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Spanish Applications of Luria's Assessment Methods

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Luria's neuropsychology has been particularly influential in the Spanish-speaking world. Its impact is observed with regard to not only assessment, but also rehabilitation, and, especially, neuropsychological theorization. In this article, Luria's approach to neuropsychological assessment is examined. A distinction between Luria's neuropsychological tests and Luria's neuropsychological approach is introduced. It is pointed out that, according to Luria, the specific tests used in the neuropsychological assessment are secondary; the theory supporting the neuropsychological testing is of primary importance. The development of neuropsychology in the Spanish-speaking world is briefly presented, and the use of Luria's neuropsychological assessment procedures in Latin America and Spain is analyzed. Finally, neo-Lurianism in the Spanish-speaking world is considered.

KEY WORDS: Luria; neuropsychology; neuropsychological theory; assessment; neo-Lurianism; Spanish applications.

INTRODUCTION

The influence of Luria's neuropsychology has been particularly strong in the Spanish-speaking world. This holds true not only with regard to his theoretical approaches, but also in relation to his assessment procedures and rehabilitation strategies. Without doubt, nowhere else in worldwide neuropsychology has Luria's influence been so significant.

Four reasons for this particularly strong Lurian impact in the Spanish-speaking world can be pointed out: First, the amount of neuropsychological literature in the Spanish language has been relatively limited. However, most of Luria's books were translated and published during the 1970s and 1980s (e.g., Luria, 1974a, 1974b, 1977, 1980a, 1980b) and are becoming a basic source of neuropsychological information for Spanish speakers. It is interesting to note that the works of most classic North American and western European authors have not been translated into the Spanish language.

Second, most leading figures in Latin American and Spanish neuropsychology are practicing within the Lurian tradition. J. E. Azcoaga in Argentina, V. M. Alcaraz in Mexico, E. Cairo-Varlcarcel in Cuba, J. Peña-Casanova in Spain, L. Balarezo in Ecuador, and A. Ardila in Colombia are a few examples. Some of them were directly trained in the former Soviet Union.

Third, since the 1970s, but particularly during the 1980s and 1990s, several neuropsychology books written in the Spanish language began to be published in Latin America and Spain. Editorial Trillas in Mexico, Editorial Prensa Creativa in Colombia, and Editorial Paidós in Argentina have published altogether more than 20 basic books in neuropsychology. The content of virtually all these publications is within the Lurian tradition.

Finally, interest in theoretical issues in neuropsychology has played a fundamental role in the development of neuropsychology in Latin America and Spain. Neuropsychological theory rather than neuropsychological assessment has been the central focus of interest in the Spanish-speaking neuropsychology community. Luria's strong and coherent theorization has been particularly attractive for Spanish speakers. It is understandable that Luria's neuropsychological assessment procedures have been used extensively in Latin America and Spain.

LURIA'S APPROACH TO NEUROPSYCHOLOGICAL ASSESSMENT

One of the crucial and most polemic points in Luria's neuropsychology has been his approach to assessment (Reitan, 1976). According to Luria, neuropsychological

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assessment must not depart from theory. Otherwise, neuropsychological assessment would become a psychometry applied to populations with brain damage, a psychometry theoretically empty from the view-point of the neurosciences (Luria and Majovski, 1977). Luria extensively displayed his approach to clinical neuropsychological assessment in Part Three of his book *Higher Cortical Functions in Man* (1966). Toward the end of his life, he published a short guide to neuropsychological assessment (Luria, 1973; see the article "Outline for the Neuropsychological Examination of Patients with Local Brain Lesions" in the previous issue). Part Three of *Higher Cortical Functions in Man* was summarized and systematized by Christensen (1975) and translated into several languages, including Spanish. Golden (1981; Golden *et al.*, 1978) went further and developed a psychometric diagnostic instrument known as the *Luria-Nebraska Neuropsychological Battery*, departing from Christensen's manual. This battery has been widely used in neuropsychological assessment in different regions of the world, including Latin America and Spain.

According to Luria, the basic goal of neuropsychological assessment is to perform a syndromatic analysis (Luria, 1966). This departs from his interpretation of brain organization for cognitive processes. Psychological processes should be considered "complex functional systems." A "functional system" is understood to be a group of interconnected biological operations that produces a particular biological effect. The functional system is based on a complex dynamic constellation of stages, situated at different levels of the nervous system, which in performing an adaptative task may be changed without the task itself being changed (Anokhin, 1974). For instance, to write represents a complex psychological process (functional system) that requires the participation of multiple areas of the brain; each of these areas makes its particular contribution to the whole system. A focal lesion of the brain will disrupt the ability to write at a particular level (the ability to perform the skilled movements required for writing, the spatial organization of writing, the selection of words, the ability to sequence graphemes, etc.). However, such focal damage will also disrupt all the functional systems for which that particular operation is required. For instance, the patient will have difficulties not only for the spatial organization of writing, but also for the spatial organization of numbers, figures, drawings, and so forth. In all the functional systems in which such an ability ("factor") is included, the defect will be apparent.

Brain damage produces not the loss of a specific cognitive process (functional system), but its disturbance at a specific level. This implies that neuropsychological assessment will be aimed at disclosing the fundamental defects or factors underlying the apparent deficits (Luria, 1966). For this purpose, it will be necessary to administer different types of tasks to the patients and to analyze how the particular difficulties in performing each of them are manifested.

This approach has two implications: (1) Neuropsychological assessment is flexible and should be adapted to each patient, and (2) the examiner must possess a vast amount of knowledge about the brain organization of cognitive activity to be able to permanently reorient the evaluation. It is not sufficient to know how to apply some more or less standardized tests. Rather, the fundamental knowledge the examiner must have is the knowledge about the brain organization of psychological processes (Ardila, 1992b). In other words, for Luria, the neuropsychologist must command a solid background not only in psychological measurement, but also in neurology, neurophysiology, neuroanatomy, and general psychology.

For Luria, the most important observation when a clinician is testing a patient refers to the nature of deviations or errors and how such mistakes could be explained. This implies that the pass/fail criterion is insufficient, or, at best, it is simply an initial gross approximation to the characteristics of the deficit. The qualitative analysis of errors will be particularly informative regarding the patient's underlying deficit ("factor"). It is not sufficient to know that a patient cannot understand language or cannot write. For Luria, the most important information is the precise nature of the patient's inability to understand language or to write and the specification of the level in the functional system that is disrupted. What are the actual mistakes that the patient makes when he or she is trying to understand language or trying to write? When patients are performing calculation tasks, the errors produced by patients with frontal lesions, those with parietal lesions, and those with temporal lesions are different, although all of these patients may present with a certain degree of acalculia (Ardila and Rosselli, 1990a; Rosselli and Ardila, 1989). All can fail in exactly the same tasks, but for totally different reasons; their errors will be the key clues for understanding the underlying deficit.

Luria strived to establish correlations between brain pathology and disturbances at specific levels of information processing, not to correlate brain pathology with performance on specific tests. Tests may be changed, but because some specific level of information processing would still be required, impairment will be manifested. Besides, the performance on even apparently simple tests can require the participation of different brain systems. Hence, even performance on simple tests can be altered as a consequence of different brain pathology, although the specific errors will be different.

Two aspects in Luria's neuropsychological assessment should be clearly distinguished: (1) the specific tests he used for pinpointing the cognitive deficits and (2) his particular clinical approach to the neuropsychological assessment.

NEUROPSYCHOLOGICAL TESTS AND THE NEUROPSYCHOLOGICAL APPROACH

In general, a great deal of interest has been focused on the specific tests Luria used. This interest is reflected, for instance, in the popularity of the aforementioned Luria-Nebraska Neuropsychological Battery. Accordingly, in his *Higher Cortical Functions in Man*, as in his *Neuropsychological Research* monograph, Luria presented an extensive series of tests that are potentially useful in neuropsychological assessment. The assessed areas include spatial, visuospatial, somatosensory, and auditory abilities; movements; oral and written language; memory; calculation abilities; and intellectual processes.

Some of these tests presented in Luria's *Higher Cortical Functions in Man* and *Neuropsychological Research* have been traditionally used in clinical practice. For instance, several tests were constructed to evaluate perceptual integrity. Others were developed by Luria, such as the tests devised to assess frontal lobe damage. But, for Luria, the critical element in neuropsychological assessment does not refer to which specific tests are used, but rather to the type of psychological processes involved in those particular tests. In fact, Luria had a more or less standard set of tests that he used according to the specific dictates. However, Luria's assessment does not call for the use of the same tests he incorporated, but rather his assessment stresses the use of the particular clinical philosophy he proposed and developed in neuropsychology.

It is important to emphasize that Luria never rejected the standardization of neuropsychological tests; on the contrary, he encouraged it. Luria investigated the performance of normal populations on neuropsychological tests. Furthermore, his tests can be standardized and some of them have been in extensive normal populations. But, the availability of norms is no substitute for the clinical ability to perform a syndromatic analysis.

Luria's assessment procedures have two significant advantages: First, they rely on simple, unsophisticated instruments, and the examiner is not required to acquire expensive, sophisticated, and often difficult-to-obtain tools. These simple instruments can even be constructed by the examiner. In fact, the neuropsychological assessment set that Luria used in his clinical research activity at the Burdenko Institute in Moscow was so simple that anyone anywhere can easily reproduce it. Second, neuropsychological assessment may be relatively brief. Assessment is flexible and must be adapted to each patient. The examiner should concentrate his or her efforts on pinpointing the fundamental defects that the patient may present. This time-saving approach may be particularly important in some clinical settings.

LURIA IN THE SPANISH-SPEAKING WORLD

Neuropsychology in Latin America began in the late 1950s, when C. Mendilaharsu and S. de Mendilaharsu created at the Montevideo Neurological Institute a division devoted to the analysis of the "higher brain functions." In Spain, the development of neuropsychology is closely related to the clinical and research work of Barraquer-Borda in Barcelona. Not only the Mendilaharsus, but also Barraquer-Borda was significantly influenced by Hécaen and the French neuropsychology school. In fact, they received their training in neuropsychology in France. Evidently, the assessment procedures they used were similar to the neuropsychological testing used by Hécaen and his French group.

During the 1960s and 1970s, a growing interest in neuropsychology was observed in Latin America, particularly in Peru and Mexico (for a review of the history of neuropsychology in Latin America, see Ardila, 1990). In Peru, A. Cáceres developed an influential group in neuropsychology. He also received his training in neuropsychology with Hécaen, and his approach to assessment followed similar guidelines. The Mexican group, even though it was also significantly influenced by the French school, was somehow more eclectic and maintained a permanent interchange of books, papers, and lecturers with the United States.

The influence of Luria in Spanish-speaking neuropsychology began during the 1970s, when most of Luria's books were translated and published by Editorial Fontanella (Spain) (e.g., Luria, 1974a, 1974b). J. E. Azcoaga (Argentina) played a significant role in the dissemination of Luria's ideas. Azcoaga created in Buenos Aires an active and productive child neuropsychology research team and developed many original theoretical approaches to child neuropsychology (Azcoaga, 1979; Azcoaga *et al.*, 1981, 1983). He was influenced by Pavlov's reflexology and Luria's theory about the brain organization of cognitive processes. Azcoaga's influence is still significant in the Spanish-speaking world, particularly in Argentina, Colombia, and Mexico.

Even though Christensen's manual *Luria's Neuropsychological Investigation* was translated into the Spanish

language in 1980, the book did not attract any special interest in the Spanish-speaking world and remained virtually unnoticed. Few (if any) neuropsychologists in Latin America relate Christensen's monograph with Luria's research.

Nonetheless, the Luria-Nebraska Neuropsychological Battery aroused a great interest in Latin American neuropsychology. This interest, however, was transient. During the 1980s, several translations and adaptations of this battery were developed in Chile, Argentina, Colombia, and Mexico (e.g., Galindo and Ibarra, 1984). Golden presented a workshop of his test battery during the International Congress of Neuropsychology held in Bogotá, Colombia, in 1981.

On the occasion of the Bogotá 1981 International Congress of Neuropsychology, a brief neuropsychological assessment monograph was published (Ardila *et al.*, 1981). This monograph, Lurian in its approach to neuropsychological evaluation, had a significant influence during the following years on the type of neuropsychological assessment used in Latin American countries. It is worthy noting that more than 700 people from 14 countries attended the Bogotá 1981 International Congress of Neuropsychology. This meeting represented a particularly important milestone in the development of Latin American neuropsychology.

In recent years, interest in the Luria-Nebraska Neuropsychological Battery has been progressively declining. More classic and standard neuroassessment instruments and Luria's more traditional approach have prevailed.

At the beginning of the 1990s and almost simultaneously, two books dealing with neuropsychological assessment were written in the Spanish language and published: in Spain, the *Barcelona Test* (Peña-Casanova, 1990a, 1990b, 1991) and in Mexico, *The Assessment of Brain Damage: A Neuropsychological Perspective* (Ardila and Ostrosky-Solis, 1991). Both became particularly influential in neuropsychological assessment in the Spanish-speaking world, and the content of both is, at least to a significant extent, within the Lurian tradition.

The Barcelona Test presents an extensive model for neuropsychological evaluation. It represents a carefully designed, comprehensive neuropsychological test battery. Different cognitive areas are included: language, memory, perception, and so forth. Some of the tests are taken from "classic" neuropsychology; other tests are taken directly from Luria. Normative data for these tests are included. Consequently, Peña-Casanova's neuropsychological assessment book represents an attempt at integration between Luria's clinical approach in neuropsychology and psychometrically oriented neuropsychological testing.

Ardila and Ostrosky-Solis's book is not specifically a neuropsychological test battery. It attempts to be a kind of textbook in neuropsychological assessment. A variety of issues related to assessment are discussed: the purposes and limitations of neuropsychological assessment, neuropsychological syndromes, the levels of a neuropsychological diagnosis, the importance of the clinical history, the relations between neuropsychology and psychiatry, and so forth. Finally, a model for neuropsychological assessment, partially but not totally taken from Luria, is presented. Some normative data are also included.

During the early 1990s, L. Balarezo in Quito, Ecuador, carried out an extensive research project directed to obtain Ecuadorian norms for most of Luria's neuropsychological tests. His research project has played a crucial role in the development of neuropsychology in Ecuador.

In parallel with this interest in Luria's approach to neuropsychological evaluation, standard neuropsychological tests have become progressively more influential in Latin America and Spain. The verbal fluency tests, the Rey-Osterrieth Complex Figure, the Wisconsin Card Sorting Test, the Boston Diagnostic Aphasia Examination, the Trail Making Test, the Token Test, and the Wechsler Memory Scale are just some examples of these standard and "international" neuropsychological instruments frequently used in Latin American neuropsychology. Different normative studies of these standard tests have been carried out in various Latin American countries (e.g., Ardila and Rosselli, 1994b; Ardila, Rosselli, and Puente, 1994).

"NEO-LURIANISM" IN THE SPANISH-SPEAKING WORLD

Recently, the idea of a "neo-Lurian" approach in neuropsychology was introduced (Ardila, 1995a). New advances in neurological and psychological sciences during the last two decades allow a further development and sophistication of different Lurian ideas about the brain organization of psychological processes. Recent advances in neuropsychology may contribute not only to Luria's neuropsychological theory, but also to Luria's approach to neuropsychological assessment. Neo-Lurianism might be defined as "the further development and sophistication of Luria's approach, maintaining his basic ideas on the functional model of the brain (complex functional systems and functional units) and his clinical approach" (Peña-Casanova and Manero-Borrás, 1995, p. 111).

A significant interest in further developing Luria's theory about brain organization of cognition has been observed in the Spanish-speaking world. In this regard, four research groups should be mentioned: the Argentinian, the Colombian, the Spanish, and the Mexican.

Azcoaga represents the central figure in the Argentinian neuropsychology school. His work in neuropsychology, particularly in child neuropsychology, has been extensively published and has a Lurian framework

(Azcoaga, 1977, 1979, 1980, 1981; Azcoaga *et al.*, 1981, 1983). He proposed an original interpretation of child developmental disorders that is particularly influential within the Spanish-speaking world.

Azcoaga suggests that neuropsychological diagnosis includes two stages: the clinical (or syndromatic) diagnosis and the physiopathologic diagnosis (to determine the impaired factors). The neuropsychological assessment must evaluate the degree of development (either normal or abnormal) of three basic devices: attention, habituation, and memory. Different testing procedures can be used in this stage of the assessment. Assessment of higher brain functions includes gnosis (sensory, auditory, and visual), praxis (simple and complex), and language. In each case, an array of testing procedures can be administered. Developmental language defects can be grouped in two large categories: difficulties in the phonological-syntactic code or in the semantic code, depending on whether the kinesthetic-verbal "analyzer" or the verbal "analyzer" is involved. Azcoaga further presents a classification of learning disabilities, including praxis, gnosis, and language retardation (higher brain functions), plus reading, writing, and calculation ability retardation (school-dependent abilities).

In Colombia, Ardila and colleagues have attempted to develop Luria's neuropsychological theory and assessment procedures in several directions: First, they have worked to further the analysis of the historical origins of cognition carried out by Vygotsky (1962) and Luria (1980). In 1993, Ardila, with the collaboration of D. F. Benson and M. Rosselli, published a special issue of the journal *Behavioral Neurology* devoted to this topic (*Behavioral Neurology*, Vol. 6, No. 2, Special issue: "On the origins of cognitive activity"). In this historical-cultural analysis about the origins of cognition, a purely neuropsychological perspective was used (Ardila, 1993b).

Second, Luria's approach to aphasia has been developed by the Colombian group. Several papers in this direction have been published in national (e.g., Ardila, 1992a, 1993a; Ardila and López, 1984a, 1987; Ardila and Rosselli, 1988) and international journals (e.g., Ardila and Rosselli, 1989, 1993, 1994a). In particular, semantic (Ardila, López, and Solano, 1989), dynamic (transcortical or extrasylvian motor aphasia) (Ardila and López, 1984b; Novoa and Ardila, 1987), and conduction (Ardila, 1992c; Ardila and Rosselli, 1990b, 1992; Benson and Ardila, 1994) aphasias have been analyzed. An attempt to integrate Luria's approach to aphasia with Geschwind and colleagues' Boston Aphasia School point of view was presented in the book *Aphasia: A Clinical Perspective* (Benson and Ardila, 1996).

Third, an attempt has been made to further develop Luria's theory about cognitive "factors" participating in cognition (Ardila, 1995b; Ardila, Rosselli, and Bateman, 1994). And, finally, Luria's approach to neuropsychological assessment has been the focus of interest in several publications (e.g., Ardila, 1992b; Ardila *et al.* 1981). New neuropsychological assessment instruments based on Luria's theory have been developed in collaboration with Ostrosky's Mexican neuropsychology group (e.g., Ostrosky-Solis and Ardila, 1991; Ostrosky-Solis *et al.*, unpublished).

Neo-Lurianism in Spain is represented by Peña-Casanova (1989; Peña-Casanova and Manero-Borrás, 1995). For him, neo-Lurianism represents a continuum between Luria's approach and other current approaches in neuropsychology, even including a partial shift of interests and terms. Peña-Casanova and Manero-Borrás (1995) propose the following six directions for future development of Luria's neuropsychology:

1. To develop the concept of functional systems.
2. To consider functional (local) specialization but to reject the strict notion of modularity for all activities.
3. To consider that cortico-cortical and cortico-subcortical connections are bilateral and that input and output are multiply represented in a parallel way. This implies the need to accept alternative parallel systems of representing information.
4. To introduce Goldberg's (1990) neo-Lurian gradiential approach, in which cortical functional organization is represented according to continuous and interactive principles; this gradiential approach would be compatible with modularity if that is seen as interactive (intermodular communication); consequently, these considerations lead to the suggestion that there is parallel distributed gradiential processing (Peña-Casanova and Manero-Borrás, 1995, p. 119).
5. To introduce neurochemical concepts into the analysis of cognitive systems.
6. To further develop Luria's model, introducing more global concepts such as consciousness and the self, allowing for an integrative view of neuropsychological psychopathology.

It is inaccurate to refer to a "Mexican group" in neuropsychology. In fact, several neuropsychology groups exist in Mexico. It should be mentioned, at least, that there are Ostrosky's group at the National Autonomous University of Mexico (Mexico City), Heres' neuropsychology graduate program (Mexico City), the neuropsychology team at the National Institute of Neurology and Neurosurgery (Mexico City), the neuropsychology group at the Mexican Institute of Psychiatry (Mexico City), the Guadalajara neuropsychology research team (Matute and Alcaraz), the Puebla graduate program in neuropsychology (chaired

by Quintanar, and, currently, with the participation of L. S. Tsvetkova, one of Luria's closest colleagues), the Monterrey group, the Cuernavaca group, the Mexicali group, the San Luis Potosí group, and so forth. All these groups have been influenced significantly by Luria's neuropsychology. In fact, neuropsychology represents an active professional and research area in Mexico. Hence, the significant amount of publications, especially national but also international, in this area is understandable.

Further developments of Luria's neuropsychology have been observed from the theoretical (e.g., Alcaraz, 1980), clinical (Ostrosky *et al.*, 1989; Ostrosky-Solis *et al.*, unpublished), and rehabilitation (Quintanar, 1994) viewpoints.

It can easily be predicted that during the following years, Luria's influence on neuropsychological assessment will remain strong in the Spanish-speaking world. Most likely, Luria's procedures will be combined with some others, including more standardized and psychometrically oriented assessment instruments. Further development of Luria's ideas with regard to neuropsychological assessment is foreseen.

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