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# SKOLEPSYKOLOGI

ÅRGANG 8 – NR. 6 – 1971

- **META-PRINCIPLES IN LURIA'S NEURO-  
PSYCHOLOGY**
- **THE FUNCTIONAL SYSTEM: KEYSTONE  
TO LURIA'S NEUROPSYCHOLOGY**  
**DET FUNKTIONELLE SYSTEM: NØGLEBEGREBET  
I LURIA'S NEUROPSYKOLOGI**  
**ITPA OG DENS ROLLE SOM DIFFERENTIAL-  
DIAGNOSTISK INSTRUMENT OG SOM  
HJÆLPEMIDDEL VED DIAGNOSTISK  
UNDERVISNING**  
**EN UNDERSØGELSE AF STÆRKT LÆSE-  
RETARDEREDES SOCIALE BAGGRUND**  
**EN UNDERSØGELSE AF HJÆLPEKLASSELEVERS  
OG HJÆLPEHOLDSELEVERS SOCIALE BAGGRUND**  
**EN UNDERSØGELSE AF STOFFORBRUGET  
BLANDT SKOLEELEVER  
I HERSTEDERNES KOMMUNE**  
**INTERVIEW-METODIK**  
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Sofie Riibjerg - S. A. Tordrup

### Bestyrelse:

Formand: *Anders Poulsen*, Skovkilden 4, 2880 Bagsværd, privat:  
(01) 98 21 06, kontor: (01) 86 63 80

Næstformand, medlemskartotek og indmeldelser:  
*Børge Jensen*, Katholmvej 11, 4700 Næstved, privat: (03) 72 20 72,  
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Kasserer: *Svend E. Christensen*, Alleen 29, 8660 Skanderborg, (06) 52 03 46

Sekretær: *Poul Thomsen*, Norgesvej 18 A, 2800 Lyngby, (01) 88 37 86

Indmeldelser sendes til *Børge Jensen*

Sekretær og kasserer for faglige møder: *Knud Haure-Petersen*, Islandsvej 17,  
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### Redaktion:

Ansvarsh. redaktør: *Mogens Hansen*, Bregnerødvej 72, 3460 Birkerød  
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Forretningsfører: *Erik Petersen*, Kingosvej 64 A, 3000 Helsingør  
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## SKOLEPSYKOLOGI

ÅRGANG 8 - NR. 6 - 1971



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## Meta-principles in Luria's neuropsychology



*The following is a tight summary of A. R. Luria's approach to the basic fields of psychology in which he has been involved for decades.*

1. There are higher cortical (or psychological) functions specific to human being and not existing in animals. These specifically human psychologically processes (or functions) derive from social sources, i. e. tool-using social behavior of man.
2. The most specific feature of these higher processes is that they are tool- or means-using processes. Animals do not use means, their behavior is not mediated by means, tools or signs, it is all immediate, natural behavior, whereas human behavior is always mediated (tool- or means-using) or indirect by structure, social by origin and voluntary (or conscious) by the modes of work.
3. This indirect, means-using behavior is mediated via speech — this most important system of tools or signs in human history. Language (or speech) has not only its semantic function: function of categorization of impressions, but its pragmatic or regulatory (or controlling) functions as well. By using language man overcomes the direct influences of environment, and his behavior becomes no more field-linked, but is goal- or plan-linked.
4. The indirect, tool (sign) using behavior starts a new form of cortical work: human cortex is no more a complex of work



of different zones, organized by influences of the »centrencephalic system« (or natural drives): it becomes a historically organized, plastic functional system where language plays a decisive organizing role. That is why »higher cortical functions of man« have to be evaluated as functional systems of cortical zones, linked by the leading role of language as a decisive means of behavior.

5. The disorganization of the brain functions following local brain lesions is in no way a partial deficit (destruction of a spherical local function) and no more a total lowering of the general brain activity. It results in a disorganisation of functional brain systems, each time resulting from a defect of a *basic factor* (according the locus of the lesion) — bringing a series of *primary symptoms* and resulting in a series of *secondary symptoms* or functional (»systemic«) results.

6. The basic goal of neuropsychology is neither a pure *description*, nor a direct reduction to a physiological issue, but a careful *psychological qualification* of the symptom (i. e. singling out the underlying factor, and then — a description of systemic results of the destruction or elimination of this factor); that is the real way to the neuropsychological diagnostics of brain injury.

That is very shortly my credo.

(Formulated in a letter to prof. Douglas Bowden, dated febr. 20. 1971, Souhanovo, near Moscow, sign. A. R. Luria).

### Terminology:

*Centrencephalic system* Penfields term for a hypothesized central structure of neurones in the brain stem which is conceived of as the anatomical basis for the coherent unity of mental processes. In many respects, the centrencephalic system would appear to be identical with the reticular activating system.

(from Hinsie & Campbell: *Psychiatric Dictionary*, N. Y. 1970).

## The Functional System: Keystone to Luria's Neuropsychology\*



By Douglas M. Bowden, M. D.,  
Department of Psychiatry, University of Washington,  
Seattle, Washington U. S. A.

A. R. Luria, Professor of Psychology of Moscow State University and chief of the diagnostic research section at the Burdenko Institute of neurosurgery is, to the West, undoubtedly the best known figure in contemporary Soviet psychology. The present paper is intended to point out certain themes which have run through his work over the past 45 years, to outline the theoretical framework from which his research has involved, and to describe a few typical experiments which will give an impression of the kind of evidence he has accumulated to support his theories.

Professor Luria has always been primarily interested in functions peculiar to man. From the 1920's to the present he has defended again and again the legitimacy of experiments designed to objectify »higher mental processes«. Also, from the beginning of his career his work has reflected a concern for the major significance of social forces in the determination of human personality and thought processes.

\*This paper was originally presented at the Convention of the American Psychological Association, New York, 1966. It is not necessarily an overview of Professor Luria's research and theory as he would present it. It is, rather, a synopsis by one who has felt his own thinking very much influenced by contact with Professor Luria and his writings. The author expresses his thanks to Professor Luria for his very generous consultation and assistance in gathering the literature on which the paper is based and sincerely hopes that in emphasizing those themes which appear most essential to himself, he has not distorted the original concepts or experimental intentions of Professor Luria.



The word »function« is ubiquitous to Luria's writings. He uses the term with variable degrees of specificity. Functions in the most general sense include such phenomena as speech, reading, and calculation; in a somewhat less general sense, functions include abstraction, selective attention, memorization, etc. In individual experiments, function usually refers to the fulfillment of a specific task, such as pressing a rubber bulb to an auditory signal, building a house from blocks, or narrating a story from memory.

Different functions are performed by different »functional systems«. In the 1920's, Luria used functional system as a psychophysiological term which referred to interactions between affect, motor activity, and thought processes. Characteristics of a functional system were inferred from vegetative, somatic, and speech reactions which were recorded as the subject performed a task. Hypotheses were stated regarding the psychological interaction of, for instance, massive affect and regulatory speech processes. At that time he was little inclined to speculation about the brain structures involved in such interactions.

In the mid-1930's his interests broadened to include the organization of functional systems within the brain. Through his study of thousands of patients with focal brain lesions, the term »functional system« has come to have a definite neuroanatomical connotation. It would be incorrect, however, to consider this the entire essence of the concept.

In its present form, the concept of a functional system involves two components: a cerebral component and an environmental component. The function »reading« for instance, cannot occur where either a book or a human brain is lacking. Thus, the concept of a functional system for reading is incomprehensible unless reading material, i. e., the environmental component, is included in the definition. The book is as essential a part of the functional system for reading as the occipital cortex.

With this conception of human functions in mind, one can define four major postulates to which Luria has adhered throughout most of his career. The first is that the cerebral component of any functional system results from the interaction of a constellation of cerebral areas. Thus, a function is localizable in the sense that damage to any one of the areas involved destroys the functional system responsible for it. Secondly, a given function may be performed in different ways, i. e., by different functional systems depending upon the individual and the circumstances in which he finds himself. Thus a function is not localizable in the sense that if damage to a structure destroys the functional system on which it is based another system can be developed to carry out the same function. Thirdly, the most powerful adaptive functions which man possesses, such as abstraction, computation, and speech itself, depend upon functional systems which are acquired rather than innate. The fourth major postulate is that the most important determinant of functional systems in man is the organization of the social environment.

Challenges to these postulates have given rise to hundreds of experiments over the past 45 years. It would be impossible to summarize all of Luria's work in a few pages. The intention here is rather to give some impression of the variety of his attempts to test his theory by citing several types of experiment and indicating how they relate to his major theses.

The following is an example of how the cortical constellations hypothesis has been studied. Luria found that word blocking was characteristic of aphasias associated with lesions in several different areas. He did not conclude from this, however, that the areas were »equipotential for word finding.« He analyzed the syndromes further and found that with lesions of the »superior premotor area« the blocking was associated with a general inability to perform repetitive motor patterns smoothly. For instance, patients with superior



premotor lesions were incapable of reproducing a rhythm (// /// // /// . . . .) tapped out by the examiner.

With lesions of the temporo-parieto-occipital region, on the other hand, motor patterns were intact, but the patients had difficulty comprehending certain simple grammatical constructions. For instance, instructed to »draw a circle under a square,« they might draw a circle and, under it, a square; they tended to follow the sequence of operations conveyed by the sequence of words in the instruction rather than the sequence of operations defined by its grammatical structure. The associated deficit suggested that word blocking in this syndrome might be due to a loss of semantic and grammatic associations through which words would ordinarily be retrieved.

Finally, patients with lesions in the left inferotemporal area often showed a very severe form of word blocking. In this syndrome non-verbal motor patterns were unaffected and comprehension of grammatical statements was intact. The lesion also prevented the patient from reading or writing unfamiliar words which had to be sounded-out, although common words which would be recognized directly from visual memory, or familiar words such as a signature, which he could write »in one motion« presented no problem. Again the combination of symptoms with the inferotemporal lesion differed markedly from that seen with either of the previous two lesions. This Luria interpreted as evidence that a different link in the functional system for word finding had been disrupted.

From a practical point of view, this approach has yielded diagnostic tools which Luria has used clinically since the early 1940's. In a theoretical sense, the evidence it yields has been taken to support the concept that functional systems involve constellations of cortical areas, damage to any one of which can disrupt the corresponding function.

The thesis that the same function can be performed in different ways implies that the different areas of the brain

can be connected in a variety of ways to perform the same function. Indeed, a major tenet of Luria's theory is that one principal difference between the human and lower animals is the plasticity of brain function, the ease with which temporary connections are made and broken by means of the second signal system.

The idea that speech might be restored by reorganizing the speech system to comprise a different constellation of cortical areas was the theoretical basis of a large scale rehabilitation program for aphasics undertaken by Luria during and after World War II (1). It was found, for instance, that patients with oral apraxias could regain control of the oral apparatus required for speech by observing the movements of the tongue and lips in a mirror as they attempted to talk. In such cases, the mirror became an environmental component of the reorganized functional system.

Other observations from an entirely different area have also been adduced as evidence that the same function may be accomplished by different functional systems, *viz.*, from studies of cognitive development in the child. In a very early study of counting, Luria noted that children of different ages counted in different ways. If they were instructed to count blocks arranged in a row, no difference was detected. If the blocks were arranged to form a cross, however, the younger children counted the block at the junction of the horizontal and vertical columns twice. On the basis of this and numerous similar experiments, Luria concluded that, at the earlier age, the culturally determined functional system for counting had not yet developed; counting was done by a more primitive form-bound functional system, so that the outcome was highly dependent upon environmental circumstances. At a later age a more complex functional system developed, which allowed counting of a more abstract nature.

A third experiment showed not only that different functional systems can fulfill the same function, but also demonstrated how such differences developed during learning and



the kinds of influence they could have on subsequent performance (2). Five sets of identical twins participated in a series of sessions with building blocks. One twin from each pair learned to reproduce model houses in which the building blocks were exposed to view. The other learned to reproduce the same houses, but the models he had to work from were covered with paper, so that the ways in which blocks were stacked to obtain the overall form of the house were not exposed to view. After 10 weeks of training with different models, the two groups showed equal facility at reproducing houses. There were marked differences, however, in their comprehension of grammatical statements regarding spatial relationships, and 18 months later, they showed great differences in their ability to reconstruct from memory the models which they had produced during the training sessions. For instance, the twins who had worked from models in which the individual blocks were hidden had less difficulty responding appropriately to the instruction, »draw a circle under a square« and were considerably better at reconstructing old models from memory.

In order to reproduce a model in which the relationships between individual bricks were hidden from view, they had first to analyze the general form of the structure and then construct the form from blocks at hand. In the process a functional system developed which had a different environmental component than that evolved by the children who had been shown the relationships between individual blocks. The functional system they developed was more abstract and more powerful in that it rendered comprehension of related verbal statements and memory for spatial relations more effective.

Some of Luria's most fascinating studies have been designed to test the thesis that man's most effective functions for dealing with his environment are acquired rather than innate. In the experiment just described, he sought to eliminate the genetic factor by elaborating the different

functional systems he wished to study in identical twins. In other twin studies he has attempted to distinguish between functional systems which are closely related to genotype from ones which are not.

One such study involved over 140 sets of twins who were subjected to a number of different tasks (3). He found that in a simple visual recognition task, the variation in performance was considerably less between identical twins than between fraternal twins. For a complex memorization task, on the other hand, the variation between identical twins was as great as between fraternal twins. From this he concluded that the functional system responsible for performance in the recognition task was highly related to genotype, whereas that responsible for memorization was related to past experience. Since past experience was as heterogeneous between identical twins as between fraternal twins, variation in performance scores for the latter was taken to reflect a predominance of experiential over genetic influences.

Luria's fourth major postulate, that the most important determinant of functional systems in man is the organization of his social environment follows directly from the postulate that such systems are acquired rather than innate. One of the studies which illustrates this principle most strikingly involved a pair of identical twins, who, at age 5, showed marked retardation in speech development (4). At the beginning of the study, the children shared a vocabulary of less than 80 real words, and their speech reflected almost no grammatical structure. They were enrolled in separate kindergartens and trained by adults who maximally encouraged their use of speech in practical situations; one of the twins received formal instruction in grammar as well.

For both twins, grammatical speech developed rapidly. They came to perform equally as well in most situations. They both developed narrative speech and verbal control over their behavior. In addition they developed constructive



play and the ability to draw from memory. These functions had been all but absent 11 months earlier.

In summary, the major finding was that identical twins living in a close symbiotic relationship and in an atmosphere of adult indifference did not develop grammatical speech, the most basic of human functions. When they were separated and exposed to adults who encouraged or demanded verbalization of perceptions, desires, intentions, etc., they rapidly developed speech. Luria concluded that grammatical language and constructive thought processes, even of a rudimentary nature do not develop in the absence of social necessity or interaction with other humans who have already acquired language.

Anyone familiar with the vast range of Prof. Luria's research interests will readily recognize that a number of large areas have been omitted from this discussion. His well-informed interest in psychoanalysis during the 1920's (5,6), and his own attempts at that time to analyze the influence of hidden affect on speech and thought processes (7); his cross-cultural studies of speech in children from rural and urban environments (8); and his studies of speech and thought in children with severe motor and mental handicaps (9) represent decades of research which we can only mention here in passing.

The major aim of this paper has been to point out several themes which are basic to virtually all of Prof. Luria's work. Each passing year sees an increasing number of translations of this man's important scientific contributions from Russian into languages more accessible to his western colleagues. It is a unique and fascinating body of theory and research which well merits the rapidly growing attention it is receiving from scholars in a broad spectrum of fields, including, not least of all, educational psychology.

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## Det funktionelle system: Nøglebegrebet i Luria's neuropsykologi\*



Af Douglas M. Bowden, M. D.,  
Department of Psychiatry, University of Washington,  
Seattle, Washington U. S. A.

A. R. Luria, professor i psykologi ved Moskvas Statsuniversitet og chef for den diagnostiske forskningsafdeling ved Burdenko Institutet for Neurokirurgi, er for den vestlige verden utvivlsomt den bedst kendte skikkelse i moderne Sovjet-psykologi. Formålet med denne artikel er at fremhæve visse temaer, som gennem 45 år har præget hans arbejde, at skitsere den teoretiske begrebsramme, hvorfra hans forskning har udviklet sig, samt at beskrive nogle få typiske eksperimenter, som kan give et indtryk af arten af den bevismængde, han har samlet som støtte for sine teorier.

Professor Luria har altid først og fremmest interesseret sig for de funktioner, der specielt vedrører mennesker. Fra 1920 og til i dag har han atter og atter gjort sig til talsmand for det legitime i at udføre eksperimenter med det formål at objektivere de såkaldte »højere mentale processer«. Ligeledes har hans arbejde fra første færd afspejlet en stærk interesse for de sociale kræfters betydning som determinanter for den menneskelige personlighed og for tankeprocesserne.

Ordet »funktion« optræder overalt i Luria's værker og bruges snart i snævrere, snart i videre betydning. I sin mest generelle form omfatter »funktioner« fænomener som tale, læsning og regning; i noget mindre generel betydning bruges ordet om abstraktion, selektiv opmærksomhed, udenadslæren etc. I individuelle eksperimenter re-

\*) Denne fremstilling blev oprindeligt forelagt for The Convention of the American Psychological Association, New York 1966. Den er ikke nødvendigvis et overblik over Professor Luria's forskning og teori, således som han selv ville fremstille det. Snarere er det en synopsis foretaget af én, som har følt sin egen tænkning stærkt påvirket af kontakten med Professor Luria og hans værker. Forfatteren udtrykker sin taknemlighed til Professor Luria for hans rundhændede rådgivning og hjælp med at samle den litteratur, hvorpå artiklen er bygget, og håber oprigtigt, at han ved at fremhæve de temaer, han selv har fundet mest væsentlige, ikke har forvansket Professor Luria's originale begreber eller eksperimentelle intentioner.

fererer det sædvanligvis til udførelsen af et bestemt arbejde, som fx at trykke på en gummibold som svar på et auditivt signal, at bygge et hus af klodser eller at fortælle en historie udenad.

Forskellige funktioner udføres af forskellige »funktionelle systemer«. I 1920'erne brugte Luria dette udtryk som en psykofysiologisk betegnelse, der refererede til interaktioner mellem affekt, motorisk aktivitet og tankeprocesser. Et funktionelt systems karakteristika blev udledt af de vegetative, somatiske og verbale reaktioner, som kunne registreres under forsøgspersonens udførelse af et arbejde. Der blev eksempelvis fremsat hypoteser vedr. den psykologiske interaktion mellem stærk affekt og regulerende talevirksomhed. På den tid var han kun i ringe grad tilbøjelig til at gøre overvejelser vedr. de hjerne-strukturer, der var involveret i sådanne interaktioner.

I midten af 30'erne udvidedes Lurias interesser til også at omfatte organisationen af de funktionelle systemer i selve hjernen. Gennem hans studier af tusindvis af patienter med fokale hjernelæsioner har udtrykket »funktionelt system« efterhånden fået et klart neuro-anatomisk indhold, men det ville dog ikke være korrekt at betragte dette som dækkende hele indholdet af begrebet.

I sin nuværende form indeholder begrebet »funktionelt system« to komponenter: den cerebrale og den miljømæssige. Fx kan funktionen »læsning« ikke foreligge, medmindre der findes såvel en bog som en menneskelig hjerne. Begrebet: læsning som et funktionelt system er således uforståeligt, hvis ikke læsematerialet, dvs. miljøfaktoren, medtages i definitionen. Bogen er en lige så væsentlig del af det funktionelle system som den occipitale del af cortex.

På baggrund af denne opfattelse af menneskets funktioner kan vi nu fremsætte de fire vigtigste postulater, som Luria har holdt sig til i størstedelen af sin karriere. *Det første* er, at den cerebrale komponent af et hvilket som helst funktionelt system er et resultat af en interaktion mellem visse cerebrale områder. Dvs. at en funktion kan lokaliseres i den forstand, at beskadigelse af et af de involverede områder vil ødelægge det funktionelle system i sin helhed. *Det andet* er, at en given funktion kan udføres på forskellige måder, dvs. af forskellige funktionelle systemer, afhængigt af individet og dets omgivelser. En funktion er således ikke lokalisierbar i den forstand, at et andet funktionelt system kan udvikles til at udføre funktionen, hvis det første skulle blive ødelagt. *For det tredje*: menneskets vigtigste tilpasningsfunktioner, som fx abstraktion, aritmetisk beregning og selve talen, afhænger af funktionelle systemer, som er erhvervede, snarere end medfødte. *Det fjerde* hovedpostulat er, at den vigtigste determinant i menneskets funktionelle systemer er organiseringen af den sociale omverden.



Afprøvningen af disse postulater har givet anledning til hundredvis af eksperimenter i de forløbne 45 år. Det ville være umuligt at opsummere Lurias arbejde på nogle få sider. Hensigten her er snarere at give et indtryk af variationsbredden i hans forsøg på at teste sin teori, og dette vil blive gjort ved at omtale flere typer af eksperimenter og anføre, hvorledes de står i relation til hans hovedteser.

Ad 1) hypotesen om den corticale interaktion: Luria fandt, at ordblokeringer var karakteristiske for afasier, der hidrørte fra læsioner i flere forskellige områder. Men herudfra drog han imidlertid ikke den slutning, at de pågældende områder i lige høj grad var afgørende for funktionen at finde ord. Han analyserede syndromerne yderligere og fandt, at ved læsioner af »det overordnede præ-motoriske område« var blokeringen forbundet med en generel mangel mht. glat forløbende udførelse af en motorisk aktivitet, som skulle gentages. Fx var patienter med sådanne læsioner ude af stand til at reproducere en rytme, som undersøgeren bankede.

Men ved læsioner i temporal-parietal-occipital området var de motoriske mønstre intakte, men patienterne havde besvær med at opfatte visse simple grammatiske konstruktioner. Hvis man fx bad dem tegne »en cirkel under en firkant« ville de ofte tegne en cirkel først og derefter en firkant nedenunder; de havde tilbøjelighed til at lade rækkefølgen af handlinger følge rækkefølgen af ord, snarere end den rækkefølge, som den grammatiske struktur angav. Dette forhold kunne tyde på, at ordblokeringen i dette syndrom skyldtes et tab af de semantiske og grammatiske associationer, som under normale omstændigheder kunne føre til identifikation af ordene.

Endelig udviste patienter med læsioner i det venstre inferotemporale område ofte en meget alvorlig form for ordblokering. I dette syndrom var ikke-verbale motoriske mønstre uberørte, og forståelsen af grammatiske forhold var intakt. Læsionen forhindrede patienten i at læse eller skrive usædvanlige ord, som derfor måtte siges i stavelser, mens der ikke var problemer med almindelige ord, som kunne genkendes umiddelbart ved hjælp af visuel hukommelse, eller med velkendte ord som fx en underskrift, der kunne skrives »som i en bevægelse«. Vi ser her igen, at kombinationen af symptomer ved denne læsion var afgjort forskellig fra de to tidligere omtalte tilfælde. Dette fortolkede Luria som et bevis på, at det var en anden forbindelse i det funktionelle system for ordgenkendelse, der var blevet afbrudt.

Fra et praktisk synspunkt har denne forskning betydet, at Luria har fået et diagnostisk middel, som han har brugt klinisk siden begyndelsen af 1940'erne. I teoretisk henseende kan disse synspunkter tages til indtægt for den opfattelse, at funktionelle systemer involverer

interaktioner af corticale områder, og at en beskadigelse af et enkelt af disse områder kan nedbryde den tilsvarende funktion.

Ad 2). Påstanden om, at den samme funktion kan udføres på forskellige måder, implicerer, at de forskellige områder i hjernen kan forbindes på flere forskellige måder ved udførelsen af samme funktion. Det indgår som et hovedprincip i Lurias teori, at en af de væsentlige forskelle mellem mennesker og laverestående dyr er plasticiteten i hjernens funktion, dvs. den lethed, hvormed mere kortvarige forbindelser kan dannes og afbrydes ved hjælp af »det andet signal-system«.

Den opfattelse, at talefunktionen kan reableres ved en reorganisering af talesystemet, således at andre konstellationer af hjerneområder tages i brug, var det teoretiske grundlag for et stortilet rehabiliteringsprogram for afatikere, som Luria startede efter den anden verdenskrig. Man fandt fx, at patienter med oral apraxi kunne genvinde kontrollen med taleapparatet ved at studere tunge- og læbebevægelserne i et spejl, mens de prøvede at tale. I dette tilfælde blev spejlet en miljøfaktor i det reorganiserede funktionelle system.

Andre observationer fra et helt andet område viser også, at den samme funktion kan udføres af forskellige funktionelle systemer; det drejer sig her om studiet af den kognitive udvikling hos barnet. I et tidligt foretaget forsøg vedr. tællefunktionen bemærkede Luria, at børn på forskellige alderstrin havde forskellige fremgangsmåder. Hvis børnene fik som opgave at tælle blokke, der var opstillet i en række, viste der sig ingen forskel. Men hvis blokkene var ordnet i et kors talte de mindre børn blokken i skæringspunktet to gange. På basis af dette og mange lignende eksperimenter sluttede Luria, at på det tidlige aldersniveau var det kulturelt bestemte funktionelle system for at tælle endnu ikke udviklet; tællefunktionen var bundet af en primitiv formopfattelse, så at resultatet var stærkt afhængigt af ydre omstændigheder. I en senere alder udvikledes et mere kompliceret funktionelt system, som tillod en mere abstrakt form for tællen.

Ad 3). Et tredie eksperiment viste ikke alene, at forskellige funktionelle systemer kan udføre samme funktion, men tillige, hvorledes sådanne forskelle udvikledes ved indlæring, og hvorledes de kunne influere på den senere adfærd. Fem par enæggede tvillinger deltog i en serie forsøg med byggeklodser. Den ene tvilling i hvert par lærte at bygge efter modelhuse, i hvilke byggeklodserne var synlige. Den anden lærte at bygge de samme huse, men her var modellerne overtrukket med papir, således at det ikke fremgik synligt, på hvilken måde klodserne var arrangeret. Efter 10 ugers træning med forskellige modeller var de to grupper lige dygtige. Der viste sig imidlertid afgørende forskelle i deres forståelse af grammatiske fremstillinger



vedr. rumlige forhold, og 18 måneder senere viste de store forskelle mht. færdighed i at rekonstruere de tidligere udførte modeller efter hukommelsen. Fx havde de tvillinger, som havde arbejdet med modeller med skjulte blokke, mindre vanskelighed med at reagere korrekt på instruktionen: »Tegn en cirkel under en firkant«, og de var langt bedre til at bygge de gamle modeller efter hukommelsen.

For at kunne gengive en model, hvor relationerne mellem de enkelte klodser ikke var synlig, måtte de først analysere dens struktur og så konstruere formen med de forhåndenværende klodser. Under denne proces udvikledes et funktionelt system, der havde en miljøkomponent, der var forskellig fra den, der udvikledes hos børn, som havde fået relationen mellem de enkelte klodser at se. Dette system var mere abstrakt og havde den virkning, at det gjorde forståelsen af tilsvarende verbale udsagn og hukommelsen for rumlige relationer mere effektiv.

Nogle af Lurias mest fascinerende forsøg er lavet med henblik på at teste den tese, at menneskets mest effektive funktioner i forholdet til omverdenen er erhvervede, snarere end de er medfødte. Ved hjælp af forsøg med tvillinger har han prøvet at skelne mellem de funktionelle systemer, som er knyttet til genotypen, og dem, der ikke er det.

I et af forsøgene indgik over 140 tvillingepar, som blev udsat for forskellige opgaver. Han fandt, at når det drejede sig om simpel visuel genkendelse, var præstationsvariationerne betydeligt mindre hos enæggede tvillinger end hos toæggede. Men hvis det drejede sig om komplicerede hukommelsesopgaver, var der samme variation, hvadenten tvillingeparrene var enæggede eller toæggede. Han sluttede heraf, at det funktionelle system, som vedrørte udførelsen af genkendelsesfunktionen, havde nær sammenhæng med genotypen, hvorimod hukommelsesfunktionen primært var afhængig af tidligere erfaringer.

Ad 4). Lurias fjerde hovedpostulat er direkte afledt af det foregående og siger, at den vigtigste determinant i menneskets funktionelle systemer er organiseringen af den sociale omverden. Et af de forsøg, som mest slående illustrerer dette princip, omfattede et par enæggede tvillinger, som ved femårsalderen udviste en alvorlig tale-retardering. Ved eksperimentets begyndelse var deres ordforråd mindre end 80 egentlige ord, og deres tale var nærmest blottet for grammatisk struktur. De blev anbragt i hver sin børnehave og trænet af voksne, som især lagde vægt på at udvikle deres tale i praktiske situationer; den ene tvilling modtog desuden egentlig grammatisk undervisning.

Hos begge tvillinger udvikledes den grammatiske tale hurtigt, og der var ikke væsentlig forskel på deres præstationer. De forbedrede

begge talesproget og den verbale adfærdskontrol og havde desuden fremgang mht. konstruktiv leg og færdighed i at tegne efter hukommelsen. Disse funktioner havde stort set ikke været til stede 11 måneder tidligere.

Hovedresultatet var, at enæggede tvillinger i nær symbiotisk relation og i en atmosfære af ligegyldighed fra de voksnes side ikke udviklede grammatisk tale, den mest grundlæggende af menneskets funktioner, Adskilt og under passende stimulering fra de voksne udvikledes deres tale hurtigt. Luria konkluderede, at grammatisk sprog og konstruktiv tankevirksomhed ikke kan komme til udvikling, medmindre der foreligger sociale krav og mulighed for interaktion med andre mennesker, som allerede har erhvervet talens brug.

Enhver med kendskab til Professor Lurias omfattende forskningsinteresser vil vide, at mange områder ikke er medtaget i denne diskussion. Vi må her nøjes med at nævne nogle få emner, som hver for sig repræsenterer årtiers forskning: hans velfunderede psykoanalytiske interesse i 1920'erne, hans daværende forsøg på at analysere de skjulte affekters indflydelse på tale- og tankevirksomhed, hans tværkulturelle studier af tale hos by- og landbørn, hans studier vedr. tale og tænkning hos børn med alvorlige motoriske og mentale handicaps.

Hovedformålet med denne artikel har været at pege på nogle temaer, som ligger bag alt Professor Lurias arbejde. For hvert år bliver et stigende antal værker af denne mands vigtige videnskabelige produktion gennem oversættelser gjort tilgængelige for hans vestlige kolleger. De udgør en enestående og fascinerende enhed af teori og forskning, som i høj grad fortjener den hurtigt voksende opmærksomhed, den har vakt hos videnskabsmænd fra en lang række områder, herunder ikke mindst den pædagogiske psykologi.

(Oversat af *Otto Sloth* efter *The Functional System: Keystone to Luria's Neuropsychology*, der også bringes i den engelske version i dette nummer af *Skolepsykologi*).