2007) reveals that individual with aphasia cannot work very effectively. Aphasic individual may lose self-worth and develop tension. Simmons Mackie and Damasio (2007) add that the people with aphasia face exclusion from full participation in conversation, obtaining information and making life decisions. People with aphasia may not be able to control their own environment. The term aphasia has been the subject of much debate (Drummond, 2006). Aphasia is a cognition-communication deficit. It can impair both communication and cognition (ASHA, 2005). Aphasia can also create vulnerability within the individual. Bakheit et al (2007) emphasizes that individual with aphasia has inability to communicate freely and frankly with others, inability to express and receive what they want and like. Sometimes, they have inability to learn things systematically. Tabi (2012) has reported that aphasia is a common situation where speech is lost and can affect any one either through stroke or brain injury. Engelter et al (2006) and Yavuzer et al (2001) reported that stroke was the most common cause of aphasia. Damasio (1992) adds that aphasia affects the mental processes involved in converting thought to language and thought to translation of grammar and symbols that are heard or read. It affects ability to reason, make decisions and be creative.

Edwards (2005) classified aphasia as fluent and nonfluent. Fluent aphasia is characterized by speech that is produced with a normal speaking rate and without hesitations, but does not convey meaning. Nonfluent aphasia is characterized by speech that has a slow rate, reduced phrase length, dysprosody (abnormal rhythm of speech), and in which speakers have increased effort when communicating (Kearns, 2005). Fluent types of aphasia include Wernicke's, conduction, anomic, subcortical and transcortical sensory aphasia. Nonfluent types of aphasia include Broca's, transcortical motor, mixed transcortical, and global aphasia. Two other types of aphasia viz., crossed, and primary progressive aphasia are not classified as either fluent or nonfluent.

A person with Wernicke's aphasia often produces nonsensical sentences although retains sentence structure (ASHA, 2007). Another characteristic of Wernicke's aphasia is fluent but paraphasic speeches by adding extra syllables or words. Wernicke's aphasics are also unaware that they are making errors in their expressive language (Caspari, 2005). Conduction aphasia is another type of fluent aphasia that primarily has deficit in ability to repeat phrases. People with this type of aphasia are able to frequently recognize their speech errors, but are unable to correct these errors (Simmons-Mackie, 2005). This type of aphasia has been related to damage within the posterior language areas (Kearns, 2005). Anomic Aphasia is a very mild form of fluent aphasia. Anomic aphasics have difficulties in word finding and word recognition (ASHA, 2007a). Although naming is disordered, but fluency, comprehension, and repetition remain relatively unimpaired. Reading and writing are only mildly affected (Kearns, 2005).

Subcortical aphasia is characterized by the subcortical location of brain damage that has resulted in aphasia. Subcortical lesions mostly occur in the thalamus and basal ganglia; these subcortical areas of the brain function to send and receive input and regulate both sensory and motor abilities (Herero, Barcia, Navarro, 2002). With the ability to use computed tomography and magnetic resonance imaging in clinical practice, it has been easier to study the language impairments and the related damage to subcortical regions of the brain (Herrero et al., 2002). There have been three types of subcortical syndromes identified: striato-capsular aphasia, thalamic aphasia, and aphasia associated with white matter disease (Rosa, Canini, Borsa, Marien, Cappa, & Abutalebi, 2014). However, these sub-categories are not easy to identify because they have no specific symptom clusters to differentiate between the syndromes (Herrero et al., 2002). In general, subcortical aphasia preserves repetition, but results in hypophonia, a reduction in voice volume. Speech is fluent but limited and the individual's writing and word finding abilities are impaired. Oral and written comprehension remains intact, and individuals are still able to read aloud (Rosa et al., 2014).

Transcortical sensory aphasia is classified as fluent; although individuals' may have impaired auditory comprehension, their repetition skills have stayed intact (Spren & Risser, 2003). It includes may frequently use filler words and circumlocutions. Most studies on transcortical mixed aphasia describe the disorder as having fluent but irrelevant spontaneous speech due to verbal para phasias (Berthier, 1999). The individual's ability to accurately repeat words and phrases does not compensate for the comprehension deficits of transcortical aphasia. In transcortical sensory aphasia, brain damage involves the deep posterior parietal or occipito-temporal region (Drummond, 2006).

Broca's aphasia signifies with difficulty in producing sentences and it is nonfluent aphasia. This type of aphasia is caused by damage in the anterior portion of the left hemisphere of the brain (ASHA, 2007a). Due to Broca's aphasia, understanding grammar becomes a problem among the individuals. Due to syntax deficits, comprehension is mild to moderately impaired. Kearns (2005) adds that people suffering from Broca's aphasia are typically able to use content words like nouns, verbs, and adverbs in their speech, but leave out grammatical morphemes and function words such as articles, conjunctions, pronouns, auxiliary verbs, and prepositions. Auditory comprehension, reading comprehension and writing is disordered.

Transcortical motor aphasia is also a nonfluent type of aphasia similar to Broca's

aphasia. As with transcortical sensory aphasia, answering spontaneous questions is difficult for these patients, but their repetition abilities are still intact. The main difference between sensory and motor transcortical aphasia is that auditory comprehension skills are relatively unimpaired in transcortical motor. Verbal and written output, outside of repetition, shows reduced quantity, variety, and elaboration of speech (ASHA, 2007a). People with transcortical motor aphasia also lack the motor precision needed to properly execute verbalizations (Hollingsworth, Rothi, & Cimino-Knight, 2005).

Mixed transcortical aphasia is a combination of both motor and sensory transcortical aphasia. Severe impairments are present in reception and expression, but people with this type of aphasia will have strong repetition skills (ASHA, 2007a). Mixed transcortical aphasia has been characterized by deficient auditory comprehension, reduced amount of verbal expression (Hollingsworth et al., 2005). People with mixed transcortical aphasia are typically unable to spontaneously produce speech, and are often incapable of naming objects (Hollingsworth et al., 2005).

Global aphasia is another type of nonfluent aphasia that damages both expressive and receptive communication. This is usually due to a large left hemisphere lesion (ASHA, 2007a). Because this type of aphasia is so severe, there is no distinctive pattern of preserved language components in comparison to impaired language components (Goodglass & Kaplan, 1983). People with global aphasia may appear to have fairly good auditory comprehension when answering yes or no questions about family members. It has also been found that global aphasics have a surprising ability to locate geographic places and understand place names (Goodglass & Kaplan, 1983). However, people with this type of aphasia have severe deficits across all aspects of language and none of the communicative modalities are preserved (Collins 2005). Other symptoms experienced by people with global aphasia include difficulties with non-verbal problem solving and oral verbal, gestural apraxia (Collins, 2005).

Crossed Aphasia and Primary Progressive Aphasia are unclassified aphasias. Crossed aphasia is a disorder characterized by the unexpected presence of aphasia following a lesion in the right hemisphere of the brain in an individual who is right-handed. Every major syndrome of aphasia has occurred as a result of crossed aphasia (Coppens & Hungerford, 1998). Primary progressive aphasia (PPA) is characterized by the gradual decline of language function with unaffected cognitive abilities for a period of time. The condition must persist for at least two years in order to acquire a diagnosis of PPA. This type of aphasia is classified as a focal dementia that causes a gradual loss of language (ASHA, 2007a). Memory, visual processing, and personality are preserved until the progressive stages of the syndrome that occur as the disorder persists. Symptoms of PPA begin with problems in word finding, and progress to deficits in grammar and comprehension. PPA can be described as an unusual form of dementia; memory functions remain undisturbed even as language gradually deteriorates (Mesulam, 2003).

Abha Gupta and Gaurav Singhat (2011) have reported that Broca's aphasia is related to non-fluent telegraphic speech. Wernicke's aphasia is related to jargon speech. Conduction aphasia is related to repetition deficit. Nominal aphasia is related to deficit word-finding and naming. Global aphasia is related to severe impairment in all modalities. Transcortical aphasia is similar to motor aphasia but with intact repetition. Transcortical sensory aphasia is similar to sensory aphasia, but with intact repetition. Perkill (2012) views conduction aphasia as disorder of repetition.

Aphasia assessment is to be conducted culturally and linguistically relevant to language and communication (ASHA, 2014). Parr (2007) suggests that family, friends and other services should be considered within the therapy process of aphasia. NIDCD (2008) tells that family involvement is a crucial component of aphasia treatment in order to learn how to adopt communication and how to support a person in treatment. NIDCD (2008) tells that aphasia therapy helps in minimizing disability by following alternative means of communication. Aphasia therapy develops social skills and confidence, promotes independence and decision making and also social integration. It also reduces social isolation and maximizes sense of well being and quality of life. Goofrey and Douglass (1959) have diagnosed in relation to individuals between predominantly expressive aphasia, predominantly receptive aphasia, mixed aphasia and the global aphasia. They have reported that spontaneous recovery as a physiological process without psycho-social influence is useful for these individuals. Applying therapeutic strategy is also important for aphasic individuals. Intervention for aphasia should be connected to counseling, collaboration & management, education and advocacy (ASHA, 2014).

CONCLUSION:

Language is a vehicle of thoughts, ideas, emotions and actions. It is the most sophisticated and versatile means available to humans for communicating. Language acquisition is very essential for academic achievement, pleasing personality, socialization, emotional stability and even for cognitive growth also. By having cognitive potentiality about aphasia, its characteristics, causes, assessment, treatment and intervention, teachers can be aware of their roles and responsibilities in order to focus on the recovery of language deficits among children with aphasia. Basically, primary teachers have to get clear notion of aphasia to deal

with the aphasic students at primary level. They should be able to guide and help the students so that they do not exclude themselves from their surroundings and go through depression. Many researches have been conducted on aphasia in abroad, but it is a recent area for research in the field of Education in India. Primary school teachers must cultivate and promote conscious and perceptual behaviours on aphasia.

REFERENCES:

- Adamovich, B.L.B. (2005). Traumatic brain injury. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders* (225-226). New York, NY: Thieme Medical Publishers, Inc.
- Alfredo Ardila (2014). *Aphasia Handbook*. Department of Communication Sciences and Disorders Florida International University Miami, Florida, USA.
- American Speech-Language-Hearing Association (1988). Prevention of communication disorders [Position Statement].
- American Speech-Language-Hearing Association.(2003). Rehabilitation of children and adults with cognitive-communication disorders after brain injury [Technical Report]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association.(2004). Preferred Practice Patterns for the profession of speech-language pathology [preferred practice patterns]. Retrieved from www.asha.org/policy.
- American Speech-Language-Hearing Association.(2005a). Knowledge and skills needed by speech-language pathologists providing services to individuals with cognitive communication disorders [knowledge and Skills]. Retrieved from www.asha.org/policy.
- American Speech-Language-Hearing Association.(2005b). Roles of Speech-language pathologists in the identification, diagnosis, and treatment of individuals with cognitive-communication disorders: position statement [Position Statement]. Retrieved from www.asha.org/policy.
- American Speech-Language-Hearing Association.(2007). Appendix: Common classifications of aphasia. Retrieved from <http://www.asha.org/practice-portal/Clinical-Topics/Aphasia>.
- American Speech-Language-Hearing Association.(2007b). Scope of practice in speech language pathology [Scope of Practice]. Retrieved from www.asha.org/policy.
- American Speech-Language-Hearing Association.(2010). Code of ethics [Ethics]. Retrieved from www.asha.org/policy.
- American Speech-Language-Hearing Association. (2011). Speech-Language- Language pathology medical review guidelines. Retrieved from www.asha.org/practice/reimbursement/SLP-medical-review-guidelines/.
- American Speech-Language-Hearing Association. (2014). Clinical topics: Aphasia. Retrieved from <http://www.asha.org/practice-Portal/Clinical-Topics/aphasia/>.
- Abha Guta, Gaurav Singhal. (2011). Understanding Aphasia in a Simplified Manner. *JCM* 12(1):32-7.
- Basso, A.(2003). *Aphasia and its therapy*. New York, NY: Oxford University press Inc.
- Bakheit, A.M.O, Shaw, S, Barrett, L, Wood, J, Carrington, S., Griffiths, S., Searle K., Koutsi F. (2007) A prospective, randomized, parallel group, controlled study of the effect of intensity of speech and language therapy on early recovery from post stroke aphasia. *Clinical Rehabilitation*, vol. 21, 885.
- Berthier, M.L. (1999). *Transcortical aphasias*. East Sussex, UK: Psychology Press.
- Byng, S., Pound, C., & Parr, S. (2000). Living with aphasia: A framework for therapy interventions. In I. Papathanassiou (Ed.), *Acquired neurogenic communication disorders: A clinical perspective* (49-75). Philadelphia, PA: Whurr Publishers Ltd.
- Caramazza, A., and Zurif, E.B. (1976) Dissociation of algorithmic and heuristic processes in language comprehension: Evidence from aphasia. *Brain and Language*, Vol. 3, 572-82.
- Caramazza, A and Berndt R.S. (1978). Semantic and Syntactic Processes in Aphasia: A Review of the literature. *Psychological Bulletin*, Vol. 85, No. 4, 898-918.
- Caspari, I. (2005). Wernicke's aphasia. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders*, third edition (142-154). New York, NY: Thieme Medical Publishers, Inc.
- Cameron, V. (2013). Best practices for stroke patient and family education in the acute care setting: A literature review. *Medsurg Nursing*, 22(1), 51-55.
- Chatterjee, A., & Maher, L. (2000). Grammar and agrammatism. In S.E. Nadeau, L.J.G. Rothi, & B. Crosson (Eds.), *Aphasia and Language: Theory to practice* (133-156). New York, NY: The Guilford Press.
- Code, C., & Petheram, B. (2011). Delivering for aphasia. *International Journal of Speech-Language pathology*, 13 (1), 3-10.
- Collins, M. (2005). Global aphasia. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders*, third edition (186-198). New York, NY: Thieme Medical Publishers, Inc.
- Coppens, P., & Hungerford, S. (1998). Crossed aphasia. In P. Coppens, Y. Lebrun, & A. Basso, (Eds.), *Aphasia in atypical populations* (203-260). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Drummond, S.S. (2006). *Neurogenic communication disorders: Aphasia and cognitive communication disorders*. Springfield, IL: Charles C. Thomas, Publisher, LTD.
- Edmonds, L.A., Nadeau, S.E., & Kiran, S. (2009). Effect of verb network strengthening treatment (VNeST) on lexical retrieval of content words in sentences in persons with aphasia. *Aphasiology*, 23 (3), 402-424.
- Elbaum, J. & Benson, D.M. (2007). *Acquired brain injury: An integrative neurorehabilitation approach*. New York, NY: Springer.
- Elman, R.J., Ogar, J., & Elman, S.H. (2000). Aphasia: Awareness, advocacy, and activism. *Aphasiology*, 114 (5/6), 455-459.
- Emiliene Eyongakpa Tabi (2012) *Aphasia and communication - A Literature review*, Degree Thesis Human Ageing and Elderly Y Services.
- Engelter, S. T., Gostynski, M., Papa, S., Maya, F., Claudia, B., Vladeta, A.G., Felix, G., & Philippe A. L. (2006). "Epidemiology of aphasia attributable to first ischemic stroke: incidence, severity, fluency, etiology, and thrombolysis". *Stroke*, 37:1379-1384.
- Fundukian, L. (2011). Aphasia. *The Gale Encyclopedia of Medicine*, 1, 444-447. Retrieved from <http://go.galegroup.com/ps/i.do?>
- Godfrey Douglas Adamson (1898 – 1959) burial record billion Graves <http://thebillongraves.com/burial-record>.
- Goodglass, H., & Kaplan, E. (1983). *The assessment of aphasia and related disorders*. Philadelphia, PA: Lea and Febiger.
- Goodglass, H. (1993). *Understanding aphasia*. San Diego, CA: Academic Press, Inc.
- Greener, J., Enderby, P., Whurr, R. (2008). Speech and language therapy for aphasia following stroke (Review). *The Cochrane Library*, Issue 3.
- Herrero, M.T., Barcia, C., & Navarro, J.M. (2002). Functional anatomy of thalamus and basal ganglia. *Child's Nervous System*, 18 (8), 386-404.
- Hillis, A.E. (2007). Aphasia: Progress in the last quarter of a century. *Neurology*, 69 (2), 200-213.
- Hinckley, J.J. Vocational and social outcomes of adults with chronic aphasia. *Journal of Communication Disorders* 35, 543-560. 2002.
- Hickok, D Poeppl (2007) The cortical organization of speech processing. *Nature Reviews Neuro science*, - nature com.
- Holland, A.L. (2007). Counseling families and adults with speech and language disorders: The view from a wellness perspective. In M.J. Ball, & J.S. Damico, (Eds.), *Clinical aphasiology* (213-221). New York, NY: Psychology Press.
- Holland, A.L. (2008). Concentrating on the consequences. In N. Martin, C.K. Thompson, & L. Worrall (Eds.), *Aphasia rehabilitation: The impairment and its consequences* (45-62). San Diego, CA: Plural Publishing, Inc.
- Hollingsworth, A.L., Rothi, L.J.G., & Cimino-Knight, A.M. (2005) *The transcortical aphasias*. In L.L. LaPointe (Ed), *Aphasia and related neurogenic language disorders*, third edition (169-185). New York, NY: Thieme Medical Publishers, Inc.
- LaPointe, L.L. (2005). Foundations: Adaptation, accommodation, and arousal. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders* (1-18). New York, NY: Thieme Medical Publishers, Inc.
- Levin, T., Scott, B., Borders, B., Hart, K., Lee, J., & Decanini, A. (2007). Aphasia talks: Photography as a means of communication, self-expression, and empowerment in persons with aphasia. *Stroke Rehabilitation*, 22-84. Retrieved from <http://www.metapress.com/content/h4137mh37812x6t/fulltext.pdf>
- Lichteim (2015) "Speech repetition as a window on the neurobiology of auditory motor integration for speech : A voxel – based lesion symptom mapping study" - Article of Neuro psychology.
- Manescu, M. (2014). Chapter-7: Motor speech Disorders : The Dysarthrias. In introduction to neurogenic communication disorders. Burlington, MA : Jones & Barlett learning.
- McNeil, M.R., & Pratt, S.R. (2001). Defining aphasia: Some theoretical and clinical implications of operating from a formal definition. *Aphasiology*, 15 (10/11), 901-911.
- Meredith wooley (2014) Roles of speech – Language pathologists in Aphasia Therapy and Rehabilitation as Reported by practicing speech – Language pathologists published thesis, University of Mississippi, Mississippi.
- Mesulam, M.M. (2003). Primary progressive aphasia: A language-based dementia. *New England Journal of Medicine*, 349 (16), 1535-1542.
- National Institute of Deafness and other Communication Disorders. (2008). NIDCD fact sheet: Aphasia. Retrieved from <http://www.nidcd.nih.gov/health/voice/pages/aphasia>.
- Parr, S. (2007). Living with severe aphasia: Tracking social exclusion. *Aphasiology* 21[1], 98-123.
- Perkell (2012), movement goal and feed back & forward control mechanism in speech production journal of neurolinguistics,
- Pulvermuller, F., & Berthier, M.L. (2008). Aphasia therapy on a neuroscience basis. *Aphasiology*, 22 (6), 563-599.
- RCSLT (2008). Evolving role in speech language therapy.
- Rosa, P.A.D, Canini, M., Borsa, V.M., Marien, P., Cappa, S.F., & Abutalebi, J. (2014). Functional recovery in subcortical crossed and standard aphasia. *Journal of Neurolinguistics*, 27 (1), 103-118.
- Sarno, M.T. (2004). Aphasia therapies: Historical perspectives and moral imperatives. In J.F. Duchan & S. Byng (Eds.), *Challenging aphasia therapies: Broadening the discourse and extending the boundaries* (19-31). New York, NY: Psychology Press.
- Sarno, M.T. (1993). Aphasia rehabilitation: Psychosocial and ethical considerations. *Aphasiology*, 7, 321-334.
- Simmons-Mackie, N. (2005). Conduction aphasia. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders* (155-164). New York, NY: Thieme Medical Publishers, Inc.
- Speakability (2000). Accessed through : <http://www.speakability.org.uk> Spreen, O., & Risser, A.H. (2003). *Assessment of aphasia*. New York, NY: Oxford University Press, Inc.
- Steele, R.D. (1999). Improving outcomes for persons with aphasia in advanced community-based treatment programs. *Stroke*, vol. 30, no. 7, pp. 1370-1379

62. Stroke association (2008). Sleep Apnea and Cardiovascular Disease: An American Heart Association/ American College of Cardiology Foundation Scientific Statement
63. Tesak, J., & Code, C. (2008). Milestones in the history of aphasia: Theories and protagonists. East Sussex, UK: Psychology Press.
64. Toner, M.A., & Shadden, B.B. (2002). Counseling challenges: Working with older clients and caregivers. *Contemporary Issues in Communication Sciences and Disorders*, 29, 68-78.
65. Wright, H.H. & Newhoff, M. (2005). Pragmatics. In L.L. LaPointe (Ed.), *Aphasia and related neurogenic language disorders*, third edition (237-248). New York, NY: Thieme Medical Publishers, Inc.
66. Vanja Kljajevic (2012). *Comprehension of Wh-Dependencies in Broca's Aphasia*. Cambridge Scholars Publishing.
67. Van der Gaag, A. (2005) Therapy and support services for people with long term stroke and aphasia and their relatives: a six-month follow up study. *Clinical Rehabilitation*. 2005; 19; 372.
68. Vygotsky L (1978). Interaction Between learning and Development. In Gauvain & Cole (Eds.) *Reading on the Development of children*. New York: Scientific American Books. Pp. 34 –40.
69. Yavuger, G, Gugelkucuk, S; Kucukdeveci, A, Gok, H, & Engin, S. (2001). Aphasia rehabilitation in patients with stroke. *Int J. Rehabit Res. Sep*, 24(3), pp. 241-244.