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CEREBRAL LESION AND LANGUAGE DISORDERS: IMPLICATIONS FOR LANGUAGE TEACHING

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INTRODUCTION

The marvelous capacity of acquiring one's native language, within the first few years of life, has been a subject of interest for quite some time. Every child, given a normal developmental environment, acquires his/her native language fluently and efficiently; moreover, he/she acquires it naturally, without special instruction, though not without notable conscious effort and attention to language.

The attempts to understand the complexities of human cognitive abilities are as old as and as continuous as the attempts to understand language. One way of investigating mental abilities and processes is by investigating language. Speech is the only window through which the physiologist can observe the workings of the cerebral life. There is no doubt that man's acquisition, comprehension, and production of an articulated language are dependent upon the activity of his central nervous system. Neither is there any doubt that a very large number of neural structures somehow participate in the elaboration of linguistic behavior.

Even if we completely understood the language acquisition process and the production and perception of speech, this would not tell us how man is able to accomplish these skills. Since the human child does spring from the womb as a fully articulate language-user, it is generally believed that lateralization begins in early childhood. It coincides with the period during which language acquisition takes place. Why are we the only species that learn and use language without being taught? What aspects of the human neurological mechanism explain this ability? How do these brain mechanisms develop?

To answer these questions, we can observe patients with brain injuries and study their language performance. In this regard, we start with a guess (usually supported by clinical evidence) of where the injury (lesion) is located. The next step can be to propose a mechanism of cerebral processes and to say how these processes have been disrupted by the disease. This kind of approach makes assumptions of two kinds: about the mechanisms of the brain, and about the nature of language.

The significance of these findings in education, if it is confirmed, is obvious enough. Second/Foreign language teaching all over the world involves age limitations of language learning and certain goals for teaching/learning second/foreign languages. We need to know the capabilities of language learners if we are to design courses effectively. If learners differ in their capacity and speech of learning, then we need to know about such attributes so that syllabuses, teaching methodologies and testing techniques can reflect them.

APHASIA STUDIES

Most of the anatomical facts about the structure of human brain are beyond dispute today, but there is no agreement on the meaning and function of the structural detail that can be discriminated under the microscope.

Functioning of brain centers is also unlikely because all nervous tissues are forever active, and the anatomical connectivity of the cortex and the brain as a whole is such that a change in activity in one part of the brain is likely to influence activity in all those parts of the brain to which it is connected. It means that a lesion deforms the normal pattern of interaction of a whole network of activities; it therefore does not merely eliminate one capacity among all capacities, but deforms or alters physiological function on a broader base (Lenneberg: 1975).

The aphasias are, unfortunately, very common diseases, and occur very frequently as the result of the disease of the blood vessels supplying the brain. There are millions of people throughout the world suffering from aphasia. Consequently, this disorder has great theoretical interest as the major source of knowledge of the brain mechanisms involved in language.

The most common conditions producing the types of aphasia that are discussed in literature are stroke, trauma and surgical lesions. These three circumstances cause a sudden and catastrophic incapability of a large amount of brain tissue that always includes

(1) the cerebral cortex (whose thickness is a few millimeters),

(2) the vascular bed (which extends its arterial tree into regions that go far beyond the lesion), and

(3) the subcortical fiber system (which also affects brain structures at considerable distances from the actual site of lesion).

Secondary alterations due to sudden lesions include metabolic changes and cellular degeneration; they affect protein synthesis and, in the case of immature brains, the potential for neurogenesis and growth (Lenneberg: 1975).

METHODOLOGY OF THE STUDY

The use of tests for the purpose of identifying relationships between certain behavioral anomalies and cerebral injuries is far from straightforward since many factors which do not specifically depend on cerebral lesions may enter into account due to their effects on the patient's psychological state and behavior (Reitan: 1974). Therefore, tests which are to be used in clinical neuropsychology must be selected with care. They must provide, either alone or in combination with others, a certain amount of information about the pathological state of the nervous system in the patients observed. Since knowledge of the correlations between cerebral structures and behavior is still very limited, the administration of even the best test battery can provide answers to only some of the questions which the psychologist may ask.

The study of aphasia, whether by clinicians or researchers is based on the development and appropriate use of empirical procedures for the assessment of speech and language behaviors. The primary goals of this assessment are to determine if aphasia is present and, if so, to identify the aphasic syndrome and to permit a detailed description of the disorder. Since these aims will be evident in the nature of the physiological assessment, it will differ to some extent from a purely linguistic approach. It is thus, from observations of all elementary aspects of linguistic functioning that the presence of aphasia and its clinical from can be identified.

Due to these considerations, this study is an attempt to supplement the findings of those earlier studies. It is similar to the case study done by Nilipour (1988). In this case, the experiment consists of language skill assessment in two phases among Persian-speaking patients with symptoms of aphasia. The first phase of experiment consists of the administration of the relevant Farsi-version of the Bilingual Aphasia test (Paradis, Paribakht, and Nilipour: 1987) before the conduction of any clinical speech therapy. The second phase of the experiment is to administer the same version of the BAT right after a period of speech therapy (9 months) by a speech therapist. The aim is to assess the linguistic abilities as well as linguistic deficits in an

aphasic patient and to investigate the level of linguistic recovery. In this way, it will be plausible to discern which linguistic features and aspects are more susceptible to impairment and which ones are easier to relearn.

The speech therapy was conducted by H. Naderian, a speech therapist at Center of Health and Welfare in Isfahan, at the rate of two sessions per week, with every session lasting 60 minutes.

The subjects of this study comprised four adult Persian-speaking patients with symptoms of aphasia as a result of cerebrovascular accident (n=3), and trauma (n=1). They were all considered fluent speakers of Persian before insult. They were referred to the Department of Speech Therapy, Center of Health and Welfare in Isfahan for speech therapy because of speech disorders subsequent to brain damage.

As stated earlier, the subjects were tested by the administration of Farsi-version of the BAT (Paradis et al.:1987) in two phases. The BAT represents an objective method of assessment. It consists of 32 standard tasks which can measure each patient's language profile. All measures on the BAT are quantitative. The qualitative clinical picture can be obtained by comparing the scores on the various tasks (e.g. comprehension relative to production, naming relative to pointing, etc.) (Nilipour: 1988). It is now feasible with the BAT to assess all patients with an equivalent instrument in each of their language performance. The preferred presentation order for items within the BAT is from the most simple to the most complex and from the most elementary to the most elaborated.

ANALYSIS OF DATA

Aphasia frequently misleads those who attempt to assess it. In order to appreciate the significance of those aspects of language which are lost, or disturbed as a result of brain damage, it is necessary that the examiner be aware of the physiological mechanisms which are called into play on each type of task or subtest. The results on a single subtest are meaningful only when considered in relation to all other tasks included in the test battery.

Give the large number of possible variables (see Paradis and Libben:1987), one should not expect definitive answers from such a small sample as the one presented here. Indeed, the four patients reported here differ from each other on a variety of dimensions (Table 1).

Case	Age	Sex	Hand	Years of Education	Occupation	Etiology	Months post onset at time of first Assessment	Months post onset at time of second Assessment	No #of Improved Tasks in Both Assessments	No #of Non-Improved Tasks in Both Assessments	No #of Complete Scores in Both Assessments	No #of Complete Failures in Both Assessments	Aphasia Type	Mean of First Language Performance	Mean of Second Language Performance
1. M.J.	29	M	R	16	Engineer	Trauma	15	24	22	9	9	--	Mild Wernicke's	8.48	9.77
2. M.R.	37	M	R	12	Employee	CVA	41/2	131/2	31	--	--	--	Conduction	6.35	8.38
3. M.M.	59	M	R	14	Retired	CVA	61	70	29	2	--	1	Wernicke's	2.58	4.67
4. H.M.	61	M	R	12	Retired	CVA	14	23	27	4	--	3	global	2.38	4.25

Table 1. Selected Information on Reported Cases

(Abbreviations: Sex: M, male; Hand: handedness, R, right; Etiology: CVA, cerebrovascular accident)

At the time of the first assessments, their ages ranged from 29 to 61 years, their education from 12 to 16 years. They also differ with respect to type and severity of aphasic symptoms. It seems that in right-handers, linguistic expression in all modalities appears to be under nearly exclusive control of the left hemisphere; the same control appears to be generally true for manual ability. Language comprehension is also under the dominant control of the left hemisphere in right-handers. There are, however, reasons to believe that this dominance is less absolute for comprehension that for expression. It can thus be hypothesized that the right hemisphere does not support speech production mechanisms. This would mean that certain brain structures that are not language specific may be employed for certain mental processes required for successful language learning. There would undoubtedly have to be a controlling mechanism, for, otherwise, neither language learning nor language use could effectively take place.

On the other hand, this study contradicts that of Lenneberg (1967) which believes that language faculty is totally displaced to the left hemisphere. This study indicates that right hemisphere has the capability of language functioning and language does not disappear totally due to brain damage. There is certainly an involvement of right hemisphere in language functioning, at least, in language comprehension and reading tasks. Hence, the focus should be on helping patients to move towards realizing their own individual and unique potential, towards becoming fully functional persons (Maslow: 1970; Rogers: 1983 Underhill; 1989).

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