

LURIA, ALEXANDER ROMANOVICH

(b. Kazan, Russia, 16 July 1902; d. Moscow, Russia, 14 August 1977),

neuropsychology, neurolinguistics, cultural psychology, classical science, romantic science, neuroanatomy, neurophysiology.

Luria's major scientific accomplishments were in the broad area of neuropsychology, with major contributions to the study of brain damage in adults, with resulting motor-sensory disruption, memory disorders, and language loss (aphasia). He worked early in his career on the cultural aspects of cognition, but later studied neurology in order to enter the medical profession and work directly with diseases of the nervous system. He is most widely known for his prodigious research and publication on the adult language disorders of aphasia, concentrating on frontal lobe functions, but extending his model of brain and language to many other regions of the cerebral cortex as well as subcortical regions. His detailed case studies of perception and memory loss are known throughout the world, and all neurolinguists have read and studied his major publications in the area. Evident in all his work was his balanced view of the mental and the physical. His psychophysical model of brain and behavior provided him with a dualism that allowed him to steer through the hazardous scientific milieu of the most repressive years of Communist Russia.

Biographical Overview . Alexander Romanovich Luria was born on 16 July 1902 in the city of Kazan, the present-day capital of the Republic of Tatarstan, in the heart of Russia, about 500 miles (800 km) east of Moscow in a region between the Volga River and the Ural Mountains. The language of Luria's birthplace is Tatar, a Turkic language of the Altaic family. Little is said regarding whether Luria knew or spoke much Tatar; he spoke Russian. Although there was a degree of bilingualism in the region, the official language was Russian. Luria's father was a gastroenterologist who taught medicine at the University of Kazan. After the Revolution of 1917, he founded and became chief of the Kazan Institute of Advanced Medical Education. Luria's mother was a dentist, and his sister eventually became a psychiatrist—no easy feat in Communist Russia.

At the age of seven, little Alexander was considered a genius; he started the *gymnasium* at that age. Eugenia D. Homskaya (2001) writes that Luria enjoyed literature, history, and philosophy. He took well to the study of languages, especially Latin, German, French, and English. When he was fifteen, the Communist revolution took place, and his *gymnasium* was closed that year. In 1921 he left Kazan for Moscow, where he worked until his death in 1977.

At the age of twenty-one, Luria married Vera Nikolayevna Blagovidova—a marriage that lasted six years and produced no children. In 1933 Luria met and married Lena Pimenovna Linchina. This marriage lasted until Luria's death in 1977; Lena died a year later. They had one child—a daughter, Elena, who was born on 21 June 1938. She eventually moved to the United States, where she practiced psychiatry in New York City for many years until her death on 20 January 1992.

After several years of cardiovascular signs of disease, Luria suffered a fatal heart attack on 14 August 1977 in Moscow, shortly after turning seventy-five. He was active up

until the very end of his life. Homskaya relates that “In the few minutes before his fatal heart attack, he was writing an article on the pathologies of memory” (2001, p. 117). Even though this paper was unfinished, Luria’s colleagues saw to it that it was published, first in the original Russian, and later, as was usually the case, in an English-language version under the title “Paradoxes of Memory” (1982).

Luria and the Soviet Union . It is unwise to discuss Luria without reference to the fact that he lived and worked in the Soviet Union, and that he was Jewish. Luria had read Sigmund Freud’s works on the psychoanalytical approach and attempted to incorporate them into his first two monographs, the first titled: “The Principles of True Psychology,” followed by a second monograph on “Psychoanalysis in Light of the Principal Tendencies of Contemporary Psychology.” These were written in Kazan by a very young Luria, shortly before he left for Moscow.

In Moscow, Luria started working in education, and at the age of twenty-one became head and chair of psychology at the Academy of Communist Upbringing (Education) of Krupskaya. In 1932 Luria published a summary of his early Freudian monographs in a book titled *The Nature of Human Conflicts*. Only thirty years old, Luria was brash enough to send a copy of his summary to Ivan Pavlov. Pavlov blazed into Luria’s office the next day, pulled out the monograph, tore it in half, tossed it on the floor, and upbraided Luria for describing behavior “as a whole” with high-level generalizations. Pavlov’s claim was that science proceeds from low-level units and progresses upward. Thus began the official Soviet condemnation of Luria’s work as “un-Soviet,” which at that time meant “un-Pavlovian.” From that point, Luria was officially prohibited from teaching, conducting research, or publishing anything that assumed a psychoanalytic stance. The ironic aspect of much of this was that, in actuality, there were points at which Luria went beyond strict Freudian mind-brain theory to search for outward manifestations of the mental, focusing upon the lower Pavlovian phenomena of motor and visceral response correlations.

Earlier, in 1924, Luria and Lev Semyonovich Vygotsky met and combined their admiration for Freud’s psychology into some of the first studies of the cognitive aspects of human sociocultural history, which they scaffolded across neurocognitive systems. Luria immediately took to Vygotsky’s claims that in order to understand human cognition, one had to consider the historical sociocultural background of the individual. It was not long until Luria, with the blessing of Vygotsky, was off to Uzbekistan in central Asia to study the effects of literacy and social change on inference, memory, and perceptual categorization. Luria, along with a colleague, F. N. Shemi-akin, had success in demonstrating that in the small villages of the region, illiterate and educated Uzbeks behaved differently in the perceptual processing of photographs and drawings. The illiterate population was not able to perceive depth in logical terms, but rather only in terms of situations depicted in the visual material. Luria set out again on another expedition to Uzbekistan, this time learning some of the Uzbek language, along with further studies of deductive reasoning; of how metaphors, symbols and logic were processed; of the perception of shapes, colors, and optical geometric illusions; and of drawing, as well as how the Uzbeks calculated and remembered (Homskaya, 2001). This significant work was blocked from publication, and the Soviet regime prohibited any sociocultural work by Luria, Vygotsky, or anyone else. The work would not see the light of day until forty years later. Michael Cole, later as a young student with Luria,

inspired his mentor to continue these sociocultural and historical studies of human cognition, and of late it has been Cole who has brought this research into clearer relief.

One fascinating aspect of Luria's scientific life in Russia is that he managed to keep as busy as he was, working and writing almost daily, drawing on his patience and self-protective skills to work under the dictates of totalitarianism. In Moscow, Luria was working on medical genetic investigations at the State Institute of Experimental Medicine. In 1936 genetic research was suddenly proclaimed illegal and the institute was closed. Luria, evidently, had sensed that the work at the institute was doomed, and had left a month earlier to pursue the full-time study of medicine, at the First Medical Institute of Moscow; he became a medical doctor. Despite his move to the medical sciences, he and many of his colleagues were known for their tendency toward liberal idealism in such spheres as art, science, and literature. Luria was among the suspected "subversives," and in 1951 his laboratory at the Institute of Neurosurgery of Burdenko was closed. He quietly and deferentially transferred to the Institute of Defectology of the Academy of Pedagogical Sciences of the Russian Federation. Not longer than a year later, in 1952, Jewish doctors fell prey to a large anti-Semitic campaign. Many Jewish physicians were fired during this time, but Luria remained relatively unscathed—likely due to the extraordinary work and responsibilities he had at the Institute of Defectology.

Case Histories and Psycholinguistic Models . Luria is well known for his book-length stories on people such as Zasetzky, who lived only in the present, and Solomon Shereshevsky, whose memory and perception were extraordinarily fixed to particulars, to the extent that he could not categorize. These books represent the best of romantic science; they are long and detailed case histories (anamnesis) and recollections from the patient. The storytelling schemata for patient behavior are often referred to as psychobiography, or as "portraits."

The romantic science of Luria and the tale of Shereshevsky have direct relevance to the psycholinguistic models of discourse analysis referred to as "mental models." To comprehend, interpret, and compute inferences in conversation properly, listeners construct an on-line view in their minds of the scenes and events being involved in conversation. Normal discourse allows for this. Theoretically, however, it has always been the case that there are no inherent restrictions or architectural constraints as to the detail needed for hearers when constructing a mental model as they listen and comprehend. The mental model claim is that hearers need to get the "gist" of what is said. Luria's tale of the mnemonist he called "S" presents instances in which the pathological press for particulars and extraordinary detail renders getting the gist of the story impossible because the model so constructed is cluttered with ornate detail. "S" was oversaturated by the particular to the point of clouding comprehension. The mnemonist described in Luria's tales cannot appreciate generalities or categories, so he cannot "get the gist."

Luria's Brain Science: Pavlov's Influence . Luria entered medical school in the early 1930s, specializing in neurology. This move enabled him to fasten the physical to his previous training and research in psychology, approaching more closely a true neuropsychology. It also provided him with added scientific armor to withstand the pressures of the materialism of the official party line. Although rebuked in his youth by Pavlov, Luria continued to utilize many of the physiological concepts for cortical neurodynamics. Spread of activation, inhibition, post-activation rebound, strength or

weakness of each, threshold levels, and decay to steady states were the jargon of cortical processing. Luria's "normal rules of force" operate where strong or important stimuli evoke strong reactions, and weak and unimportant stimuli evoke weak reactions. When the rules of force break down, the physiology changes. In the so-called disrupted inhibitory phase, both strong and weak stimuli evoke reactions of the same strength—a so-called phase of equalization. Paradoxically, a physiologically altered phase may come about in which weak or insignificant stimuli will actually evoke stronger reactions than strong stimuli.

The frontal lobes were the anatomical structures that received most of Luria's attention, in that they appeared to him to be the central control and regulation systems for planning actions and carrying them out. In a real sense, in Luria's scheme, the frontal lobes were the sine qua non of personal humanity, because they housed systems for goal-oriented intentional behavior, evoking the movements, guiding them to their ultimate target shapes. Major execution systems reside in the frontal lobes, and many important neuropharmacological neuronal networks course through them—especially dopaminergic systems in mesolimbic zones of the frontal lobes.

Luria wrote at length on motor perseveration, where activated movements tend to be erroneously reactivated at subsequent points; he distinguished two forms of frontal lobe motor perseveration. One resulted from an efferent pathological inertia, in which lower-level motor sequencing was disrupted by lesions in anterior regions of the frontal lobe. A major responsibility of the anterior motor system in Luria's model is to smoothly sequence the surface order chaining of motor gestures. Disrupted sequencing often resulted in the carryover of prior action, and in speech, articulatory gestures would be erroneously repeated. A second type of perseveration affected slightly higher-level programs of action, in which raw articulatory units were not so much affected as the units at the level of the phonological plan. There has been an upsurge in the study of perseveration in the early twenty-first century, but Luria laid much of the foundation in the 1960s. His 1973 publication, *The Working Brain*, contains an excellent survey of his "classical" and nomothetic neuropsychology.

Throughout his neuropsychological studies of language deficits secondary to brain damage, Luria maintained a Freudian strategy of eschewing any overly localistic and physical mapping from form to function. As Freud, and John Hughlings Jackson before him, Luria resisted strict localizationist interpretations of the classical aphasiologists (Pierre Paul Broca, Carl Wernicke, and Ludwig Lichtheim), opting for a greater deal of computational simultaneity of related but noncontiguous regions. His constant awareness of the effects of culture on cognitive patterns kept him even further away from innocent localization of function in the brain. Pavlov's physiology tended to reduce to the physical all too easily. Behaviorist reductionism was to be countered at all times, replaced by Luria with some form of psychophysical identity or parallelism.

Luria's Linguistic Aphasiology . Luria never supported classical aphasia localization, and therefore was a constant critic of the neolocalizationists who followed Norman Geschwind. It is likely that much of Luria's nonclassical localizationist aphasia model was due in large part to the overwhelming bias in his data corpus of World War II penetrating missile wounds and war-related traumatic brain injuries (closed head injury) in young military patients. Little wonder that stroke etiology in older patients played a

minor role in Luria's observations of aphasic disorders in the war-torn late 1930s and 1940s. Etiology of aphasia often determines the nature of its symptomatology.

Central to Luria's breakdown of cortical function is Pavlov's tripartite division into three types of complex neural circuitry, called analyzers. There are analyzers for the input-output systems that most directly connect the body with the outside world (primary systems), analyzers for internal proprioception (secondary systems), and a third set of analyzers that interconnect the other analyzers in many ways (tertiary systems). Human language capacity results from massive interaction of the separate analyzers. For example, a highly complex analyzer for speech output would involve tight interaction among phonological plans, phonetic detail of allophones, and subcortical/cranial nerve function, ultimately synapsing upon muscular structures in the articulatory periphery. Acoustic analyzers are obviously set to underlie speech perception as part of the gateway to comprehension. Since evidence points to sensory guidance for muscular movement systems, human articulatory function must integrate auditory and speech movement programs for a proper output. Phonemes are multifaceted abstract units of both sensory and motor interaction. The phoneme is considered to be a set or "bundle" of features—mostly articulatory, but some acoustic. Words, concepts, and conceptual units are complex elements, which can be dissociated as a consequence of damage to the nervous system; the system is highly interactive.

Luria's Aphasic Syndromes . Luria's early notions of frontal lobe function led him to the conclusion that the aphasias resulting from brain damage there mostly left the patient with disruptions in the sequencing of elements in the volitional production of language, that is, serial ordering. The temporo-parietal regions of the dominant hemisphere, however, mediated language codes primarily through the selection of elements, based on similarity of form function in hierarchical systems of associative relations. Sequencing, contiguity, and syntactic ordering are not considered typical functions of posterior cortical language regions. This strict dichotomy between frontal lobe sequential ordering and temporo-parietal lobe selection has been criticized as overly simplistic.

For Luria, there are essentially five aphasia syndromes, and he outlined these in a presentation at the Ciba Foundation on Disorders of Language in the early 1960s. The first aphasic syndrome is referred to as sensory aphasia. Luria defined many types of sensory aphasia, but all involve some aspect of the auditory analyzer, and for the most part, the brain damage is in the dominant temporal lobe in the posterior third of the superior convolution. Compromised are the comprehension of spoken language and the inability to repeat words and name objects. Writing and spontaneous speaking are compromised. Much of the problem with sensory aphasia for Luria involved a disturbance in the utilization the distinctive features of phonemes—especially the acoustic features, sets of which constitute the phonemic architecture. The phonology of the linguist Roman Jakobson is readily apparent in most of Luria's linguistic descriptions of phonemic hearing. The syndrome of acoustic-amnesic aphasia in Luria's scheme is characterized by a short-term verbal buffer memory breakdown, whereby the patient cannot "hold onto" the acoustic impression long enough to operate on it for its production. The disruption here is not so much representation retrieval, but rather that the sensory acoustic activation decays too quickly.

Motor Aphasia: Two Types . For Luria, there is not just one motor aphasia, classically labeled as Broca's aphasia. Luria postulates two motor aphasias; one directly invades the efferent/kinetic motor articulatory programming. The creation of smooth, serially ordered sequences of sound is impeded, and the speech is slow and laborious. This Luria labels "efferent motor aphasia" and locates the responsible brain damage in Broca's area in the posterior third of the inferior frontal lobe convolution. Afferent motor aphasia arises as a consequence of damage to the sensory strip region across the Rolandic fissure from the primary motor cortex for the speech articulators. Without internal sensation of touch for the articulators, the speaker cannot maintain guided and targeted movement. Due to the loss of internal sensation, for example, the tongue will have difficulty finding its way through the oral cavity, and will be prevented from making the fine articulatory gestures with respect to place of articulation, manner of articulation, and quite likely, proper manipulation of the vocal cords to turn glottal pulsation on and off. This is essentially an internal kinesthetic disruption.

Semantic Aphasia . Luria's characterization of semantic aphasia is eclectic and pulls from different theories, especially the work of Henry Head. The region most vulnerable to lesions causing this form of aphasia is in a sort of way-station area, where the regions are at the interface of vision, audition, and tactile. Accordingly, Luria locates the general cortical zone for this type of aphasia in the tertiary parieto-temporal-occipital cortex, where there are overlapping functions. When the semantic systems are functioning normally, there is a great degree of simultaneous synthesis of lexical, grammatical, logical and relational computations. Many of the lexical relations are fixed by a certain similarity of function, which then form into so-called associative fields. The fields are groupings of words based on a similarity of sound or on a similarity of function or on levels of cohyponyms. Semantic breakdowns will occasion word substitutions among these types of word associates. Difficulties arise in the computation and comprehension of sentences with inversions and with complex intersentential referential relations. Spoken human language output is extremely fast, and many semantic and grammatical processes are computed cooperatively and with a speed that almost approaches simultaneity. At times, semantic aphasia will involve extreme difficulty with the retrieval of words from the patient's mental store of words. As expected from lesions so far from the motor centers, the semantic aphasic has no paralysis, ambulates with no effort, and articulates normally.

Anomia . Early on, Luria (1964) embedded an amnesic aphasia under sensory aphasia. Others have called this amnesic aphasia an anomia, in which the overriding disturbance is one of accessing words—most often nouns. As sensory aphasia, fluent anomias are considered to arise from lesions to posterior temporo-parietal in the dominant hemisphere. For Luria, there are three types of amnesic syndromes. The first is an access disruption in the visual modality specifically. *Optic aphasia* is a term that many use in present-day aphasiology, and it usually follows as a consequence of damage to the occipito-parietal regions of the left hemisphere. The second type of anomia for Luria is more of a phonological execution breakdown of the phonological structure of the word. Here, a portion of a word or its metrical structure is retrieved, but one or more of the segments are altered—often with phonemes that share perhaps two of three features. For example, the word *dinner* may be produced as "tinner." The "d" and the "t" share manner (oral stops) and place (alveolar), but differ in the feature (voice). The third type of anomia in Luria's scheme produces more exclusively semantic associates, in which the substituted word is within the same semantic sphere as the word sought

after. Luria's "rules of force" of cortical neurodynamics are altered here, with the result being a leveling of activation strength such that semantic sphere associates of the target have close to an equal chance of being retrieved.

Conduction Aphasia . Luria always resisted allocating syndrome status for conduction aphasia. The sine qua non of this type of syndrome is a failure to repeat a heard verbal stimulus successfully. Repetition failure is the major response indicator of acoustic-amnesic aphasia, and so in a sense conduction aphasia, as anomia, for Luria has been embedded in an overarching syndrome category. In conduction aphasia, responses are typically replete with phoneme errors, such as substitutions, deletions, or incorrect serial ordering—either anticipatory or carryover. Phonemic paraphasias are also a marker of this aphasia type. What establishes conduction aphasia as truly autonomous is the fact that many of the repetition errors are not caused by short-term verbal auditory memory. Rather, the repetition errors seem to adumbrate faulty manipulation of phoneme features rather than a fast fade of the auditory stimulus. Often, these patients will take a rather long time to provide the repetition, but they nevertheless stay on target as they approach the correct production. This mechanism would argue for conduction aphasia being more than the result of a working memory or operating buffer breakdown. Furthermore, Luria implicates an element of afferent motor aphasia, because he claims that faulty proprioception (kinesthesia) within the oral cavity would weaken correct specification for features such as place or manner, since without tactile sensation, the articulators would lack crucial knowledge for proper gestural achievement. Luria, further, accepts a suggestion from a contemporary aphasiologist, Kurt Goldstein, that the mere act of repeating a heard stimulus upon command by the examiner is far removed from anything natural regarding language production. The patient must attain a highly abstract cognitive stance for this special form of conscious activity. It is that ability that is possibly disrupted in conduction aphasia. Lastly, Luria has always been suspicious of disconnection accounts of this syndrome. Classical aphasia models specified a lesion that disrupts neither Broca's area nor Wernicke's area, but rather the myelinated white matter fiber tract that connects the two (the arcuate fasciculus).

Dynamic Aphasia . The category of aphasia in Luria's scheme that he labeled *dynamic aphasia* implicates several frontal lobe systems, and also closely relates to one other classical aphasia type: transcortical motor aphasia. If one considers why Luria selected the adjective "dynamic" for this syndrome, one can approach the cognitive mechanism he is suggesting. A crucial role of the frontal lobes is not only executing the dynamics of communicative production, but of first planning and calculating the intention to act. There must be a way of transferring these intentions into sequenced movements, and where language is involved, the sequences involve the construction of phrases and sentences. Volitional evocation of action matrices is seriously disturbed; sentences are slow to come. The spontaneity of speech production for planned communicative narrative is difficult, at best. This breakdown is easily disassociated from much else of the language code, for the simple reason that these subjects can understand heard speech and can perform curiously well in naming (single objects or other elements); they have fluent speech (when the speech is less volitional and more automatic), their audition is unaffected, and they can repeat single or automated short stretches of speech. Without any intentional processing, these patients often "echo" what they hear from speakers—what is referred to as *echolalia*. Finally, patients with dynamic aphasia have much more difficulty with verb access than they do with nouns; the opposite accrues for sensory and semantic aphasia; there, the breakdown is more severe for nouns.

Transcortical Motor Aphasia . Later in his life, Luria integrated the classical syndrome known as transcortical motor aphasia, because that aphasia type has been in models of language breakdown since Ludwig Lichtheim's (1885) classic study and because its behavioral and neuroanatomical correlates have nearly matched Luria's dynamic aphasia. Luria's (1977) last assessment of these two anterior frontal syndromes is that transcortical motor aphasics subdivide upon close examination into one group whose volitional sequencing errors are replete with perseverations and another group who do not perseverate. Otherwise, the patient populations share much in common—neither group initiating much novel language production on their own. Both at least seem to be a

consequence of lesions anterior to Broca's area in prefrontal regions. Obviously, as Luria writes, much further careful neuropsychological and neurolinguistic research is needed with these dominant hemisphere frontal lobe syndromes.

Luria's International Influence . Alexander Luria put forth a herculean effort to penetrate the West and influence its scientific thought from the closed society that was the Soviet Union. Very few Soviet scientists had the success of Luria in projecting ideas from inside the Kremlin during most of the twentieth century. He paid early visits to Germany in 1925, where he met Kurt Goldstein, and to the United States in 1929, where he met the Czech linguist Roman Jakobson, who eventually taught at Harvard University. From 1930 to 1960, Luria had great difficulty in maintaining steady research laboratory investigative work, and during this period only a relatively small number of his larger works and some scattered papers in English reached beyond Russia's border.

Homskaya (2001, chap. 6) defines the 1960s as the decade of increased intensive research and active international outreach—largely through numerous visits to the Soviet Union by American and other renowned Western neuroscientists, such as Karl Pribram. Luria took advantage of an increasing number of international congresses—especially the meetings of the International Congress of Psychology. In 1966 Luria organized and presided over the Eighteenth International Psychological Congress, which conveniently took place in Moscow. At this meeting, he also actively participated in other seminars and colloquia that addressed pathopsychology, electrophysiology, and biological bases of memory traces. That Eighteenth International Psychological Congress turned out to be one of the most influential meetings, with a swath of nations represented by the participants, as well as the scale of neuroscientific issues addressed. Participants in this Eighteenth Congress included Karl Pribram and Hans-Lukas Teuber (U.S.), Brenda Milner (Canada), Oliver Zangwill (U.K.), and Henri Hecaen (France). Also in 1966, Luria was elected vice president of the International Association of Scientific Psychology, became an honorable foreign member of the American Academy of Arts and Sciences, and was elected as an honorary member in a number of national psychological societies throughout Europe.

Luria's works were eventually translated into English, German, French, Spanish, and some other languages. Mouton and Basic Books were high-profile publishing outlets for Luria's earlier works on traumatic aphasia, the working brain, and the novelesque works on two famous patients with disrupted memory and perception. Several of his books were later published by Harvard University Press. He read and wrote English quite well and worked judiciously with his English-language galleys—often helping with the

original translations. He was an active member and manuscript reviewer on editorial boards for a number of international journals in the neurosciences: *Neuropsychologia*, *Cortex*, *Cognition*, and *Brain and Language*—to mention just a few.

During the Cold War years, many young Latin American students went to Russia to do graduate work in neuropsychology with Luria, all of whom brought back his theories and models to their native countries. Luria's work was in turn shared at the various conferences on neuropsychology in Latin America—especially in Mexico, Colombia, and Argentina. One of the most prominent and prodigious scholars from Luria's lab is Alfredo Ardila, a Colombian who teaches at Florida International University in Miami. Alexander Luria remains one of the most renowned and influential investigators of the neuropsychological sciences of brain and language, despite the fact that his research and publication trajectory emerged from the sealed society of the Soviet Union.

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