THE USE OF PROTOCOLS IN THE EVALUATION AND TREATMENT OF APHASIA

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Abstract:Language impairments are defined as communication disorders that typically affect a person's ability to talk, understand what others say, write and read. Affecting thousands of people worldwide aphasia is a language disorder that is of great interest for many language pathologists and linguists. Because this disorder has an impact on the linguistic components of language -phonology, morphology, syntax, semantics and pragmatics –protocols like Famous People Protocol, Cinderella Story, etc. have been designed to evaluate a person's speech by performing a thorough investigation of these five basic components. By using these protocols, language pathologists or linguists can easily accomplish the evaluation and treatment of people suffering from aphasia thus providing useful information on the affected language level.

Keywords: aphasia, language disorder, protocols, language pathologist, affected language level

Throughout the years scientists have been intensively preoccupied with the study of the origins and evolution of a language. In order to obtain a clear and concise evidence, they have included in their study disciplines like linguistics, psychology, neuroanatomy, and genetics. One might think that linguistics, as a science, is the one which brings its full contribution to the evolution and understanding of a language but the involvement of other cognitive sciences is also essential therefore emphasising the interdisciplinary nature of the evolution of languages.

According to Ardilla[1], there are three different stages in human language evolution:

1. **Primitive communication systems**: use of sounds, gestures found mainly in animals.
2. **Initial language systems**: sounds are combined to form words, but there is no relationship among the words. This is the lexical/semantic system found in children at the beginning of language development.
3. **Advanced communication systems:** here the words are combined to form correct sentences, which means that language is seen as a grammatical system.

With the development of the last stage, the evolution of language reaches its peak. The stages mentioned above suggest that human language first appeared as a combination of sounds and later these sounds became words.

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[1] Alfredo Ardila, *A Proposed Neurological Interpretation of Language Evolution*, Hindawi Publishing Corporation, Behavioural Neurology, volume 2015, article ID 872487, p.5.

If we want to understand the origins of a language, it is important first to comprehend the development of those areas of the brain that are involved in language processing, such as the Lexical/Semantic system (temporal lobe) and the Grammatical one. Gannon et.al.[2] in their research on chimpanzees identified that the "*anatomic pattern and left hemisphere size predominance of the planum temporale (PT), a language area of the human brain, are also present in chimpanzees.*" This planum temporale, which is more evident in the left hemisphere of the brain, is an important element involved in language reception (Wernicke's area) and communication disorders among humans (vocal-auditory or gestural-visual). The study conducted by Gannon et al. confirmed that no planum temporale asymmetry was found in any nonhuman primate. The study demonstrated that the PT of chimpanzees anatomically is not identical/ similar to that of humans, in this case, PT representing the key element for language and other tasks related to communication. Due to the existence of this asymmetry among chimpanzees, it can be proposed that this "developed before the appearance of contemporary human language and probably before our divergence between humans and chimpanzees."[3]

On the other hand, the development of the Grammatical system, verbs, grammar and speech praxis, appeared simultaneously in history furthermore "they are strongly interrelated and depend upon a common neural activity".[4] Ardilla[5] describes the story of the KE family presenting difficulties in language production. After being subjected to several tests, it was revealed that the disorder the family members suffer from is due to "a mutationin a single autosomal-dominant gene, FOXP2, located in the chromosome 7."[6] In their research Gary F. Marcus and Simon E. Fisher[7] sustain that *"In humans, mutation of this gene, which has the technical name of 'FOXP2' results in a severe developmental disorder that significantly disrupts speech and language skills."* This gene mutation prevents people to utter grammatically correct sentences, triggers orofacial dyspraxia (uncontrolled mouth and face movements) and intellectual limitations. Significant researches were carried out to demonstrate the importance of FOXP2, named as the "*grammar gene*"[8]which was observed in many brain regions and "*could have contributed to the evolution of human speech and language by adapting specific cortico-basal ganglia circuits to communication purposes*."[9]

Due to certain neurological disorders, these two systems of the brain may be injured, causing serious language loss or impairment. The most severe language disorder that usually occurs due to stroke, head injury or brain tumour is **aphasia**. Several definitions have been attributed to aphasia by researchers, such as: "*the loss or impairment of language function caused by brain damage*"[10], "*loss or impairment of the power to use or comprehend words*

[2] P. J. Gannon, R. L. Holloway, D. C. Broadfield, and A. R. Braun, *Asymmetry of chimpanzee planum temporale: humanlike pattern of Wernicke's brain language area homolog*, Science**,** vol. 279, no. 5348, 1998, pp. 220.

[3] Alfredo Ardila, *A Proposed Neurological Interpretation of Language Evolution*, Hindawi Publishing Corporation, Behavioural Neurology, volume 2015, article ID 872487, p.8.

[4] Alfredo Ardila, *Origins of the language: correlation between brain evolution and language development*, Available at <https://goo.gl/IoQvUg> [Accessed April 15th 2017].

[5] Alfredo Ardila, *A Proposed Neurological Interpretation of Language Evolution,* Hindawi Publishing Corporation, Behavioural Neurology, volume 2015, article ID 872487, p.9.

[6]*Ibidem*, p. 9.

[7] Gary F. Marcus and Simon E. Fisher, *FOXP2 in focus: what can genes tell us about speech and language?*, Trends in Cognitive Sciences, vol. 7, no. 6, 2003, pp. 257-262.

[8] M. C. Corballis, *FOXP2 and the mirror system*, Trends in Cognitive sciences, vol. 8, no. 3, 2004, pp. 95.

[9] Alfredo Ardila, *A Proposed Neurological Interpretation of Language Evolution*, Hindawi Publishing Corporation, Behavioural Neurology, volume 2015, article ID 872487, p.9.

[10] D. Frank Benson and Alfredo Ardila, *Aphasia: A Clinical Perspective*, New York, Oxford University Press, 1996, p.3.

usually resulting from brain damage"[11], "*a language disorder that occurs in adults following focal brain damage, typically involving the language dominant cerebral hemisphere*"[12] and "*adisturbance of form, expression and symbolic comprehension*"[13]. According to Ardila[14] there are only two basic aphasia syndromes: Wernicke's aphasia (fluent aphasia) and Broca's aphasia (non-fluent aphasia). The disorders are characterised by speaking, writing, understanding and reading disturbances. One of the major problems that affect almost all aphasic patients is word finding difficulties categorised according to Doesborgh[15], as:

- **semantic paraphasias**: substitution of one word with another one by making a relation between the two; e.g. apple instead of plum
- **phonological paraphasias**: errors in the form of the word; e.g. '*kear*' as opposed to '*pear*'
- **neologisms:** made-up words; e.g. '*adepgood*' for '*spade*'[16]
- **generalisations:** patients do not name the thingthey supposed to; vegetable instead of carrot
- **circumlocutions:** aphasics describe the words instead of naming them; e.g. it grows on a tree
- **recurring utterances:** sounds, words that are constantly repeated; e.g. '*do-do-do*'

The errors mentioned before have an essential role in classifying patients, but they do not offer enough information for the language pathologist or clinician to plan treatment as it is a great demand to assess the deficits underlying these symptoms from a linguistic point of view. This analysis can be performed with the help of several tools by analysing patient's discourse.

Discourse is essential for communication as well as for expressing feelings, emotions, opinions or ideas. It is also imperative for the analysis of linguistic production in patients suffering from a language impairment like aphasia. Nowadays many researchers, clinicians and speech-language pathologists emphasise the importance of narrative analysis that represents a significant aid in the evaluation of the linguistic impairments aphasic patients may manifest. So as to obtain a clear and concise analysis of discourse scholars use standardised protocols encompassing "four different discourse genres: personal narratives, picture descriptions, storytelling, and procedural discourse."[17] These genres are categorised as spontaneous and semi-spontaneous speech. Sessions are organised, where aphasic patients are asked to produce discourse with the help of these protocols. Each session is either audio or video recorded. Hence the researcher is able to convert the transcriptions to the CHAT (Codes for the Human Analysis of Transcripts) standard that contains specific extensions for aphasic language and analyse them

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[11] Merriam-Webster Dictionary, Available at <https://www.merriam-webster.com/dictionary/aphasia>, [Accessed April 17th 2017].

[12] AL Holland, DS Fromm, F DeRuyter, M Stein, *Treatment efficacy: aphasia,* J Speech Hear Res., vol. 39, no. 5, 1996 pp.S28.

[13] Alexandra Ciocîrlan, Radu Drăgulescu, *Distorsionări ale comunicării. Cercetări de psiholingvistică,* Cluj-Napoca, Casa Cărții de Știință, 2013, p.145.

[14] Alfredo Ardila, *Origins of the Language: Correlation between Brain Evolution and Language Development*, In *S. M. Platek and T. K. Shackelford, Eds., Foundations of Evolutionary Cognitive Neuroscience*, Cambridge University Press, New York, 2009, pp. 154.

[15] Suzanne Johanna Carola Doesborgh, *Assessment and Treatment of Linguistic Deficits in Aphasic Patients (PhD thesis),* Amsterdam, the Netherlands, Universal Press Veenendaal, 2004, p.1.

[16] Jonathan D. Rohrer, Martin N. Rossor, and Jason D. Warren, *Neologistic jargon aphasia and agraphia in primary progressive aphasia*, Journal of the Neurological Sciences, vol. 277, no.1-2, 2009, pp. 156.

[17] MM Forbes, D. Fromm, B. MacWhinney, *AphasiaBank: a resource for clinicians,* Seminars in Speech and Language, vol. 33, no.3, 2012, pp. 219.

with the help of a special program such as CLAN (Computerized Language Analysis)[18] designed by Brian MacWhinney in the year 2000.

The first session begins with the production of *personal narratives* which are obtained by asking the patient about their disability, speech, recovery and a significant incident in their lives. Most of the patients consider this task to be the most difficult one as they demonstrate serious word finding problems.

The second session is characterised by *picture descriptions* where aphasics are presented three black and white drawings:

1. four- panelled image in which a child breaks a window while kicking a soccer ball, named as "Broken Window";
2. a six-panelled picture representing a child who refuses an umbrella and is caught in the rain referred to as "Umbrella";
3. a drawing made by Nicholas and Brookshire[19] representing the rescue of a cat who got stuck in a tree.

Using these prompts patients are asked to tell a story with a beginning, a central part and an ending[20].

The third session is *storytelling* where aphasic patients are asked to narrate the *Cinderella* story. At the beginning, they are given the book to look through it and then it is taken away from them. Eventually, patients have to tell the story on their own without any aid.

The last session is *procedural discourse* in which participants are asked to recount the making of peanut butter and jelly sandwich with the help of additional photographs.

There is also an independent protocol, entitled **The Famous People Protocol,** useful for evaluating spoken language abilities. Here, aphasics need to recognise certain famous people (singers, actors, presidents,etc.) and give some details about them.

Discourse recordings produced throughout the years are collected in an online database known as AphasiaBank, created by Brian MacWhinney and Audrey Holland in 2007 as part of a grant. The database comprises a vast number of recordings in different languages like English, Spanish, German, Italian, Hungarian, Mandarin and Chinese. AphasiaBank can be accessed by clinicians, researchers and speech therapists or anyone who is interested in researching aphasia, secured with a username and a password.

In 2010 Brian MacWhinney et al.[21] carried out research in which 24 aphasic and 25 non-aphasic patients were videotaped while telling the Cinderella story. The researchers' aim was to compare lexical diversity across the two groups by determining as a reference point 10 nouns and verbs. By analysing the videotaped discourses, they concluded that people with aphasia have "a marked reduction in lexical diversity and a greater use of light verbs."[22] They have also emphasised the ten most frequent nouns and verbs used by both groups. The aphasic people used nouns like "man, shoe, girl, and home"[23] which are not specifically related to the Cinderella story

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[18] B. MacWhinney, *The CHILDES Project: Tools for Analyzing Talk* (3rd Edition), Mahwah, NJ: Lawrence Erlbaum Associates, 2000.

[19] LE Nicholas, RH Brookshire, *Presence, completeness, and accuracy of main concepts in the connected speech of non-brain-damaged adults and adults with aphasia*, Journal of Speech and Hearing Research, vol. 38, no.1, 1995, pp. 145-156.

[20] Heather Harris Wright and Gilson J Capilouto, *Manipulating task instructions to change narrative discourse performance*, Aphasiology, vol.23, no.10, 2009, pp. 1295.

[21] Brian MacWhinney, Davida Fromm, Audrey Holland, Margaret Forbes and Heather Wright, *Automated analysis of the Cinderella story*, Aphasiology, vol.24, no. 6-8, 2010, pp. 856-868.

[22] *Ibidem*, p. 856.

[23] *Ibidem*, p. 861.

compared to the words used by non-aphasics such as "dress, fairy, stepdaughter, and godmother".[24] Regarding verbs, 33 verbs used by aphasics are also found in the discourse of non-aphasic people. Error analysis was also performed by the authors so that they have tracked paraphasias such as: "Cinderenella, Cinderlella, Cilawella, Cilawilla and Cilawillipa and ………., Secerundid."[25]

Another research conducted by Gerasimos Fergadiotis and Heather Harris Wright[26] highlights the dissimilarities in lexical diversity among aphasic and non-aphasic patients with the help of tasks like single picture description, sequential pictures and storytelling. It was observed that "different elicitation techniques may impose different cognitive and linguistic demands."[27]In order for a person to be able to retrieve words, the interaction between diverse linguistic levels (phonologic, syntactic, and semantic) may be possible. In case one of the levels is impaired word retrieval fails. The authors concluded that people with aphasia proved higher lexical diversity for sequential picture description and storytellingthan for single one.

Unfortunately, the database does not contain any samples in Romanian as, according to our knowledge, up to this moment little research has been conducted in Romania on this issue by linguists. The goal of this article is to familiarise readers with the possibility of creating a Romanian database of samples recorded with Romanian aphasic patients by using the translated and adapted protocols to the Romanian standards. The ultimate goal is to translate and adapt these protocols in Romanian and use them for the evaluation and treatment of aphasic people in Romania.

The founders of AphasiaBank granted permission to perform these translations and to adapt certain parts of the protocols to the Romanian standards. In this way, all the descriptions, details, advice, datasheets are going to be translated, and three out of the six protocols are going to be totally changed. As the creation of a Romanian database would bring benefits for the study of aphasia among the Romanian population the purpose of this study is to use information related to the Romanian tradition, as follows:
-    the *Cinderella* story will be replaced by "*Capra cutreiiezi*" (*The Goat and Her Three Kids*) written by Ion Creangă;
-    in the procedural discourse aphasic patients will be asked to describe how they would prepare 'sarmale' (*cabbage rolls*) instead of peanut butter and jelly sandwich;
-    the Famous People Protocol will include personalities from Romania.

The personal narrative and the picture description protocols will remain the same with the only difference that all data is going to be translated into Romanian.

With the help of these protocols researchers from Romania will be able to evaluate aphasic patients, identify lexical, semantic and grammatical impairments, perform studies based on these protocols (e.g. picture description and the conceptualisation deficits in Romanian aphasic patients), study lexical diversity across these discourse elicitation tasks, study patterns of lexical use, grammatical structures, inflections, content, word length, coherence etc.

 The aim of this paper is to familiarise readers with the importance of developing a Romanian database for aphasic language meant for research and teaching purposes as well. By

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[24]*Ibidem*, p. 861.
[25]*Ibidem*, p. 862.
[26]Gerasimos Fergadiotis and Heather Harris Wright, *Lexical diversity for adults with and without aphasia across discourse elicitation tasks*, Aphasiology, vol.25, no. 11, 2010, pp. 1414-1430.
[27] Gerasimos Fergadiotis, Heather Harris Wright and Gilson J. Capilouto, *Productive vocabulary across discourse types*, Aphasiology, vol.25, no. 10, 2011, pp. 1261.

creating a Romanian database, as part of the AphasiaBank will bring a new contribution to the study of aphasia, therefore, offering an additional method to the therapy of those people who suffer from this disorder.

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