

Neuropsychological investigation with Luria's methods

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Luria's Neuropsychological Investigation (1, 2) is a qualitative method mainly developed as an instrument for diagnosing focal brain lesions. The question has arisen as to whether there is any point in introducing the Investigation as an instrument in behavioral toxicology.

In this paper a short description is given of the theoretical foundation of Luria's methods and of the procedure of the Investigation. Examples of its use are mentioned. Its possible value in this particular field remains to be clarified however. One of the main trends in Luria's concept of psychological function is that complex behavioral processes are not "localized" but are distributed throughout the brain in "functional systems." These systems are organized so that each cortical zone contributes in a specific way in accordance with its position within the cortical hierarchy and in accordance with the rules of innervation and inhibition. Therefore, for a complex behavioral act to be performed in a precise and smooth manner, the coordinated and governed working of all cortical areas responsible for the elements of the act is a necessary condition. The theory also assumes that the higher psychological processes are social in origin and structured through the mediation of speech and that these processes function consciously in a self-regulated manner. Accordingly they are individual and can therefore only be investigated within the particular framework of each person's psychological construction. Neurophysiological evidence of these considerations has been found, eg, in cerebral blood flow studies, and the newest histological findings concerning the diversity of human brains give further support.

The main demand on the investigation is to embrace these theoretical trends. Thus attention must be paid to the cultural and social situation of the individual being examined. The development and level of speech function must be taken into consideration, as well as the level of consciousness and capacity for control and self-regulation. The Investigation is a clinical examination, and the psychologist must make him- or herself acquainted with the patient's psycho-

logical state as it is available from the record. Full awareness of the present condition and the past history is also essential, and motivation and trust must be created. The examination is divided into stages, each determined by the information obtained in and the results of the preceding stages.

The *first stage* is a preliminary conversation to establish the patient's state of consciousness and the level of intellectual functioning as compared to the premorbid level. The attitudes towards the illness and the current situation and towards family and surroundings are elucidated. Finally, a clinical history is taken.

It is essential for the neuropsychologist carrying out the examination to have broad clinical experience. The structure of this method is comprehensive within the theory, but it is up to the investigator to differentiate between disturbances in functional systems caused by lesions in various areas of the brain. Furthermore it is important to distinguish between neurotic or psychotic syndromes and disturbances caused by either delimited focal lesions or more generalized affections. The preliminary conversation illuminates, in particular, Luria's first and third blocks, the block of energy and tone, and that of planning and control.

The *second stage* of the examination is mainly directed towards the block of perception and the storage of information. The primary aim is to discover the state of the individual analyzers, kinesthetic and motor, auditory, tactile, and visual. The tests are simple and standardized at a level which anyone with no organic brain lesion can perform, including people with poor or little formal educational background. In accordance with the characteristic qualitative viewpoint of this procedure the neuropsychologist has to analyze the means the patient uses to perform a test and must change the stimuli and the situations if the patient's responses are not fully comprehensible. This situation implies that, even if most of the tests available in Luria's Neuropsychological Investigation are used, the investigation cannot follow a strict scheme. If the patient has difficulties in a certain area of functioning, it may be important to investigate further within this area, to try out the elements of the functional system where disturbances

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are suspected. It is also of interest to evaluate whether a change in conditions, giving partial or additional information, more time, and emotional support, improves the function.

The *third stage* is the selective part of the investigation. The tests are chosen to illuminate the extent and degree of the disturbances on the basis of earlier findings, particularly in the second stage. The examined areas include speech, memory, and thinking processes, and the range and complexity of the tests presented are determined individually. Depending upon the whole situation and the clarity of the symptoms disclosed, more or fewer tests are employed. It must be noted, however, that, in order to fulfill the demands of the final, fourth stage, not only tests focused on the defects will be needed, but also tests that can disclose the intact functions.

The aim in the *fourth stage* is the formulation of the conclusion that will be based on a comparative analysis of all the data. The syndrome of the fundamental defect must be identified, and, as far as possible, the underlying pathophysiological structures must be defined.

Theoretically a localized lesion can be proposed only if all functional systems that include a disturbed factor are affected, while at the same time all functional systems that do not include this factor are preserved. These circumstances lead to Hans-Lukas Teuber's (5) principle of double dissociation, which makes possible the evaluation of the reliability of the findings; a control system is included in the examination. An example of the simple test from stage 2 is a test evaluating sensorimotor function. The patient imitates the examiner, who holds his fingers in various positions; the response yields information of such varied functions as perception, kinesthetic basis for a movement, gnostic spatial experiences, right/left orientation, body image, and possibility for shifts in movements. The more selective tests in stage 3 include tests for receptive and expressive speech. In practice both categories are examined at the same time and sometimes by the same methods. The tests of receptive speech range from simple tests for phonemic hearing, word comprehension, and understanding of simple sentences to an understanding of logical grammatical structures. In this area a task can be "Draw a cross beneath a circle — a square to the right of a circle but to the left of a triangle" or "If I had breakfast after having read my newspaper, what did I do first?" The memory tasks range from simple to complex, including interference, retrieval, and various forms of recall. The most complex tests

illuminating higher intellectual processes deal with concept formation at various levels.

The Luria Neuropsychological Investigation was developed for the examination of individual cases, and Luria himself has described general signs elicited by assorted tests and grouped them together into unified syndromes (3, 4). The procedure is simple, it is usually followed with interest and acceptance by the subject, and it can be completed in 1—2 h. The main demands are on the examiner, who has to guide the sequence of the procedure, to combine and group the tests, and to ensure that both disturbed and intact functions are examined.

The investigation has also been used in group studies, and the results obtained were evaluated statistically. In the group studies the same procedure was followed for all the patients. The tests were selected, first, to be representative of the whole spectrum of cognitive functions and, second, specifically to illuminate areas of particular concern for the groups in question. Statistical evaluation was made possible by the rating of results from the various tasks on the following three-level scale: no disturbances, slight disturbances, and severe disturbances.

Concerning the applicability of the Luria Neuropsychological Investigation, it is important to note that, even though the investigation is predominantly directed towards focal diagnostics and even if the double dissociation principle that assures the reliability of the investigation is closely connected to focal diagnostics, experience has shown that diffuse brain dysfunction can also be disclosed and the various disturbances arranged in order of seriousness. The Investigation is delicate and informative in the hands of the experienced investigator.

References

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