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NEUROPSYCHOLOGICAL ASSESSMENT: COMPUTERIZED BATTERIES OR STANDARD TESTS

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SUMMARY

In clinical neuropsychology a huge number of neuropsychological tests have been developed, and the corpus of these instruments is always increasing. Because of this, the question has been raised as to which are the most usefull instruments that provide the best neuropsychological profiles of the subjects. In the actual literature, there are polemics about the advantages and disadvantages of computerized neuropsychological batteries versus standard paper and pencil tests.

Inthe present increased level of neuropsychological evaluation, computerized batteries still are not used in the majority of tests in clinical neuropsychology. Besides the impressive collection of neuropsychological instruments, the role of the educated and experienced clinician in neuropsychological evaluation is irreplaceable.

Key words: *neuropsychological assessment - computerized batteries - Boston Process Approach*

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INTRODUCTION

Clinical neuropsychology is the applied scientific discipline that studies the relation between a human's brain functions and his behaviour (Kolb & Whishaw 2003). The neuropsychological assessment reached its zenith in the 80's of the 20th century; there was great demand for clinically trained neuropsychologists, and neuropsychological evaluation is considered as an essential "tool" in neurology. However, nowadays the role of neuropsychological assessment, has been radically changing, and this evaluation has developed new characteristics that have, also, from time to time, but continually, been changing.

The constructors of neuropsychological instruments believed that they would be able to construct a single test for brain damage evaluation and make clear the distinction between patients with brain damage and patients without brain damage. Such beliefs have proved to be unreal; among other reasons, the specificity of these tests has been undermined by their construction because it was impossible to avoid the elements that did not belong exclusively to the measured construct (Lezak 1995). The majority of the neuropsychological tests for higher mental processes, owing to the complexity of these processes themselves, include the examination of various functions, not only a single isolated function.

Over time, more sophisticated test procedures have been developed, owing, above all, to the development of cognitive neuroscience and diagnostic methods of brain visualisation, as well as, generally, to the increase of health care. By the 90's of the 20th century, a large number of neuropsychological tests have been developed, and the scope of these instruments has been continuously enlarged by new ones.

Considering the huge test corpus, the question of which are the most adequate instruments that would provide the most reliable neuropsychological profiles of the patients is imposed. In this sense the advantages and disadvantages of computer neuropsychological batteries are discussed in relation to the classical "paper-pencil" test type (Kertzman, Erznik, Grispan, Weizman & Kotler 2008, Woo 2008, Kemp, Hatch & Williams 2009). One of the advantages of the computer batteries compared to the classical tests is their economy, as they require less time for administration. Scoring is automatic, results are immediately available, and the possibility of the examiner's error in the scoring is minimal (Woo 2008). Neuropsychological paper-pencil tests are limited as they require trained neuropsychologists to conduct the administration and interpretation (Kertzman, Reznik, Grinspan, Weizman & Kotler 2008), and such an administration procedure is to be performed for each test. Such process is, as it is stated, expensive and takes a lot of time. These limitations initiated the development of the range of the computer cognitive batteries as a relatively cheap alternative to standard tests.

Although computer interpretation of scores does not require neuropsychological expertise, the issue is whether this fact should be considered as an advantage of computer batteries. Thus, neuropsychological diagnostic has been assumed to be a highly specialized skill mastered by trained neuropsychologists, while computer reports provide a schematic presentation of test scores, without the possibility for more subtle analysis. Unlike standard clinical evaluation the computer tests do not provide qualitative analysis in sufficient measure. With the application of classical tests a trained examiner may inspect not only the error

type produced by the patient but also the strategy applied by the patient in the process of solution seeking which is very important in the determination of diagnosis. The examiner begins the analysis with an interview in order to get insight into the patient's emotional state, his/her social competences, as well as to understand those cognitive domains that are, most probably, dysfunctional. On the basis if this information and observations of the patient's behaviour, the decision about the test type that is to be applied is made and the limitations that may result as the consequence of certain handicaps, are perceived (Pavlovic 1999). Beside this, the interview provides information about the reflection of the patient's neuropsychological status on his/her future, also including the examiner's recommendation to the patient as to how to compensate his/her cognitive disturbances (Lezak, Howieson & Loring 2004). In other words, computer neuropsychological batteries in significant measure reduce the interaction between examiner and patient, and they can not replace the clinical interview that is important for appropriate interpretation of the results, prognosis and planning of the rehabilitation program.

The main task of the neuropsychological examination is to evaluate the premorbid level of the cognitive abilities. It represents criteria on the basis of which it could be determined whether certain cognitive function is damaged as well as the degree of expressed damage (Ocic 1998). For this kind of evaluation, the interview data, the highest test scores, data about professional achievements and data about the patient's most developed skills are all used. Hence, the scores represent only one of several factors that participate in the evaluation of premorbid cognitive level, and the information about the patient obtained on the basis of computer batteries is not sufficient to define premorbid intellectual capacities.

Another problem with the computer batteries refers to their inadequacy when the patient is not trained to use the computer, which is relatively often the case with older persons. This may be a source of anxiety for the patient and it may result in test failure.

The application of computer batteries implies preserved motoric function and these batteries, mostly, rely on the visual sensory modality, so that it is not possible to apply them in the case when there is a patient with handicap in these functioning fields. The classical tests may overcome such difficulties as they use instruments of audio type.

FIXED, INDIVIDUALISED AND FLEXIBLE BATTERIES

The impressive collection of tests available to neuropsychologists, at one end of its spectrum contains standardized fixed batteries with precise criteria for "organicity". Computer neuropsychological batteries belong to this type of instruments. These test batteries have an advantage as the measuring procedures are standardized and since the results may be used both for diagnosis and for research. Simple administration, scoring and interpretation is common with such tests and, at the same time, represents their, probably, the most significant quality (Colb & Whishaw 2003). It is important to point out that the use of fixed batteries may provide reliable neuropsychological profiles, as well as that these results may be used for research purposes. However, test scores are not adequate comparative standards for persons that suffer from global deterioration or for those who have been brought up in such psycho-social or cultural environment that had unfavourable influence on cognitive development. Neuropsychological evaluation can be incorrect if it relies only on test scores, not taking into consideration illness history, observation of the patient's behaviour and qualitative analysis of test results. The ability to initiate cognitive strategy during the problem solving, mental activity control and regulation, the way in which a patient follows and maintains given instructions should also be considered in the interpretation process. These data are very important not only for the purpose of understanding cognitive deficiency but also for the purpose of potential evaluation for rehabilitation (Ocic 1998).

The application of fixed, including computer batteries, does not require either knowledge of any theoretical test basis or brain organization. Thus it is less possible that the examiner acquire required knowledge and experience that is necessary to conduct research and valid interpretation. Also, it is less probable that the application of fixed batteries will identify strong and weak aspects of the patient's cognitive functioning. Also, these batteries can not be applied to patients in delirium or confusional states, or in progressive states of dementia (Ocic 1998) and, as already said, with patients that have deteriorated motoric function and vision.

At the other end of this spectrum are individualised test batteries that require limited theoretical knowledge for administration and interpretation. Such assessment is far more qualitative than quantitative. Testing is modulated according to the abilities and ethology of the examinee, with focus on qualitative aspects of his/her achievements on each test. For example, Luria's neuropsychological assessment is not exactly test battery, but it is a strategy for examinee exploration. (Luria-Nebreska neuropsychological Battery represents an attempt to structuralise and qualify Luria's procedure, but in this way the battery has been transformed into a completely different analysis compared to Luria's assessment).

Between these two extremes in neuropsychological assessment, lies composite, so called flexible batteries where each test, with comparative norms, is set in a formal way, but qualitative analysis and test score profiles are considered as well. Flexible batteries consist

of flexible tests group that are obligatory and are supplemented with other tests according to the specific neuropsychological disfunctions of the patient. An example of such a method is the Boston Process Approach (Kaplan 1998) where the score itself is not crucial but the information treatment and its behavioural results are. Also, strong and weak aspects of each patient are defined. In such a flexible assessment, each battery is under constant modification in order to accommodate test revisions and further development. The only limitation imposed on the examiner is the need for certain education that is the condition to acquire the status of clinical neuropsychologist. Hence, the use of neuropsychological tests based on the cerebral organization theory includes the understanding of such theory. It is not possible to acquire the necessary knowledge and experience in the application, administration, evaluation and interpretation of these tests during short weekend courses. For example, the patient with IQ 130 can show relative damage on episodic memory tests, but his scores may be acceptable when compared to the score of the patient with IQ 90. So, contrary to the standard psychometric assessment, neuropsychological assessment must be flexible. Such flexibility makes interpretation more complex and requires extensive training in the field of fundamental neuropsychology and neurology, as well as in neuropsychological assessment. It is obvious that computer batteries can not meet the criteria imposed in such programs; they can find their place within flexible batteries, but only as a part of the instrument palette.

Computer programs within neuropsychological assessment are rapidly multiplying and gradually advance towards a dominant place in the repertoire of neuropsychological tests. The guideline for appropriate computer neuropsychological assessment was published for the first time in 1987 and is still valid (Schatz & Browdyke 2002). It is desirable that anyone who intends to introduce these computer programs into his/her research procedure, should get acquainted with these guidelines that also include ethnical standards. On the other hand, many recently published books, as well as published catalogues of instruments show that the majority of psychologists still prefer to choose clinical approaches to the techniques including occasional use of specialized computer programs (Lezak, Howieson & Loring 2004). As the development of these programs goes on, computer batteries still do not have a central role in the practice of clinical neuropsychology. However, their use in study programs is increasing.

Certanly, the computer programs are not a replacement for standard neuropsychological assessment. But they are useful devices for neurologists, psychiatrists and physicians specialized in other fields who can, in a very short period of time, reach objective data that will ease treatment planning (Woo 2008). If these tests indicate possible damage, physicians may refer to neuropsychologists who will give a detailed evaluation of both strong and weak aspects of the patient's cognitive functioning, as well as strategies applied in the course of accomplishing tasks. In this way the patient and his family have assistance as they learn how to deal with the problems, how to reduce symptoms, since the patient is recommended possible ways in which he/she can compensate for the cognitive deficit in everyday life. Also, such information helps the patient and physician to decide whether rehabilitation is the right choice. In terms of this, neuropsychologists can recommend a cognitive rehabilitation program that will be harmonized with the patient's neuropsychological profile.

It should be noted that these tests are only part of a neuropsychological assessment that also considers diagnosis, illness history, interview data, the manner in which the task has been solved, and the cognitive functioning profile. Neuropsychological assessment contains an evaluative component including hypothesis testing and data integration (Leposavić, Leposavić & Jašović-Gašić 2009). Also, this assessment may supplement the description of the nature of the disturbance and contribute to the differential diagnosis, particularly in terms of the distinction between neurological and psychiatric disorders. Hence, tests are only a part of the tools used by neuropsychologists in their assessment to the patient. The instruments enable us to obtain data about the way in which patient with brain damage thinks and functions in everyday life. However, beside the impressive collection of neuropsychological instruments, it seems that the role of a clinician with education and experience in the neuropsychological evaluation, as well as in psychodiagnostics, is essential.

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