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ALEXANDER ROMANOVICH LURIA (1902-1977) AND THE MICROGENETIC APPROACH TO THE DIAGNOSIS AND REHABILITATION OF TBI PATIENTS

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SUMMARY

Alexander Romanovich Luria (1902-1977), Russian psychologist and neuropsychologist, is recognized throughout the world as one of the most eminent and influential psychologists of the 20th century, who made advances in many areas, including cognitive psychology, the processes of learning and forgetting, mental retardation and neuropsychology. Luria's scientific career was build in "the stages of a journey undertaken" (as the Russian title of Luria's autobiography says): co-working with Lev S. Vygotsky (1896-1934) and the foundation of the cultural-historical school (the 1920s), cross-cultural research, an expedition to Central Asia, and studies on twins (the 1930s), the war and the first works on brain injured patients (the 1940s), research into mentally retarded children, brain injuries and rehabilitation (1950s), the systematic development of neuropsychological research (the 1960s and 70s). The research on the functioning of the brain, touching on learning and forgetting, attention and perception as psychological constructs, was to engage Luria for forty years. Analysis of functional changes resulting from local brain lesions constituted the area of greatest interest. The single-case approach to neurological studies was to be the focus of his last years. In this paper we attempt to show the impact of Luria's approach on the foundations of the microgenetic approach to the diagnosis and rehabilitation of patients with traumatic brain injuries, and especially the importance of symptom analysis in single-case studies.

Key words: *neuropsychology (history), single case study, microgenetic theory*

There is no hope of finding the sources of free action in the lofty realms of the mind or in the depths of the brain. The idealist approach of the phenomenologists is as hopeless as the positive approach of the naturalists. To discover the sources of free action it is necessary to go outside the limits of the organism, not into the intimate sphere of the mind, but into the objective forms of social life [...]. To find the soul it is necessary to lose it.

A.R Luria

INTRODUCTION

Alexander Romanovich Luria (1902-1977) was a world famous neuropsychologist, whose work was to have an impact upon many areas, including cognitive psychology, learning and forgetting and mental retardation, and above all neuropsychology. During the year 2012, which is the 110th anniversary of his birth, a number of congresses have been organized in his honor. The Moscow International Congress dedicated to the 110th anniversary of Alexander Romanovich Luria's birth organized by the Lomonosov Moscow State University, Department of Psychology, the Burdenko Neurosurgery Institute, the Russian Academy of Education and the Russian Psychological Society, which was held on 28th November – 1st December 2012, was one of the main events, incorporating a wide variety of contributions, including the papers by the authors of the present study. Each speaker pointed out some aspect of Luria's work, depending on the aspect of his research they are familiar with: as a student and/or co-worker, as a psychologist or neuropsychologist, or as a historian of psychology, neuropsychology or culture. Despite the variety of the topics presented, only a part of his vast and complex scientific activity was taken into account, something that runs the risk of an over-simplification of Luria's theoretical and methodological contributions.

The biography written by Luria's co-worker, Evgenia D. Homskeya (2001), gives us a sufficiently well-informed and well-constructed picture of Luria's scientific career (Mecacci 2005). The index helps us to single out "the stages in the journey undertaken" (as the Russian title of Luria's autobiography says): co-operating with Lev S. Vygotsky (1896-1934) and the foundation of the cultural-historical school (the 1920s); cross-cultural research, an expedition to Central Asia, and studies on twins (the 1930s); the war, the front and the first works on brain injured patients (the 1940s); research into mentally retarded children, brain injuries and rehabilitation (the 1950s); and the systematic development of neuropsychological research (the 1960s and 70s). However, it is difficult to obtain an integrated concept of Luria's attitude towards a theory of the symptom in neuropsychology, from his autobiography or from the monographs hitherto written about him. Some authors are bewildered by the wide dispersion of Luria's work, seeing him as moving from developmental psychology to neuropsychology, and from the child, mostly normal, to the adult, mostly brain-injured.

A BRIEF SKETCH OF LURIA'S LIFE

Alexander Romanovich Luria was born in Kazan, an old Russian university city east of Moscow, in 1902. He was the son of a prominent physician, interested in psychosomatic disorders, Roman Albertovich Luria. His mother, Evgenia Viktorovna (née Haskin) was a dentist. In 1918, Luria gained his high school graduation certificate before the usual graduation date, entered the Faculty of Social Sciences at Kazan University at the age of 16, and obtained his degree in 1921 at the age of 19. While still a student, he organized the Society of Social Sciences. Later, as an assistant at the Institute for Labor Organization in Kazan, he established the Kazan Psychoanalytic Association, and planned a career in psychology. He corresponded with Freud. As a result of this interest, he wrote a book, which was published in the United States, entitled *The Nature of Human Conflicts* (1932). He describes in it attempts to study emotional states by recording motor and vascular responses (Cole et al., 2006).

In the early 1930s Luria undertook clinical trials that formed the basis of the creation of a new field – neuropsychology – which in turn was to bring him worldwide fame. Then he completed his education at the Institute of Medicine, obtaining his medical degree in 1937, and began working at the Institute of Neurosurgery. In 1941, as a result of Germany's attack on the USSR, Luria was appointed director of a hospital in the Urals. He wrote several works on the diagnosis and treatment of gunshot wounds to the head, and developed a theory of rehabilitation of patients with brain damage, with particular emphasis on aphasia. Among



Fig. 1. Alexander Romanovich Łuria (1902-1977): Post war portrait (1940s) [Source: From the private library of Professor Jason W. Brown]

his colleagues were such well-known psychologists as Zeigarnik and Rubinshtein, and the neurologists Perelman and Basin (Pąchalska 2007).

In 1944 Luria's first neurological writings in English were published, though fame in the West was to come only with the translation into English of the article "Brain disorders and language analysis," published in *Language and Speech* (1958), and the book *Traumatic Aphasia* (1959). It was then that his work on brain injuries became known. Evidence of specific brain functional organization was found by Russian psychologists in studies of the mental activity of a deaf-mute child, a mentally retarded child, an adult suffering from brain injury, or a psychiatric patient. Examples seen in chronic deformations at birth and lesion cases in adults showed the human brain's ability to program and re-program itself.

HIERARCHICAL MODEL OF CORTICAL FUNCTION

The first to suggest the use of anatomical criteria in the delineation of cortical area hierarchies was Flechsig (see: Kolb & Whischaw 2003), though it was to be Alexander Luria during the 1960s who was to fully elaborate the concept (Luria, 1973). Luria divided the cortex into two functional parts:

- the posterior part of the cortex is the sensory unit, which receives sensations, processes them, and stores them as information;
- the anterior cortex (the frontal lobe) is the motor unit, which formulates intentions, organizes them into programs of action, and executes the programs.

Luria (1966) showed that the two cortical units possess a hierarchical structure, within which three cortical zones are functionally placed above each other:

1. The first zone is equivalent to Flechsig's primary cortex.
2. The second zone consists in the slower-developing cortex bordering the primary cortex, labeled by Luria the "secondary cortex."
3. The third zone, the slowest-developing cortex, was designated the "tertiary cortex."

Luria conceived of the cortical units as working in concert along zonal pathways (Fig. 2). Sensory input enters the primary sensory zones, is elaborated in the secondary zones, and finally is integrated in the tertiary zones of the posterior unit. To execute an action, activation is sent from the posterior tertiary sensory zones to the tertiary frontal motor zone for formulation, to the secondary motor zone for elaboration, and then to the primary frontal zone for execution (see also: Kolb & Whishaw, 2003).

Consider a simplified example of Luria's model. Say you were walking along and came upon a soccer game. The actual perception of the movements of players and the ball would be in the primary visual area. The secondary visual sensory zone would recognize that those activities constituted a soccer game. In the tertiary zone, the sounds and movements of the game would be synthesized into the realization that one team had scored and was ahead and that the game had a certain significance for league standings. By the time the information is integrated in the tertiary zone, there is considerably more to it than what we would

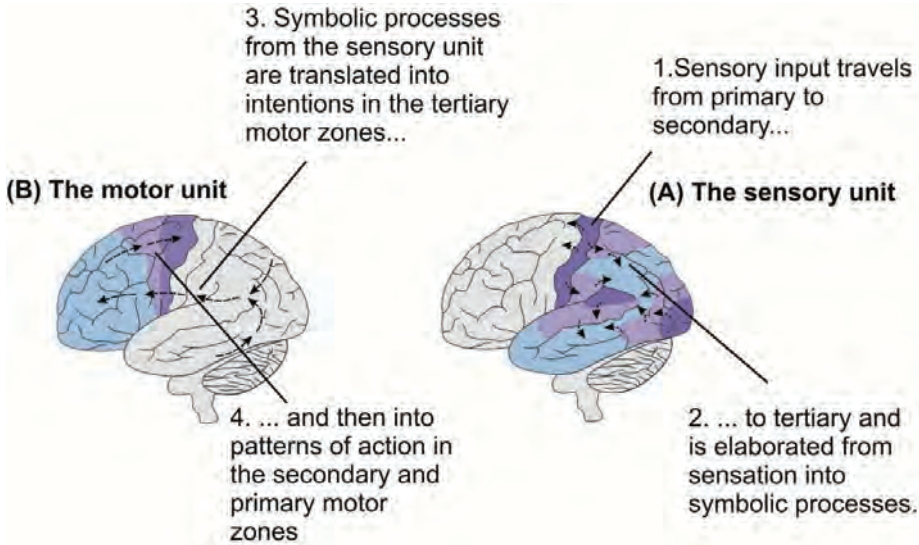


Fig. 2. Functional units of the cortex. (A) The first functional unit of the cortex—the sensory unit. The dark blue-shaded areas are primary zones; medium-shaded areas secondary zones; light-shaded areas tertiary zones. Sensory input travels from primary to secondary to tertiary and is thereby elaborated from sensation into symbolic processes. (B) The second functional unit of the cortex—the motor unit. Symbolic processes from the sensory unit are translated into intentions in the tertiary motor zones and then into patterns of action in the secondary and primary motor zones [After: Pachalska & Kaczmarek 2013]

think of as "sensory." It is both knowledge of what has been perceived just now and of the rules of the game as well.

The paralimbic cortex is activated for memory processing and the amygdala for emotional assessment by information in the tertiary sensory zone. Subsequently the cortical events would activate intention in the frontal (motor) cortex's tertiary zone with regard to a viewing spot and team support. This plan's execution is formulated in the secondary frontal zones. The crowd's actual movement is initiated within the frontal cortex's primary zone (see also: Luria 1966).

EVALUATION OF THE HIERARCHICAL MODEL

Kolb & Whishaw (2003) point out that Luria's model is based on three main assumptions:

1. Information is serially processed by the brain, a step at a time. Sensory receptor information goes first to the thalamus, then the primary cortex, then the secondary, and finally the tertiary. In a similar way, output travels from the tertiary sensory to the tertiary motor, then the secondary motor and finally travels to the primary.
2. Serial processing is hierarchical; meaning that complexity is added by each level of processing, one qualitatively different from that at the previous levels. The tertiary cortex could be viewed as a "terminal station," given that it re-

ceives input from the sensorimotor and perceptual areas while performing higher cognitive processes on that input.

3. The way we see the world is as unified and coherent entities. Luria's formulation agreed with the commonsense view that each percept is created by some active process, and the simplest way for it to be formulated is in the tertiary cortex.

The application of the then known anatomical organization of the cortex constitutes the strong point of Luria's premise, allowing for a rudimentary explanation for Luria's daily clinical observations (Luria 1973). Problems arise in relation to the questioning of fundamental assumptions on the part of more recent anatomical and physiological findings (Papathanasiou & Whurr, 2000; Ronning et al. 2005; Rosenthal 2005; Rosenthal & Desi 2005).

The following should be considered:

- Firstly, for a strictly hierarchical processing model to work, all cortical areas should be linked serially, but such a serial linkage does not happen. That cortical areas have reciprocal (reentrant) connections with the regions to which they connect has been observed, meaning there is no simple "feed forward" system. The percentage of possible connections among different areas in a sensory modality has been found to be only about 40%. Therefore there is no single area which receives input from all the other areas, which creates difficulty in the conscious forming of a single percept in one area.
- Secondly, every cortex zone has connections to many cortical areas, representing a situation wherein each cortical zone is probably undertaking more than one operation, this being subsequently relayed to different cortical areas. In addition, the results of the same operation are likely to be of interest to more than one cortical area, which would account for multiple connections (Kolb & Wishaw 2003).

The primary visual cortex displays these principles, since it appears to compute data related to color, motion, and form. These calculations are transmitted to specific cortical regions, which enable a given object's recognition, and simultaneously other cortical areas that make naming possible. In addition, the calculations are sent to subcortical regions that make it possible to remember and giving rise to an emotional attitude towards the object. This being the case, does every serially connected new area perform increasingly complex operations? Probably this is not the case, since an area like the primary visual cortex that processes color, shape and motion can be considered more complex than an area that processes only color (see Brown 2004). It appears that Luria's views on the homogeneity of perception are not correct. It is well known that we can still experience one observation, despite the fact that there is one final terminal which makes this observation.

TOWARD THE MICROGENETIC MODEL

The question arises: How can we put this knowledge together in a meaningful way to see organization in the cortex if we do not accept Luria's hierarchical model? According to Felleman and van Essen (1991) there can be two possibilities:

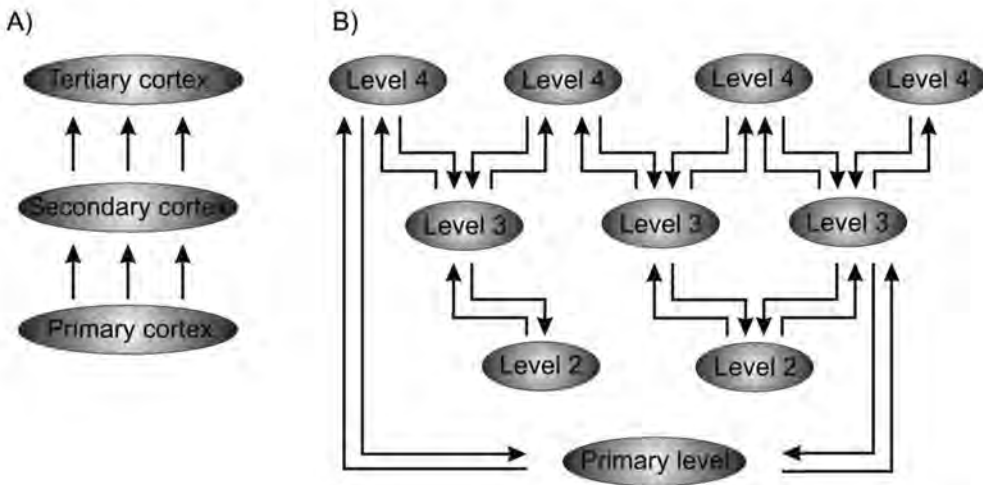


Fig. 3. Hierarchical models. A) Luria's simple serial hierarchical model of cortical processing. (B) Felleman and van Essen's (1991) distributed hierarchical model, which features several levels of association areas. Areas at each level are interconnected with one another [After: Pachalska 2007]

1. there is no hierarchical organization, but instead a kind of non-ordered neural network. As an individual organism gains experiences, the network orders itself in some way, thereby producing perceptions, cognitions, and memories. Many neural network models of brain function propose this to be what actually happens. However, the results of a wealth of perceptual research suggest that the brain filters and orders sensory information in a species-typical fashion.
2. the cortical areas are hierarchically organized in some well-defined sense, with each area occupying a specific position relative to others, though with more than one area being allowed to occupy a given hierarchical level (see also: Kolb & Whishaw 2003).

These authors suggest that a pattern of “forward and backward” connections could be used to determine hierarchical position. Thus, ascending (or forward) connections terminate in layer IV whereas descending (or feedback) connections do not enter layer IV, usually terminating in the superficial and deep layers (see Figure 3). They also recognize a third type of connection, one columnar in its distribution and terminating in all layers. A basis for placing areas in the same location in the hierarchy is provided by this rare type of connection.

A model was then developed by Felleman and van Essen based on these assumptions, called a Hierarchical Distributed System. Here various information levels correspond to different phases in the formation of perceptions though a correspondence to different qualities of the perception created in the streams of information. It is noteworthy that some signals bypass the intermediate levels; with hierarchical development, the number of areas increases. In summary, the higher up in the hierarchy in this model, the more fragmented is the system.

This model and those similar to it have the disadvantage that by becoming increasingly complex they are unable to explain “holistic” phenomena, such as consciousness, identity and personality. Ultimately it is unclear which are the “bottom-up” and which the “top-down” connections as a result of the relativity of the whole approach. Those models presented earlier likewise assume that the brain gradually makes the overall observation from incomplete pieces of information; as perception develops, the brain uses a hierarchical system, which gradually dissipates. Here there is a logical contradiction because the premises are defective, e.g. the brain is viewed as an engineer-designed machine rather than the product of evolution and development.

Kolb & Whishaw (2003) in reviewing the literature on animal research show that the spinal cord initiates the levels of function, while they terminate in the cortex. This hierarchy of functionality may be demonstrated by the examination of animals that have been subjected to the removal of increasing amounts of brain tissue. We are here reminded that the cortex is made up of two basic types of neurons – the spiny and the aspiny – organized into about six layers. The cortical layers can be considered sensory, motor, and associational (Purves et al. 1999). The cortex is vertical in organization, referred to as columns or modules (Berridge 2000). Cortical modules can be seen in the spots and stripes visible in specific histological preparations (Peters & Jones 1984-1989) and through the application of neuroimaging technologies (Kropotov 2009).

Multiple representations of sensory and motor functions exist in the cortex. Among evolutionary changes that have been taking place in mammals there has been an increase in the number of representations. Cortical connectivity is characterized by reentry: each cortical area is reciprocally connected with many, but not all, other regions in a given sensory modality. The cortex processes information about the world in multiple representations, and these representations are not formally connected; yet we perceive the world as a unified whole. This conundrum is the “binding problem.” Feedback loops influence cortical activity, not only from other cortical regions, but also from subcortical forebrain regions, such as the amygdala and hippocampus. The cortex is functionally organized as a distributed hierarchical network (Brown 2001; Kolb & Whishaw 2003).

These assumptions correlate with the microgenetic model developed by Jason W. Brown since the 1970s, and then elaborated by his students and colleagues, and presented in a series of monographs and articles (see Pąchalska & Weber 2008; Pąchalska et al., 2012). The conversations and correspondence between Brown & Luria (Brown 2001; Pąchalska 2002; Brown & Pąchalska 2003) also constituted a forum for the examination of this problem.

RESEARCH ON TRAUMATIC BRAIN INJURIES

Luria concentrated his work on the psychological effects of brain lesions from the early 1940s. Like Goldstein, he was a strong opponent of strict location views. In many of his publications he strongly disputed the tradition derived from the theory

of Wernicke. In 1947 came the first monograph on this topic, „Travmaticheskaya afaziya” (Traumatic Aphasia) published in 1947 (Luriya 1947), which has been translated into English (Luria 1959). In 1948 he wrote “Vostanowlenye funkcyi posle voennoi travmy mozga”), which also has been translated into English (Luria 1963).

Luria’s works devoted to the descriptions of patients following traumatic brain injury can be considered in three periods.

- the war, the front and the first works on brain injured patients (the 1940s),
- research into brain injuries and rehabilitation (the 1950s),
- the systematic development of neuropsychological research (the 1960s and 70s).

A very significant aspect of Luria’s approach was the close connection between the assessment of disorders and therapeutic procedure (Kaczmarek 2012). This made it possible to achieve a deeper insight into the difficulties encountered by patients, and led to the refinement of the course of therapy at the same time. For forty years, Luria conducted research with great success on the functions of the brain, including such psychological constructs as learning and forgetting, attention, and perception. He was most interested in analyzing changes in function as a result of focal brain lesions.

LURIA’S CLASSIC CASES IN NEUROPSYCHOLOGY

In the late 1950s, Luria was permitted to return to the study of neuropsychology, which he pursued until his death from heart failure in 1977. In the years just prior to his death, he returned to his earliest dreams of constructing a unified psychology, in which brain studies would provide a common basis. The most significant factor was for him the impact of brain damage on psychological functions. He believed that higher cortical functions incorporate complex systems, and for this reason each focal brain lesion may lead to the disorganization of a great variety of higher cortical functions, which include a component (factor) immediately affected by the lesion in a cerebro-cortical area. It is in connection with this that each and every symptom manifesting a disturbance of important cortical functions may be of a multivalent nature, and special work is needed to analyze the mechanisms resulting in the appearance of a given disorder (qualification of the symptom), so that clinical significance might be attached to the observed defect. Detailed analysis of the symptoms allows one to reach to the causes of disturbance despite its ambiguity. However, it is necessary to separate the symptoms caused by whole brain damage (e.g. increased intracranial pressure) from the symptoms caused by focal damage.

At the end of Luria’s life, he was especially focused on the problem of the single-case approach in neuropsychology. He published two case studies. The first of these publications presented a man with an exceptional and idiosyncratic memory (Luria, 1968). The other book described Lieutenant Lova Zasetki, who suffered a brain injury at age 23, during World War II (Luria, 1972).

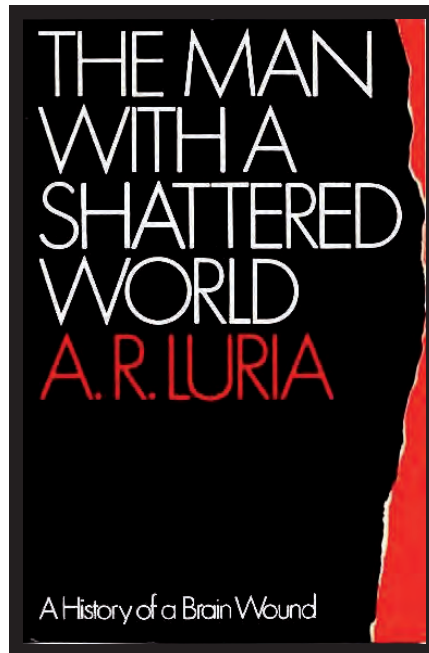


Fig. 4. The cover of Luria's book, *The Man with a Shattered World* [Source: From the private library of Professor Jason W. Brown]

In studying this book, we learn that the bullet went through the left parietal-occipital area of the brain. The process of inflammation following injury caused adhesions in the meninges and inflammatory changes in the adjacent brain tissue. Neurological examination revealed hemianopsia. In the initial phase of the disease there were also hallucinations. Zasetski (Luria 1984:50) describes it in his diary in the following way:

For two days I did not close my eyes. At that time, hallucinations seemed to be bound to me. Oh, hurt! I close my eyes and open them again soon, because in my eyes there is something strange – the face of a man with huge ears (I think) and with huge eyes, or just show to me the different faces, objects, various freaks, so, because of fear, I quickly open my eyes.

In addition, the patient exhibited impaired memory and speech – he forgot necessary words. Moreover, he also experienced difficulties with writing and reading, and he searched long in his memory for the relevant words, despite knowing three languages. Understanding what others had said also required a great effort.

Zasetski states (Luria, 1984:140):

I listen to what the teacher says, and it seems to me that I understand: words seem familiar to me, but when I start to listen to every word, I stop even for single words – I cannot remember its meaning, its real image ... the teacher says ... words run .. run and disappear along the way. Words evade somewhere in the memory and in no way can they recall themselves.

This statement clearly shows how the processes of perception, attention, memory and speech are coupled with each other. The patient had also lost the capacity for spatial orientation and got lost even in familiar surroundings. He displayed an impaired body schema. Zasiiecki himself described it as follows (Luria 1984: 53):

I often forget where, in what place is my forearm or buttock. I know what is the arm, and I know that it should be close to the forearm, but where, around the neck or hand? The same applies to the word „rear”. Are they closer to the knees, or rather the pelvis?

The patient described being lost not only in relation to visual-spatial orientation, but also was unable to determine the source of sounds coming to him. He wrote (Luria, 1984:65-66):

During the walk I even more lose orientation: where am I now? I often wander a few steps from the house. After the injury my orientation disappeared in the position of sound sources, and so it has remained ... Often I have to turn around, until I realize how sounds are flowing ... I see another weak point - I stopped to orient myself in the direction of the sound, simply say in the space of the sound. I do not know why it happened, but it is like that, I can only guess from where the sound comes, seeing mouth movements or other external symptoms of it.

He lived in a world without memory, and for thirty years he tried to recover at least the crumbs of it. He had also a destroyed imagination. Because he could not remember the events of the recent past, he gained a strategy of recalling events from the end. He writes about it in the following way (Luria 1984:113):

Most of it reminded me of the distant past, from early childhood, and of the period of elementary school. I define it as a life and remembering ‘backwards’, because it’s easier to remind myself of the facts from the distant past, from the kindergarten.

As Luria stated (1984:48), he was completely lost in the world, could not understand it because the whole world had broken into a thousand tiny pieces. This was expressed by him in the following words (Luria, 1984:48):

After the injury I do not see any object as a whole, not one thing, I'm now forced to guess all the time these objects, phenomena, everything that is alive, that is, to imagine them, connect in the memory as a whole, to receive them not directly, but through imagination. Even a small inkwell is not seen in its entirety.

The important question that should be put is this: what happened to the brain of Zasetki, that his world broke into a thousand tiny pieces? Luria attributes these disorders to the impairment of tertiary cortex, the parieto-temporo-occipital juncture (temporo-parietalo-occipitalis, TPO) in particular. This zone is responsible for the analysis and synthesis of impressions received. In classical neuropsychology these disorders would be defined by the term Gerstman's syndrome, due to the symptoms of anomia, body agnosia, acalculia and visual-spatial deficits (Kaczmarek et al., 2003). A similar interpretation would be presented by modern neuropsychology. It should be noted, however, that the syndromological analysis presented by Luria is closest to the concept of the neuropsychology of process (Pąchalska & Kaczmarek 2013).

In sum, the case study presented by Luria illustrates the blend of classic, experimental approaches with clinical and therapeutic approaches so characteristic for Luria. It is just such a form of synthesis that may stand as a model for contemporary cognitive science.

THE MICROGENETIC APPROACH: THE ORIGIN OF THE SYMPTOM

One of the fundamental problems in neuropsychology is the origin of the error or symptom, comprehended as an unexpected deviation from normal behavior. For Luria, a theory of symptom was a sine qua non for neuropsychology, though he himself did not possess a definitive theory. Instead, he applied in various situation the insights of others, including Pavlov, Wernicke, Vygotsky, Goldstein and Brown (see also: Pąchalska & Kropotov 2013).

However, Luria pointed out that the normal and the pathological should not be considered as two poles, one positive and the other negative, but rather as two qualitatively different dimensions, through which the interaction between the human being and the environment is developed. If the normal becomes a normative parameter (for example, to be able to read and to write in a Western industrialized country), that is what has to be followed or adopted by an individual in a given historical and cultural context, and depends on the demands of that particular context. In other words, alexia may be considered a "pathological" condition only in a context where reading is considered a "normal" ability of every individual (Mecacci 2005).

In microgenetic theory, the symptom is a link from the pathological to the normal, a piece of preliminary behavior that becomes a momentary terminus. In both normal and pathological behavior, microgeny deposits a cognition in the same way that phylogeny and ontogeny deposit the human mind/brain. There is progressive zeroing in on the target over growth planes in brain evolution, moving generally from whole to part, context to item, depth to surface. The microgenetic approach reconsiders the regression hypothesis advanced in a different form by such earlier thinkers as Hughlings Jackson and Roman Jakobson (Brown & Pachalska 2003).

In contrast to the prevailing assumption that brain function is dynamic and structure is static, the process of structural growth (morphogenesis) and behavior turns out to be one and the same process, reiterated over time, such that behavior is four-dimensional morphology. In order to understand the morphogenesis of brain and behavior, it is necessary to consider the role of two concepts: parcellation and heterochrony. Parcellation is the achievement of specification from the sculpting of exuberant initial growth. Heterochrony refers to the timing of development. In particular, neoteny (the prolongation of an early phase of development) creates the potential for new behavioral possibilities, adaptive or maladaptive. A symptom occurs when a lesion delays a segment of process (neoteny) with incomplete specification (parcellation). The regression hypothesis is refor-



Fig. 5. Alexander R. Luria, right, and Jason W. Brown in the 1970s. Professor Brown obtained a grant from the Fogarty Center at the National Institutes of Health, as part of the US/USSR Cultural Exchange Program, and spent a few months with Luria in Moscow. While Prof. Luria was recovering from a heart attack at a convalescent hospital, Prof. Brown would accompany him on his daily walks. Luria spoke excellent English, and the two scientists enjoyed a close friendship and worked together on a research project on the function of the frontal lobes and frontal lobe syndrome [From: Pachalska 2007]

PROF. A. R. LURIA
UNIVERSITY OF MOSCOW
13 PRUNZE STR., MOSCOW 919.

October 18 1973

Dr Jason W. Brown
College of Physicians & Surgeons
Columbia University

Dear Dr Brown

I was delighted to have your letter and to learn that you are planning a visit to our country in 1974-75.

Of course we should be only too glad to show you our ways of analysis of patients with local brain lesions.

Now we are especially interested in memory disturbances also, aided with deep lesions of the brain, in Neuropsychiatric analysis of speech disorders with a reconsideration of Aphasia problem and restriction with the Neuropsychology of the right hemisphere etc. of course with further investigation in Frontal Lobe Syndrome.

The plan of your work depends from the time you plan to spend here, but up to me — its best would be just to have a better information of the work we are doing and of our methods. If you would contact Dr Robert Weyler Hunt who was here during three months and who is now working in Dept of Psychology of Massach. Inst. of Technology under H. L. Teuber — he could give you a detailed information.

You have to bear in mind that an immediate scientific exchange exists between Moscow University and Columbia University and if you would apply to the authorities of Columbia University to include you in the program, — it would be the easiest way.

Sincerely yours
A. R. Luria

Fig. 6. A letter from Alexander R. Luria to Jason W. Brown. A special friendship joined Luria with Brown, for whom he often wrote long letters, sharing insights on the functions of the brain, as well as the methods developed for the treatment of patients established in this time by Professor Brown at the New York Center for Cognition and Communication. Clients of the center (in which the first author of this biography is a consultant) were and still are mainly patients after traumatic brain injury [Source: From the private library of Professor Jason W. Brown]

mulated thus: pathology does not expose stages in the reverse of the acquisitional sequence, but rather the process leading to the stages.

Several long discussions that took place when Brown visited Luria in Moscow, and the subsequent exchange of written correspondence (see Fig. 6), led to a consensus between them:

...further evidence that symptoms undergo a coherent, rather than piecemeal transition is provided by observation of the recovery of function after brain damage. Some aspects of the theory can provide

a motivation for research and a strategy for treatment (see: Brown & Pachalska 2003).

At the time Brown visited Moscow, Luria was emphasizing the importance of further studies on the frontal lobes. Shortly before his death he was looking at story recall in cases of frontal tumor and vascular lesion. He was impressed by the fact that such patients showed derailments in recall, but eventually were able to retrieve the core events of the story and its meaning. The importance of these cases pertains to inter-sentential connectedness in the generation of utterances from memory or, conversely, the effect of frontal lesions on memory and conceptual associations in recall. Other “frontal lobe” topics that were of interest to him at the time included the degree of generality or specificity in perseveration (motor, speech, writing, and so on) according to the laterality and depth of the brain lesion, and the application of electrophysiological measures of habituation to phonological and semantic stimuli in cases of adult brain damage and normal and retarded development (Pribram & Luria, 1973).

Luria did not leave behind a fully developed program of neuropsychological research to be implemented by his followers, but his ideas were so wide-ranging and powerful that they will continue to influence the field for years to come. In Brown’s opinion, “The work on the frontal lobes was ingenious and innovative and, more importantly, was on the right track; the work on memory, aphasia and perception will not survive; and the functional system approach will follow the uncertain fate of componential theory” (Pachalska et. al. 2012).

Luria, like Brown himself, was critical of the quantitative neuropsychological test batteries that have dominated work in the field, and believed that psychometric methods should not replace a thorough bedside examination with emphasis on qualitative change (Akhutina & Tsvetkova, 1983). The nature of the symptom was of crucial importance. This insight was in turn an important inspiration for the development of the microgenetic theory of the symptom (Brown & Pachalska 2003).

Luria always stressed his debt to Lev Vygotsky (1934 -1962), whom he used to call a genius. It is certainly true that the ideas of Vygotsky have a microgenetic dimension, especially studies of the development of inner speech, as well as his belief that the role of language was mediation, through the internalization of ego-centric speech as verbal thought (Brown 2002, p. 3). The laws of thinking, of concept formation, and the transformation of word meanings were studied over the course of development and during the performance of a specific task. The implications of these studies for microgenetic theory and their exploration in adult aphasia were described by Luria (e.g. 1962, 1966).

It was a lucky coincidence that Luria had the chance to become acquainted with the great figures of the Russian psychophysiological school (suffice it mention Pavlov, Bernshtein and Anokhin). This provided the basis for the development of his own ideas. One of them was the notion of “functional system” originally proposed by Anokhin, who considered it to be a circuit board or network of components. For Luria, there was a dynamic element, while pathology in the

system led to a qualitative reorganization. Another important implication for microgenetic theory was Luria's view of action as a system of oscillatory levels. It is worth mentioning that this idea was originally proposed by Bernshtein (Pachalska et al., 2012) and developed in microgenetic theory (Brown, 2005). Presently, it is further elaborated in the theory of mental state (Pachalska et al., 2012). One of the most important assumptions is that mental states overlap, pulse, and co-exist, which is in close relation not only to the fourth dimension of hyperspace (that is, time), but also to the fifth dimension (that is, vibration; see Kaku, 1994). To some extent, Luria also had microgenetic ideas, in that there was an unfolding from older to newer systems, and that cognition was hierarchically organized.

The strength and dynamics of Luria's approach follows from the fact that his testing was bedside rather than standardized, so a problem, e.g., in repeating a series of sounds, *ba, pa, ba*, could be due to comprehension, production, serial ordering, memory, perseveration, etc., so it was only in the context of a total examination that one could interpret an isolated symptom. In this respect his approach was consistent with microgenetic theory. In the West, however, his approach has been translated into yet another quantitative battery, known as "Luria-Nebraska," which he would never have approved of (Glozman 1999).

NEO – LURIANISM

Luria's work was continued after his death all over the world, both by his colleagues with considerable academic achievements (Bejn, 1964; Akhutina & Tsvetkova, 1983) and supporters in the Soviet Union (Glozman, 1999) as well as



Fig. 7. Alexander R. Luria, left, and Prof. Marcelli Klimkowski in the 1960s [Source: From the private library of Professor Marcelli Klimkowski]

in other countries, such as Poland (Kaczmarek, 1984, 1987, 1993, 1998, 2012; Kaczmarek et al. 2003; Kądziaława, 1983, 1986, 1993, 1996, 1997; 2000; 2003, 2012; Klimkowski, 1975, 1976; Klimkowski & Herzyk, 1987; Maruszewski, 1966, 1970, 1972, 1973, 1974; Tłokiński, 1986; Herzyk, 1992, 2000, 2004, 2005, 2011; Pachalska, 1986, 1990, 1999, 2002, 2003, 2005; 2007, 2008; Pachalska & Kaczmarek, 2013; Pachalska & Kropotov 2013; Pachalska et al., 2011; Przesmycka-Kaminska, 1980, 1990, 1994; Seniów, 1978, 1999, 2002, 2003), Finland (Laaksonen, 1986), Denmark (Christensen, 1975), Italy (Bisiach & Luzzatti, 1978) or the U.S. (Brown, 1972, 1975, 1979, 1983, 1985, 1988, 1994, 1996, 2000, 2001, 2002, 2003, 2004, 2005, 2010; Brown & Perecman, 1986; Brown & Pachalska, 2003; Tonkonogy & Goodglass, 1981; Goldberg, 2001).

Luria also worked closely with Polish scientists. Mariusz Maruszewski and Marceli Klimkowski gained in Moscow their clinical and scientific experience, when they studied and received training in Moscow under his direction, devel-

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Действительный член
Академии Педагогических Наук
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Москва, ул. Фрунзе, 11.

5. II. 1972

Дорогой Марцел,

Твое письмо мной очень обрадовано. Перед тобой рас-
сказывается блестящая карьера и у меня нет никаких
сомнений, что ты справишься с руководством Каздзьяло.
Я посоветовал тебе рекомендацию и уверяю, что это будет
очень хорошо.

У нас все идет своим ходом. Только недавно стал дру-
жить — «Вопросы Невропсихологии» и «Невропсихоло-
гия памяти: Проблемы работы над памятью, над
краткой памятью».

Лена пишевала недавно перенесла операцию и на-
дняк на едем на Звонки в «Чикаго». Там я буду
еще раз переносить свою работу по работе над
памятью, которая на работе вместе с А. Левин-
сон и Филлерштейн.

Лена на работе только сейчас закончила на 3 с 8
часов — прощай уже сейчас.

Привет Лене и Марселю.

Александр

Fig. 8. A cordial letter of prof. Luria to prof. Klimkowski with warm greetings and words of satisfaction with ongoing cooperation [Source: From the private library of Professor Marceli Klimkowski]

oping their neuropsychological knowledge. This was later introduced to the University of Warsaw and the Maria Curie-Skłodowska University in Lublin, where research teams were formed that contributed to the development of the discipline in Poland.

Luria also had other students and friends in Poland, and he kept especially close contacts with the scientific centers of Lublin, Warsaw, Cracow and Gdańsk



Fig. 9. Prof. Aleksander R. Łuria, and Prof. Maria Susulowska during his visit to the Jagiellonian University in 1964. Prof. Susulowska was a close friend and collaborator. He visited her home and wrote to her long letters very often, sharing insights on the functions of the brain, as well as the methods developed for the testing of patients after traumatic brain injury and the significance of a brain lesion for the whole life, cognitive, emotional and professional, of the injured person. Prof. Susulowska founded the Cracow school of neuropsychology, to whom belong Dr. Janusz Pałczyński, Prof. Krzysztof Janeczko and Prof. Maria Pachalska, the first author of this biography [After: Pachalska & Kaczmarek 2013]

(his students and friends there included Bożydar Kaczmarek, Danuta Kądziaława, Elizabeth Łuczywek, Maria Susulowska, and Waldemar Tłokiński). A major tribute was paid to his achievements when he was awarded of a doctorate *honoris causa* at the Maria Curie-Skłodowska University. Another Polish tribute to Luria was a special volume of *Aphasiology* edited by Prof. Kaczmarek (1995), in which former Luria's disciples published their works based upon his ideas.

One of Luria's most fruitful and interesting contacts in Poland was with Professor Maria Susulowska from the Institute of Psychology at the Jagiellonian University in Krakow. Several long discussions took place when Luria visited Susulowska in Krakow, and in the letters they exchanged, revolving around the importance of single case studies, as opposed to the growing trend in favor of group studies (see also Pachalska & Kaczmarek, 2013). They both agreed that if a lesion in a specific area of the cerebral cortex damages, for example, the operations of listening to musical language, this fact has a very serious consequence for the personal life and the profession of a musician, while the effects may be very small for a person interested in music only as an amateur listener. It should be added that Susulowska loved music, and this opinion was shared and discussed when she attended a concert with Luria at the Cracow Philharmonic. It is perhaps from here that Luria's attention was drawn to the significance of a brain lesion on the whole life of the injured person, cognitive, emotional and professional (Luria, 1976).

Indeed Luria's clinical cases are complete "histories" of that specific person, what they were in the past, what they are in the present, and what they might be in the future, as in the most famous case we have described in this biography (Luria, 1974). Of course this perspective recalls Freud's approach in his clinical cases, where the therapy and the rehabilitation are the means of access to the whole psychological life of the individual under treatment. As Freud said in introducing the concept of psychoanalysis, a theory of mind is at the same time a framework for therapy, and therapy is a concrete validation of the theory itself (see also Mecacci 2005).

However, this perspective does not mean that Luria divided the clinical from the experimental, or that he rejected wholly experimental investigation, such as the factorial-model comparison between patients with different brain injuries. However, the necessity for a thorough investigation of a single person, this particular man or this particular woman, with a specific culture, a specific profession, a specific family and social context, remained fundamental: according to Luria only this type of research would enable a scheme of rehabilitation to be drawn up, made to measure for that person, to allow them to regain their lost world (see also: Pachalska & Kaczmarek 2013).

Recently, during the 20th anniversary of the Polish Society of Neuropsychology, which took place on 23 and 24 September 2012, at the University of Gdansk, a session was held during which Professor Danuta Kądziaława (2012) gave a lecture dedicated to the scientific activity of Prof. Alexander Romanovich Luria and his input on the development of neuropsychology in Poland.

Thanks to the efforts of the founder and long-term President of the Polish Society of Neuropsychology, Professor Maria Pachalska, there was added, to the long list of institutions and individuals around the world that have honored Luria's scientific achievements during his life or after his death, the Polish Neuropsychological Society, which awarded Alexander Romanovich Luria posthumously its highest honor – the Copernicus Prize 2002.

BUILDING A NEW BRIDGE BETWEEN EAST AND WEST: LURIAN NEUROPSYCHOLOGY, MICROGENETIC THEORY AND THE NEUROSCIENCES

One of Prof. Luria's closest scientific colleagues was Prof. Natalia P. Bekhtereva (1924 -2008), granddaughter of Vladimir Bekhterev, a prominent Russian neurologist considered the father of objective psychology, a distinguished Russian neuroscientist and physiologist, who developed the neurophysiological approach and contributed a great deal to the development of Russian neuroscience. She was the Director of the Institute for Experimental Medicine of the Academy of Medical Sciences of the USSR, which she administered between 1970 and 1990, and founder of the Institute for the Human Brain, operating under the auspices of the Academy of Sciences of the USSR, of which she was elected a member in 1981. The Institute was located in St. Petersburg, at 9 Academic Pavlov Street.

Prof. Bekhtereva invited Prof. Luria (along with other prominent neuroscientists from around the world, such as Prof. Karl Pribram from Georgetown University and Prof. David H. Ingvar from Lund University) to a symposium entitled "The neurophysiological mechanism of mental activity," which was held in June of 1972, in St. Petersburg (in the Moika Palace, along the Moika River, where Rasputin was supposedly lured and murdered).

While Prof. Luria was recovering from a heart attack at a convalescent hospital, Prof. Bekhtereva visited him, and the two scientists enjoyed a close friendship and scientific discussion (Pachalska & Kaczmarek, 2013). A representative of the Institute for the Human Brain was also present at the Moscow International Congress dedicated to the 110th anniversary of Luria's birth: Prof. Yuri D. Kropotov, who, together with Prof. Maria Pachalska, a representative of the Krakow Academy, Krakow (Poland) delivered a paper entitled, "*An evaluation of differentiated neurotherapy programs for a patient after severe TBI and long term coma using event-related potentials.*" The paper revealed interrelations between the Lurian approach, neurophysiology, and microgenetic theory based upon 10 years of therapy and research on patients with severe brain traumas, who had been awoken after a long coma. It was shown that a syndromological analysis makes a more effective diagnosis of the patient possible and, consequently, enables the choice of an appropriate therapeutic program as well as an evaluation of its efficiency. An illustration of the approach described was the presentation of a patient who had been awoken



Fig. 10. Prof. Natalia P. Bekhtereva (1924 -2008; second from left) developed neurophysiological approaches to psychology, such as measuring the impulse activity of human neurons. She was awarded (among other outstanding Russian scientists) the USSR State Prize for 1985. [From: Private Library of Prof. Yuri D. Kropotov, Russian neuroscientist and neurophysiologist, also a winner of the USSR State Prize for 1985, first from the right in the second row]

from a half-year coma followed by chronic, six year, anosognosia and severe frontal syndrome. Standard rehabilitation procedures proved to be inefficient in this case. After 6 month of intensive neurotherapy the patient regained full consciousness and his frontal symptoms were also considerably reduced. It should be pointed out that a transcranial magnetic stimulation (rTMS) program produced more evident physiological and behavioral changes than did relative beta training. This allows one to conclude that a combination of various neurotherapeutic approaches (such as neurofeedback, rTMS, and tDCS) can be helpful in the therapy of severe cases of TBI. It was also stated that Event Related Potentials (ERPs) may be used to assess functional brain changes induced by neurotherapeutic programs. At the same time, other neurophysiological papers presenting event evoked potentials, delivered by representatives of various countries, were given. The paper confirmed the dynamic organization of brain functions, which constituted one of Luria's main assumptions, and it was lively discuss, and very well received, especially by the clinicians.

The Moscow International Congress dedicated to the 110th anniversary of Alexandr Romanovich Luria's birth proved to be a great success, despite the fact that it was delayed for a month due to financial problems of the kind that scientists so often face all over the world. First of all, the congress showed that the Russian school of neuropsychology is still strong and active, and that Luria's stu-

dents have new ideas to offer. No wonder many distinguished neuroscientists, from Russia and from all over the world, took active part in the Congress. The tele-bridge (the satellite conference) in which such well known researchers as Prof. Cole, Prof. Goldberg, and Prof. Puente took part, was also very stimulating.

An impressive exhibition was presented during the congress (see: Fig. 11), featuring some of Luria's projects and work. The venue for this exhibition, Auditorium 303, is named after Luria, and a memorial plaque was unveiled during the congress by the Dean of the Faculty of Psychology Prof. Yuri V. Zinchenko.



Fig. 11. Two pictures from the exhibition organized in the Department of Psychology, in the Luria Auditorium at the Lomonosow Moscow State University. Top: the exhibition tableaux featuring some of the projects and work of Alexandr Romanovich Luria; Bottom: a group of psychology students, who took an active part in organizing the congress. *Photo by: Liudmila Liutsko, University of Barcelona*



Fig. 12. Prof. Alexandr Romanovich Luria (1902-1977): Picture with a view on the Kremlin, Moscow (1962), and a picture of Prof. Maria Pachalska, a representative of the Krakow Academy, Krakow (Poland), the President of the Polish Neuropsychological Society, Editor-in-chief of *Acta Neuropsychologica*, and representative of the International Neuropsychological Society, taken during the congress: building a new bridge between East and West, between Lurian neuropsychology, microgenetic theory and neurophysiology: 50 years later (2012).

Photo by: Lina Jisseth Toro Melo, University Libre, – Cali Santiago de Cali, Colombia

Moreover, the congress led to the (re)activation of the Russian Neuropsychological Society, in which an active part was taken not only by distinguished Russian neuroscientist, but also by a young scientists, of course, with the encouragement and support of Prof. Maria Pachalska, President of the Polish Neuropsychological Society, Editor-in-chief of *Acta Neuropsychologica* and representative of the International Neuropsychological Society. The enthusiastic participation of young scientists from all over Russia, from St. Petersburg to Kamchatka, as well as other countries, is also worth mentioning in this context. Neuropsychologists from many countries, including Brazil, Italy, Norway, Poland, Spain, Portugal, the US, South Africa and Columbia, were very eager to gain deeper knowledge of the Lurian approach, as well as neo-Lurian techniques, such as neurodiagnosis and neurotherapy. During this congress it was possible to build not only a symbolic “bridge” connecting scientists of different generations and developing of neuroscience, which in illustrated by the pictures presented in Fig. 12, but also to enhance real connection between the Lurian tradition and contemporary neuroscience.

The Russian Psychological Society awarded three neuroscientist, including Prof. Maria Pachalska, for their distinguish contribution to neuropsychology (Fig. 13). The



Fig. 13. The diploma awarded to Prof. Maria Pachalska by the Russian Psychological Society

diplomas were presented by the President of the Russian Psychological Society, Prof. Yuri V. Zinchenko.

In addition the Polish Neuropsychological Society had the pleasure to award several eminent representatives of Russian psychology and neuropsychology with its highest award, Copernicus Prize 2012 (Fig. 14) as well as presenting the diploma, *Virtuti Medicinali* 2012, to the members of the organizational committee.

Among those who received an award was Prof. Janna Glzman, with whom we have had the pleasure to cooperate for a number of years, and who is a fellow scientist with whom we can exchange new ideas.

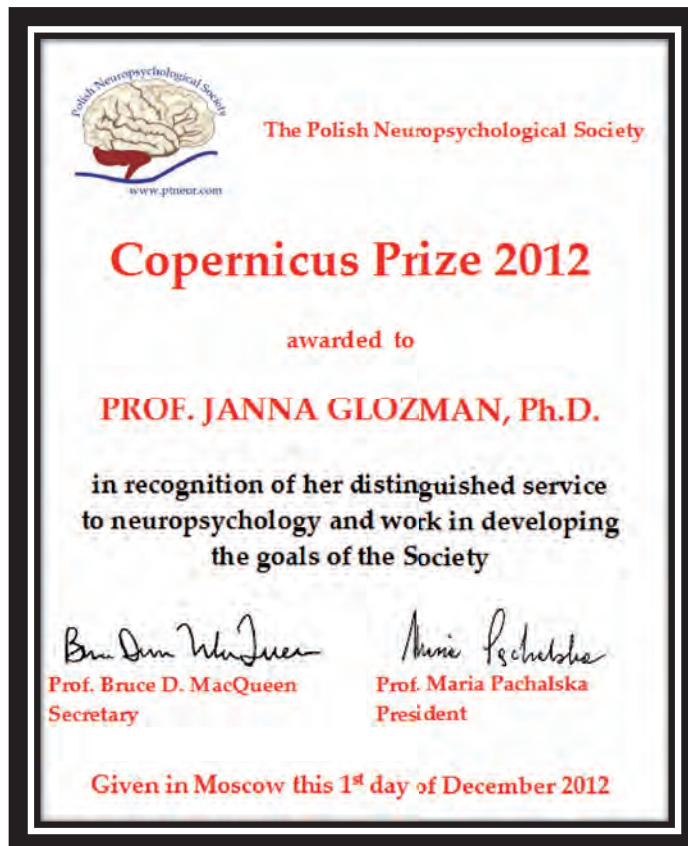


Fig.14 The diploma awarded to Prof. Janna Glzman by the Polish Neuropsychological Society

It is not an easy task to sum up the life of such a profound thinker and skillful clinician as Prof. Alexandr R. Luria. The most appropriate tribute that we can offer him is simply to get on with the work, and make efforts to find answers to the questions he put to us in his life and works. In other words, it is not enough merely to mourn his passing away, but it is right to continue his fascinating research on the mysteries of the human brain and mind.

As Prof. Jason W. Brown puts it:

We still feel a profound sadness for our loss but also a strong sense of the joy and intellectual challenge that Prof. Alexandr R. Luria brought into so many people's lives. Though I knew him for only a short time and conversed with him for only a brief time, yet, as I recall him, it seems to me that he loved life so much, it seems somehow wrong to weep over his death instead of celebrating his life, as was done during the Moscow International Congress dedicated to the 110th anniversary of Alexandr Romanovich Luria's birth. He would want us to laugh!

Then Russian School of Psychology can say, along with the great Roman poet Horace:

*MONUMENTVM EXEGI AERE PERENNIVS.
I have built a monument more lasting than bronze.*

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