APHASIA AND LANGUAGE DEFICITS: A DESCRIPTIVE ANALYSIS

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Abstract - This case study focused the characteristics of aphasic patient' speech, namely with regard to the impairment of several language functions. Firstly, we introduced a theoretical review supported by Roman Jakobson's framework. Secondly, we examined (by segmentatio in the psycholinguistic perspective) the speech analysis of a female patient diagnosed with Broca's aphasia (non-fluent aphasia), resulting from a stroke in Broca's area. A discourse analysis was performed by categories to identify the linguistic components affected. The results showed deficit for verbal fluency, for naming and for repetition tasks. On the other hand, verbal comprehension was intact. The verbal production was restricted to short sentences and with irregular segments (high level of names, low rate of pronouns), low lexicon frequency, semantic errors and high effort during articulatory production. The limited prosody was also verified. The psycholinguistic analysis plays an important role to the verbal rehabilitation mostly considering the Educational and Language areas of intervention.

Keywords - Social Sciences; Aphasia; Psycholinguistics; Discourse Analysis; Language Deficits.

I. INTRODUCTION

Language and speech should be differentiated as concepts attending to the fact that language involves the speech skills as communication instrument. Language addresses a higher core. Speech is part of the discourse and could be encoded and examined considering phonology, lexicon, semantics, prosody, pragmatic, morphology, etc. Those components are sensible to computation in computerized dictionaries that inform on the humans' verbal behaviour. That behaviour is endorsed by specific traits of individual's discourse concerning visual discrimination, emotional tone, analytical thinking, clout, lexical frequency (indicator of factor G), among other language functions [1,2].

The speech is expected to be articulated in correct grammar when there are no neurological disturbances [3, 4, 5]. The acoustic spectrum is the most direct evidence of speech, considering normal and abnormal contexts. Abnormal contexts like aphasia involve deficit behavior mostly observed in the symbolic representation and by adding the perturbation in motor control (articulation). Aphasia is a pathology (locally identified in the damaged brain) affecting the routes of lexical and syntactic repertoire [6].

With origin in brain lesions, aphasic patients show specific and well-known language handicaps and also communicative privation (absences during conversations). That privation will compromise the pragmatic function of language once the lexical meanings would be instable and not accurate during the speech settings of individuals [7]. If aphasia is well defined attending to the evidence of Psychiatry and Psychology, the affected language dimensions are not so clear during an evaluation of aphasic discourses. Precisely we need both Psychology and Linguistics experts to understand the big picture in a diagnosis step [7]. Besides the linguistic components (example: lexicon) and the language functions (example: emotional tone), it is important to approach the cognition in aphasia.

The cognitive functions are considered as preserved once specific language functions are impaired. Recent evidence shed light on the cognitive – mostly the executive function related to semantics – constraints observed in aphasia [8,9]. On the other hand, it is important to distinguish what language skills are active or constrained [10]. For aphasia the pragmatic function is seriously damaged even when only production or comprehension is impaired. All that because human language (verbal behavior) is about the language in use (context). If production skills are damaged, in aphasic individuals, the non-verbal meanings are not enough to ensure the pragmatics of the discourse [11] [5]. The instability of words, irregular sentences and low rate of intonation are seriously present.

The aphasia classification involves a factorial structure [12]: aphasia is a communication disturbance with origin in a neurological disorder and is not limited to the phonological component [13]. There are another factors involved and the disorder is defined by the difficulty acquired concerning the generation and interpretation of linguistic symbols. The symbols encoding and decoding are impaired processes and not only the articulatory movements (instrumental component of the speech) [14].

Jakobson [5] developed his work about aphasia with a main basis: the clinical evidence and first case studies of Goldstein. The aphasic discourse was examined, firstly: in the instrumental properties; secondly: in the symbolic properties. The second revealed to be really

impaired as considering that the speech is symbolic based [14]. When symbol encoding is impaired, so the individual will display error in prosody, in syntax and other components. However, those components are more or less evident according to the mother tongue.
The mother tongue is a very important variable that determines the specificity of instability and fluency (non-fluency) in aphasia. A Portuguese speaker will differ from a German speaker when we look at the grammar system of distinct languages. Mother tongues have significant influence in the cognitive and verbal reasoning mapping [15-17] and, per consequence, the disability with origin in the aphasia will be different. If we already stated that cognition is not constrained, however the language activation is strictly related to reasoning. That reasoning is the basis of pragmatics.

According to Hallowell & Chapey [13], aphasia could be divided in fluent, non-fluent and other types. This classification depends on the performance of the patient toward specific tasks: discourse fluency; words' repetition; comprehension of messages and instructions [16]. And, as supported by Jakobson theory [15] and past work of other scholars [17, 18], the paraphrasing it is not valid to evaluate discourse as complete speech in the case of aphasics.

Another important highlight: to understand the discourse analysis of aphasic speech we need to examine the markedness in grammatical system and the differentiated loss of skills to manage vowels and specific consonants according to different mother tongues. Related to the markedness we need to address the redistribution of language competencies in the system (meaning the home language and also another languages where the subjects are proficient) [19].

This work aims to show the characteristics of the speech of aphasic patients, namely with regard to the impairment of several language functions. Here we proceeded to a theoretical review on the highlights based in the framework of Roman Jakobson and related evidence-based research. We examined the speech segments and codes of two patients diagnosed with Broca's aphasia (non-fluent aphasia).

II. DISCOURSE ANALYSIS

In this brief discourse analysis we present a case study diagnosed with non-fluent aphasia. This case is characterized by a constrained speech with shortened sentences (multiple cases point out to a discourse where sentences are represented by nouns only). The lack of syntax is evident; the lexical frequency is not affected but the repertoire is very low. The prosody is greatly impaired. The verbal outputs generate poor speeches and a pragmatic with serious difficulties about intelligibility.
The pronouns are reduced in number and the absence of words is evident as well as the semantic constrained (the individual intends to develop a speech with paraphrases but with low success). Verbs are function words avoided in their correct manner: the infinitive is the most recurred in aphasia (non-fluent). Articles and prepositions are absent generating a 'telegraphic' discourse.

The 'telegraphic' discourse does not reflect a lack of grammar awareness, but instead we are observing discourses with instability toward the use of grammar rules. The naming skills are also compromised and the variation of that deficit is determined by the damage in neurological diagnosis.

For this aphasia we can observe that patient has lack of knowledge about the articulatory points and develop a speech with serious constraints in the phonetic structures. In the case of spontaneous speech, the expressive skills decline and the speech reveals more sequences of errors and distortions of vocabulary and semantics. The naming tasks are more controlled for the number of errors (they are not so prominent). Regarding the passive voice, this is the major syntactic challenge for aphasic patients during a conversation [20].

About prosody, intensity, rhythm, velocity and intonation are impaired – the fluency guarantees, in normative cases, that speakers are proficient. The lexical repertoire analysis was the focus of this study: two moments of discourse of a female patient, portuguese native, speaker, 37 yr of age, psychologist. She was diagnosed as having non-fluent aphasia, resulting from a post-cerebral vascular accident. There is an evolution from the first to the second period of the case' speech (the intervention was introduced after the period 1).

Transcription of segments of the discourse (aphasic patient) in period 1.

"Eu, eu, eu, nã ê consigo ler, consigo ler, não, é, é, é a notices mais ou menos Lê eu não com...eu não Mas outras pessoas, é, é, livre, bem sabes, de-pende (…). Antes...é muito pu-lhor, certo, mas é, é, é, perna direita sabes, é, é, éfé, efetar, é, é, caminhar não é conseguir Depois éspetal em Valongo, é caminhar, mas...consegui; braço, mais ou menos...é aqui, mas é, é mãos não conseguiu, é, é, hum, hum, hum...sim (…). Pai...é Jão...avó, mais ou menos É não, é compreende...é bem afasia, avc (…)"

Transcription of segments of the discourse in period 2:

"antes, é, pois, hã, pessicologia…depois…dan..çava depois AVC eu, nnão falava…nada é, é, é,sssim e não, não…é pois é…está é muito nova sabes é, é, é…é, é cadeira de roodaaas, sabes, braço e falar nove é, é,

sabes, não, en…ten-des nada muito… (ri)…muito Eu antes, é, é, eu, eu, é sozinha sabes é, é, teu…quilo mas…depois AVC sabes…pai, avó, todas, sabes, é muito complicado u-ma amiga afastou…outras pessoas é, é, éééééé acompanhar hã,hã terapias é mmmuito duro mas é conseguir,… sabes é…fala todos os dias ocupassenal…é, é difícil, muito difícil…mas..con-seguiu não é, desistam (…). Eu, é, gosto de sessir, é, é sair é filmes, é, é, é, éspetaculo…eu, eu, vivo…eu olha é-fasia, é, olha, é… mas, é, é, sair, conversar, conversar..todos dias [ri] domingo não…é des-cansar. "

Both speeches were maintained as considering the language source: Portuguese. A brief analysis concludes that this discourse, in the two moments, presents the expected telegraphic discourse and high effort to produce sentences, despite of the grammar instability. Interjections are mostly used to balance the thought of the individual during the speech, as well as the paraphasia and sometimes paralexia. The paraphasias are frequently phonological and semantic. We can observe that verbs were widely used in infinitive mode (poor lexicon diversity); the phonological awareness is seriously constrained; the repetition during the speech is frequent; nouns are higher in number than verbs (action words). Other linguistic functions are affected such as the pragmatic, not the prosody. About the intellibility of discourse: the comprehensibility of the speech and narrative intended by the patient is almost neglected. In the second period, after intervention we observe that there are improvements.

Improvements were achieved but not in a significant manner (qualitative analysis through the discourse analysis): about verbal fluency in the period 1, 98 words in 71 secs; in the period 2, 136 words in 135 secs. About the lexical frequency - related to index of difficulty of words during speech – there are no evidence to address. The individual increases the pragmatic competence supported by a constant word, in Portuguese. The repetition was maintained during the two periods.

In sum, verbal comprehension was intact but the verbal production was restricted to shortened sentences and with irregular segments (high level of names, low rate of pronouns), low lexicon frequency, semantic errors and high effort during articulatory production. The limited prosody was also verified. The psycholinguistic analysis plays an important role to the verbal rehabilitation mostly considering the Educational and Language areas of intervention.

REFERENCES

[1] N. Makris, D. Tachmatzidis, and A. Demetriou, "Mapping the evolving core of intelligence: Changing relations between executive control, reasoning, language, and awareness", *Intelligence*, vol. 62, pp. 12-30, 2017.

[2] T. Shirdel, and M. Naeini, "The Relationship between the Big Five Personality Traits, Crystallized Intelligence, and Foreign Language Achievement", *North American Journal of Psychology*, vol. 20, 2018.

[3] A. Nyman, S. Strömbergsson, K. Lindström, A. Lohmander, and C. Miniscalco, "Speech and Language in 5-year-olds with Different Neurological Disabilities and the Association between Early and Later Consonant Production: Speech/Language in Neurological Disabilities", *Developmental Neurorehabilitation*, 1-10, 2021.

[4] K. Tetzloff, J. Duffy, H. Clark, R. Utianski, E. Strand, M. Machulda, ... and J. Whitwell, "Progressive agrammatic aphasia without apraxia of speech as a distinct syndrome", *Brain*, vol. 142(8), pp. 2466-2482, 2019.

[5] R. Jakobson, "Linguistics and communication" [Lingüística e comunicação]. Cultrix, 2008.

[6] A. Luria, "The contribution of linguistics to the theory of aphasia", In *Roman Jakobson* (pp. 237-252). De Gruyter, 2020.

[7] E. Lacey, L. Skipper-Kallal, S. Xing, M. Fama, and P. Turkeltaub, "Mapping common aphasia assessments to underlying cognitive processes and their neural substrates", *Neurorehabilitation and neural repair*, vol. 31(5), pp. 442-450, 2017.

[8] R. Schumacher, and A. Halai, and R. Lambon, "Assessing and mapping language, attention and executive multidimensional deficits in stroke aphasia",*Brain*, vol.142(10), pp. 3202-3216, 2019.

[9] R. Jakobson, R., "Two Aspects Of Language And Two Types Of Aphasic Disturbances. In *Studies on child language and aphasia",* pp. 49-74. De Gruyter Mouton, 2018.

[10] C. Jagoe, and T. Wharton, "Meaning non-verbally: the neglected corners of the bi-dimensional continuum communication in people with aphasia", *Journal of Pragmatics*, vol. 178, pp. 21-30, 2021.

[11] B. Hallowell, and R. Chapey, "Introduction to language intervention strategies in adult aphasia", In R. Chapey (Ed.), Aphasia and related neurogenic communication disorders, pp. 3-19. Philadelphia: Lippincott Williams & Wilkins, 2008.

[12] J. Friedrich, J. "Psychopathology and the essence of language: the interpretation of aphasia by Kurt Goldstein and Roman Jakobson", *History of psychiatry*, 17(4), pp. 419-436, 2006.

[13] J. Gervain, F. Macagno, S. Cogoi, M. Peña, and J. Mehler, "The neonate brain detects speech structure", *Proceedings of the National Academy of Sciences*, vol. 105(37), pp. 14222-14227, 2008.

[14] S. Figueiredo, "Comparison of Cognitive Performance Between Two Generations of Immigrant School-Aged Children: Child Development Change Over Time", *Journal of Cognitive Education and Psychology, 2020*.

[15] S. Figueiredo, "Competition Strategies during Writing in a Second Language: Age and Levels of Complexity", *Languages*, vol. 4(1), p. 11, 2019.

[16] N. Cocks, S. Byrne, M. Pritchard, G. Morgan, & L. Dipper, "Integration of speech and gesture in aphasia", *International journal of language & communication disorders*, vol. 53(3), pp. 584-591, 2018.

[17] H. Goodglass & J. Mayer, "Agrammatism in aphasia", *Journal of Speech and Hearing Disorders*, vol. *23*(1), 99-111, 1958.

[18] K. Goldstein, "The problem of the meaning of words based upon observation of aphasic patients", In *Selected Papers/Ausgewählte Schriften* (pp. 345-359). Springer, Dordrecht, 1971.

[19] R. Jakobson, "Aphasia As A Linguistic Topic", In *Studies on Child Language and Aphasia* (pp. 37-48). De Gruyter Mouton, 2018.

[20] L. Cummings, and M. Mega, "Neuropsychiatry and behavioral neuroscience". Oxford University Press, 2003.

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