

LANGUAGE STRUCTURE IMPAIRMENTS IN BRAIN DAMAGE PATIENTS

Sílvia Fernandes de Oliveira

F.C.L. - UNESP - Brazil

Abstract: This work aims basically at the application of strictly linguistic criteria in the interpretation of the facts of aphasia. The central concern is to investigate deficits occurred in language structure, at the information processing level. The intention is to demonstrate, based on experience of direct contact with aphasic patients and also through analysis of their speeches, impairments of basic language mechanisms.

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Language is one of the most important cognitive function, therefore, it can give us the key to unveil the architecture of the brain's dominant hemisphere. The study of aphasia syndromes has been undergoing a significant transformation as now it is not taken as a mere way to test linguistic capability, it constitutes now a source of data which have a crucial role in the development of models which embody the cognitive and psychological aspects, as well as the linguistic aspects in the comprehension of information processing. Studies on this can contribute for a better understanding of language and cognition mechanisms and to develop hypotheses about the nature of this process.

When we study language structures in brain damage patients a formal characterization of the deficits and the proper selection of data reveal the language mechanisms involved, as well as reflect their functional architecture. While analyzing the pathological speech, the linguistic should not compare each aphasia symptom to a determined element of the normal linguistic behavior but rather interpret it within the pathological frame it is part of. Or better, an aphasia symptom has a pathological meaning in the clinical context which expresses a global disturbance. A vision of the whole and both levels of analyses are fundamental: at first the formal marks should be detected, necessarily, at surface level, and then, from this point

towards the basic semantic relations at deep level. Therefore, the main problem is not the observable data, but its interpretation.

To investigate the structural deficit, it is necessary to precise the nature of the difficulties the patients reveal and details grammar deformations. However, it is important to point out the role these formal and abstract relations perform in the cognition, that is, we cannot forget the representative function of these grammar instruments. Brain damage does not result in an undifferentiated loss of language capability but in a selective loss of some ability. The brain damage may alter selectively any particular subsystem while preserving others and the nature of these observed selective deficits should be related to the theories of functional architecture as a whole.

From the observed data, we can arrive to particular descriptive generalizations. This means that the detailed investigation of particular performances contributes for the understanding of the general conditions of the grammar systems and the linguistic structure. Manifestations at surface level can indicate different processings in the in the various types of aphasia syndromes. These differences are not easily interpreted, however, they cannot be ignored.

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This study involved three adult male patients, with university degree, who used to talk as ordinary people. They manifested communication and language disturbances consequent to brain damage. The verbal corpus was obtained in oral interviews, when their spontaneous speeches were analyzed. Symptom analysis was characterized, considering different kinds of information processing, and trying to determine impaired mechanisms which generate symptomatology. Each patient revealed a particular linguistic behavior of three basic types of aphasia (conduction aphasia, Broca aphasia and Wernicke's aphasia). It should be emphasized that they are three particular cases of speech disturbance, each patient having peculiar characteristics which determined, in a way, patterns of verbal performance and, especially, strategies in order to compensate deficits. Each and every interpretation of linguistic facts must be considered together with general characterization of the patient for speech evaluation. By examining particular cases, with more precise investigation, it is possible to determine the nature of the deficit in verbal performance.

In literature, conduction aphasia patients present specific features of faults in phonological system. In an appropriate communicative context, there is an «island» of phonological problems. The impairment, the disturbance, is «localized» at this level of speech production. It is necessary to approach this question on a strictly semiotic base: the intrinsic and essentially linguistic property of the phoneme. The patterns of phonological breakdown revealed in this syndrome were characterized considering how this impairment appears as a key element in the description of the speech performance of this patient. At first, impairments seemed to occur at

phonological level. But after a more precise analysis, a morphological impediment, a basic inability to establish connections between parts, i.e. relationships between linguistic units was noted.

We analyzed the patient's attempts to make it right, observing particularly the «construction» of the word, the arrangement of morphemes, trying to characterize the patterns of the phonomorphological ruptures shown in this syndrome. We noted that the patient showed alteration in the emission of derived words as well as words which have inflected mechanisms. Those are morphological facts. The patient's route, his morphological difficulties strikes us an idea of a certain refinement on the functional approach. It is the use of a more analytical expression to make up for the difficulty to perform a more complex operation, a more abstract unit with a specific functional value. As we analyze the various speech rupture patterns of this patient, a central fact caught our attention: he showed a certain incapability to deal with this artificial separatism of the various segments which compose a word. He could not achieve the vision of the «constructed» whole and the various compartments which takes part in a word. He comprehended it and produced it as a monolytical block. The patient seemed to «stumble» phonologically, but there was a deeper impairment, a morpho-syntactic one, which generated a semantic difficulty.

For the Broca aphasia syndrome, the most considerable hypothesis is the impairment of the syntactic component of the language processing system. In this case, it is necessary to investigate the notion of «syntactic difficulty». It is a selective disturbance, of a specific mechanism characterized fundamentally by the inability to organize words in a sentence and by the misuse of grammar units. Speech is characterized fundamentally by the omission of function words, grammar markers and by the use of very simplified phrasal structures. This deficits can be compensated by alternative routes of lexical coding, once the patient preserves a lexically based semantical capability. In this approach, it is already know the hypothesis that the access to closed class words is normally mediated by a different route from that of the open one. Finally, there may be differences in processing between these two types of linguistic units, therefore susceptible to selective ruptures.

The difficulty of sentence structure - coordination and subordination - was considered as the crucial point of the linguistic activity of this patient.

Both these types of relationship constitute the clause as a speech and communication unit, whatever its dimensions and structures. Coordination constitutes a resource to bring near elements which have similar syntactic functions and lie in the same relational hierarchy. Both clauses maintain, respectively, totality and independence, forming two «wholes» which interrelate. Therefore, they come from the same paradigmatic axis. This is one of the fundamental features which define their nature: juxtaposition of elements. Subordination, on its turn, constitutes a structure which presupposes hierarchy and different degrees of complexity. The subordinated clause takes a dependence relation to one term in the other clause, incorporates into it and forms a «whole», although being, internally two clause structures. Subordination establishes structural relations between the clauses whereas the coordination establishes logical relations.

In the process of re-elaboration of his linguistic difficulties, the patient searched alternative mechanisms, which, even when failed, revealed the possible route to be rescued. The greatest difficulty to elaborate subordinate structure, and the adapted strategy to generate sequential coordinative sentences, explicated a basic impaired mechanism, a linguistic cognitive one,

result of the brain lesion. One of the most likely hypothesis to explain this linguistic performance is that the whole structural frame includes meaning matters. It concerns, more specifically, to a semiotic change: the Broca aphasia patient's speech is the manifestation of a breakdown in the perceptive cognitive system.

In an initial analysis, Wernicke aphasia patient's spontaneous speeches maintain, in a way, syntactic structures. In not so severe patients, the maintenance of intonation and the use of all grammatical classes of words and their arrangement in verbal production can be noted. Therefore, the principal deficit seems to be of lexical nature. The linguistic frame which is revealed in the speech, is named «dissyntax», a specific type of syntactic impairment. Apparently, the logic semantic relationships remain impaired and generate linguistic disturbance by affecting the rules of textual agreement. It is necessary, moreover, to precise the nature of lexical impairment and its consequence on syntactic level. In Wernicke aphasia syndrome, the most important impairment is the semantic contents of the speech, but the necessity to evaluate how this deficit is reflected in the syntactic structure of speech should be pointed out.

The patient shows difficulty to use linguistical units which explicit, or carry, more meaning. His verbal statements are difficult to understand as the grammar used in the sentences do not necessarily have semantical relation and the produced sentences do not seem to express any logical continuity of thought. Researchers point a double privation in deep structure : inefficient lexical selection and inappropriate syntactic structures. There is an alteration in the semantical contents of each linguistic unit, but there is also a difficulty in the organization of the meaning by the linear disposition of these units along the sintagmatic axis.

In spite of the selective deficits, it was observed that the most damaged level was the cognitive one. The nature of selective impairments and also their relations with theories of language functional architecture as a whole should be investigate. It should be emphasized the morpho-syntactic breakdown of the language system. The selective impairment observed - morphophonological, syntactic or semantic - is an effect with a deeper problem of logic nature. The linguistic structures include a logic function and, therefore, a logic fault will have manifestation at surface level. The most serious problems observed refer to links and relationships between linguistic units. Fundamentally, the patients lose their ability to construct a linguistic relationship, whatsoever the level or complexity of this relationship.

The development of linguistic research of aphasia requires precise interpretation of the description and classification of strictly verbal syndromes and continuous regard to whole symptomatology. Not only the absence or presence of certain verbal activities, but especially the diversity between predominant features should be noted, for linguistic properties are differently hierarchized. The research about aphasia - as semiotic disassociation - can provide data which could not be obtained by any other way. The purposes of this study is not limited to purely theoretical approach: it has pragmatic purpose in order to influence, at least as suggestion, the patient's therapeutic process.

Table 1 Linguistic Features of the Patients

	PATIENT 1	PATIENT 2	PATIENT 3
APHASIA	Conduction	Broca's	Wernicke's
PREDOMINANT ALTERATION	phono-morphological	Syntactic	Semantic
COMPREHENSION DIFFICULTY	Proper linguistic element construction	Proper Phrase structure elaboration	Altered Information contents in the phrase
DEGREE OF DIFFICULTY	<ul style="list-style-type: none"> less difficulty in autonomous lexical items (without suffixes or prefixes). 	<ul style="list-style-type: none"> Information transmitted through the syntactical structure less difficulty in lexical items 	<ul style="list-style-type: none"> lexical items and grammar elements carrying information
EXPRESSION IMPLICATION	little relevant	relevant	very relevant

It is important to emphasize the cognitive approach which admits mental reality, and its purpose to specify underlying abstract structures of verbal performance. The grammatical class oppositions are not formal differences, but they reflect an articulation at cognitive level, that is, they reproduce some aspects of human cognitive organization. Therefore, it can be concluded that the linguistic code has a mental representation. It is important to focus abstract system, impaired mechanisms, language processing, that is, mental functions of language use and to investigate how the rules are used by the mind in order to express verbal messages.