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DISTURBANCES OF GRAMMATICAL OPERATIONS
IN PATIENTS WITH "SEMANTIC APHASIA"

1946 - 1975

DISTURBANCES OF GRAMMATICAL OPERATIONS IN SEMANTIC APHASIA

A REVISED VERSION OF

This is ^Vone of the earliest papers the author published in the field of aphasia.

The main purpose of this study was to analyse the rules of the break ^Ddown of operations with grammatical constructions in patients with local brain lesion.

The subjects reported here were mainly those with lesions of temporo-parietal parts of the left hemisphere and the syndrome of "semantic aphasia" which was described by the author in his later works. All patients referred to in this paper had suffered brain hemorrhage or brain tumors. All of them, ^{And} ~~see~~ - first of all - Patients Avt. and Pros., were very carefully studied for more than a year each and were the first patients the author approached with Neuropsychological analysis.

The present paper was published in 1946 in the "Proceedings of the Academy of Pedagogical Sciences of the Russian Federation" (vol.3, pp.60-98) and underwent a slight abbreviation when the author translated it in 1975 for this volume. During this translation the author added references to some studies done after the first publication of this paper.

I. INTRODUCTION

The acquisition of conscious analysis of the grammatical structure of language is one of the most important processes in the child's mental development. During the early stages

of its development the child begins to use the grammatical structures; but a conscious analysis of grammatical structures already used remains difficult and requires some special effort.

It is well known that the child has much to do with things and events reflected in language, whereas he remains not fully aware of the formal features of speech itself, and the ability to analyse consciously, [†] the forms of language itself is a product of special school education and especially of the lessons in grammar. The difficulty of the conscious analysis of the grammatical forms of language requires a new abstract attitude and new kind of activity, where immediate relation to the objects, actions and events are blocked, and the attention is shifted to the word itself, ^{that} is a rather difficult process.

This was shown in the early works of L.I.Bozhovich, L.S.Slavina and the further works of S.N.Karpova and her associates.

These studies showed that the pre-school child is unable to shift his attention from things, actions or events, designated in speech to the speech itself, and he uses speech as a kind of transparent glass which enables him to see the environment but of which the subject is not aware.

To master grammar, one has to block this concrete attitude and to replace the "practical concepts" of the child with "theoretical concepts" which are required by the study of language and speech themselves.

It is easy to see that such a shift of attention begins during the first lessons of writing and reading, when the child has to deal with sounds and letters, words and sentences, rather than with objects and events they reflect. It is well known that the first stages of teaching in the school result in a real revolution in the child's consciousness and that the teacher has to overcome a series of obstacles in order to guide the child to the abstract forms of behavior dealing with ~~the~~ singling out separate sounds of the word, writing down separate strokes and combining them in to lines representing parts of letters (which is a senseless work before the child acquired the operations of writing). It is known as well that it is rather a difficult task to break the child's immediate relations to objects, actions and events and to transfer it's attention to the word sounds, morphemes and grammatical structures which become real goals of his linguistic behavior during the lessons of language.

That is why the process of acquisition of this linguistic attitude is of special interest and special importance¹⁾. There are two ways to come closer to the intimate mechanisms of conscious processing of grammatical structures. The first

1) During recent decades a long series of studies were done in this field. We shall not mention them here. We want only to refer to the important work done by our former collaborator Prof. S.N.Karpova and her co-workers who described very carefully the acquisition of the child's abstract attitude towards the reality of language and speech.

is to study the subsequent stage of their acquisition in children, the second - the careful analysis of their destruction in local lesions of the brain. The second of these is in no way of less importance than the first. It was W. Wundt who once mentioned that brain injuries are one of the most significant means for psychological analysis: that which is indivisible in normal consciousness can be separated in pathological cases and this provides new opportunities for the understanding of the interrelations of psychological functions. The same was suggested by I. P. Pavlov who said that pathological data splitting and simplifying indivisible normal events, open new ways in the scientific analysis of intimate physiological processes.

We shall follow these ways, bearing in mind that lesions of the specifically human parts of the tertiary zones of the cortex are of special significance for the acquisition of complex codes, and that lesions of these zones result very often in an inability to deal not only with complex spatial relations but as well with the symbolic codes which are based on the simultaneous syntheses. We already mentioned in a series of other publications (Cf. A. R. Luria, 1966, 1969, 1972 et al.) that mastering of complex grammatical relations as well as mastering the numerical operations can be supposed to be examples of such symbolic processes which require complex forms of spatial orientation.

We shall start from this assumption, and we shall try to answer the question what kind of complex grammatical relations are broken down in patients with primarily disinte-

gration of simultaneous spatial relations¹⁾.

The syndromes of disturbances of grammatical operation (or symptoms of "agrammatism" were carefully described by a series of authors (as A. Pick, 1914, H. Head, 1926). It is well known that lesions of the posterior parts of the major hemisphere can result in a deterioration of the ability to deal with complex grammatical relations, while the ^understanding of simple forms of fluent speech, which do not involve complicated logico-grammatical relations, is preserved. It is well known that lesions of the anterior parts of the speech zones result in a breakdown of fluent grammatical speech and in the appearance of "telegraphic speech", whereas the understanding of complex grammatical forms remains normal²⁾. What remains unknown is what kind of grammatical constructions suffer predominantly and which grammatical forms remain preserved.

The following questions will therefore be discussed in this paper:

1) Does the conscious awareness of language and speech itself suffer in these cases? How far do the patients of the group mentioned preserve their ability to shift their attention from things and events mentioned in a verbal contribution to the verbal contribution itself?

- 1) This approach was further developed in the author's books mentioned in the introductory lines of this paper.
- 2) This assumption was studied by the author in a series of publications (cf. A.R. Luria, 1966, 1970, 1972, 1973) and in a later paper on disturbances of understanding of speech in non-fluent motor aphasia (1975).

2) To what extent do the grammatical operations undergo a change in these patients and ^{what} ~~are~~ are the basic rules of these changes?

3) If some changes of "linguistic awareness" and grammatical operations are seen - what is ^{the} ~~the~~ influence of these changes on the verbal behavior of the patients?

Data we shall deal with in this paper ^{are} ~~are~~ based on our observations and experiments with 30 patients with lesions of the posterior (parietal or temporo parietal), ^{parts} of the major hemisphere. These patients with a clear syndrome of "semantic aphasia" were selected, some with tumors of this zone (verified on operation) or with hemorrhage in the same zone (verified clinically and sometimes in autopsy). A number of patients with gunshot wounds were included who had undergone careful study during the first years of World War II.

Only patients with a high level of education (economists ingeneers etc.) were selected (the exceptions being two ~~was~~ patients who had recently finished high school with a fresh grammatical experience).

The author's collaborators O.P.Kaufmann and V.K.Bubnova took part in these observations.

We shall begin with some data concerning "linguistic awareness" and then move to the study of derangement of grammatical operations.

II. CHANGES IN SPEECH AWARENESS

The first problem we mentioned is: can speech itself become the object of conscious analysis, and if this process

suffers in what group of patients does the possible shift of attention from concrete things and situations formulated verbally to the words and sentences themselves suffer the most?

To study this problem we used the method of counting the number of words and sentences given in a communication. Only normal subjects with preserved speech were used in these series - or patients with semantic aphasia without any disturbances in repetitive speech and without any literal or verbal paraphasias^a. All patients were able to comprehend such simple instruction as "please, count the number of words in the phrase" etc. All patients were able to repeat the phrase presented, and no patients with severe memory defects were used in this series. A special sentence or a paragraph was given to a subject without any breaks or intonations, and the subject had to tell how many words (or sentences) the communication contained. In special cases the number of words came in conflict with the number of object mentioned; such were the cases when the subject was given a sentence: "There were twelve chairs in the room" and he was asked to count the number of words in the sentence (not the number of chairs in the room).

As it was shown by several investigators (T.O. Guinevs-kaya, 1933, N.G. Morozova, 1935 and afterwards S.N. Karpova, 19) children of 5 to 6 years of age as a rule show the tendency to count things rather words and that special training was required to direct the child's analysis away from

objects and to link his attention to the words.

Here are some examples:

Lenia P. 6 years. "The tree fell down". How many words are there? "One word" Why? "There was one tree, and it fell down. "The tree was ~~was~~ felled by an ax" How many words are there? "Three words". Why? Because it is the man, who felled, the ax and the tree."

Zoia A. 5 years. "Two trees are standing" How many words are there? "Two words". Why? "Because there were two trees..."
"In the room was a table and chairs". How many words are there? "Three: one table and two chairs".
"The cake was eaten". How many words are there? "There are none! All was eaten, Nothing remained, only crumbs..."

It was seen that in the process of development of the child, different parts of speech become the object, of awareness at different levels: first the designation of objects (nouns), than - of actions or qualities (verbs and adjectives), and only after that - particles. Singling out particles as special words remain the most difficult task.

It was seen, too, that the development of the process of a conscious attitude toward the words can take two forms: either it is a gradual singling out the types of words we mentioned, or it is the process of splitting words in phonetic units and counting these units. An example of the last "over-formalization" can be found when the child begins to count syllables instead of words, and, being asked to count

the number of words in the sentence "The windows were open" begins to count phonic units: "The - win - dows - we - re - - o - pen ... ". All these observations, carefully described by the authors mentioned, show how long and dramatic is the development of "verbal awareness" in the child.

The first observations on patients with semantic aphasia gave the impression that these patients were inclined to deal with things and situations designated in verbal communications rather than with the verbal units of these communication themselves. The idea that these patients had lost the "abstract" or "theoretical" attitude and that they could scarcely handle the formal side of speech came several years before it was proposed by Kurt Goldstein, and the observations made during this period seemed to confirm this idea.

A patient with a tumor of the left parietal lobe and the syndrome of naming defects as well as a series of severe semantic defects in understanding of speech, when asked to repeat the sentence, "I shall go home with my mother", rose up and started to say good-bye. Another patient with atrophy of the same region of the brain, when asked to repeat "I want to go home" + went up and expressed thanks for permission to leave the word. During the first years of our observations we supposed these patients have lost their "abstract attitude" and dealt as a rule with immediate surrounding and concrete actions, rather than with the verbal behavior (such as repetition of phrases) itself.

Investigations of the next years changed our interpre-

tation of this facts. During a systematic rehabilitation training we could observe, that repetition of words and phrases could become the subject of the patients activity; nevertheless marked difficulties in the patients operation with linguistic units still remarked, and the tendency to deal with facts and events as units of a verbal communications, rather than with words, as formal units of the sentences, was still observed.

When one of our principal patients Avt. (an engineer, 49 years old, with atrophy of the parietal lobe as a result of hemorrhage and clear semantic aphasia), was asked to give a sentence containing seven words, he started to count every word bending his fingers and telling: "I - went to a walk - set down - in - the garden - that makes five, returned to my house and had a rest! That makes seven!"

The same was seen in our experiments with counting the number of words in a sentence given. When the sentence included only meaningful words (nouns and verbs) he counted the number of words with no mistakes; when auxiliary words were introduced - the patient became unable do be aware of these words and did not single out them.

Here are some examples:

Patient Sosn. (hemorrhage in the left temporo parietal zone and residual amnesic (semantic) aphasia.

(a) (Sentences containing only basic words (nouns and verbs). Trees were covered with blossoms (in Russian the sentence "Derevia pokryty zvetami" doesn't include any

particles or auxiliary words "There are three words".

"Snow drifts are lying" ("Lezhat Sugroby sniega")

"Three words" etc.

(b) (Sentences with auxiliary words): "Ya idu v less"

("I am going to the forest", "v" means "to") "Three

words: Ya-idu-v less" "Chelovek sidit za stolom" (The

man is sitting by the table", "za" meaning "by") "Three

words: chelovek - sidit - za stolom" etc.] The same was

seen in a group of patients with tumors of the left

parietal zone.

It is clear that whereas significant parts of the sentence - nouns - and verb - were singled out easily, auxiliary words remain were not singled out.

Further experiments showed that in certain conditions - in cases we pronounce words separately and every word - even an auxiliary one - became a separate phonetic unit - the whole picture changed. So if words were separated phonetically and pronounced with intervals (I - am - going - to - a - walk) patients became able to count even auxiliary parts as well, although a transfer of the same action to the sentence which was pronounced without such intervals - was as a rule very difficult if not impossible.

Here are further illustrations:

Patient Sosn.:

(a) "Ja pishu, a sestra smotrit" (I am writing and my sister observes me) - "Four words: I - am writing

- my sister - is observing" etc.

(b) "Ya - pishu - a - sestra - smotrit". "Five words!"

(right) "Chelovek - v - dome". (The man's - in - the house) - "Three words" (right) etc.

(c) Ptichka v gnezdie (The bird is in the nest) "Two words: a bird and a nest. "Rebenok v shkolie" (The child is in the school) - "Two words". "Devochka - v - shkolie" (The girl - is - in - the school") - "Three words: the girl - in - the school". Malchik v shkolie (The boy is in the school". "It seems there are two words: the boy and in the school" etc.

It must be mentioned that difficulties in paying attention to the words (instead to the objects and events) can be seen in different forms of aphasia, although - as further observation showed - patients can overcome these difficulties in the course of rehabilitative training.

III. Disturbances of grammatical concepts.

The difficulties of linking attention toward the realities of speech ^t itself which we have just described indicates that we can expect even more massive defects in performance with respect to this linguistic processes themselves if we move to a more complicated task.

These tasks can ~~be~~ either to deal with basic grammatical concepts, to distinguish basic formal grammatical categories of words, or to deal with the relation of the grammatical forms to abstract the expression of complex relations with the help of special grammatical means.

We shall move now to some facts which can help us to study this group of difficulties in the verbal behavior of our patients.

1. Definition of linguistic categories
(parts of speech)

The basic experiments of this series were to turn an aphasic to a position of a linguist, ~~and~~ to give the patient a word and to ask him to define the category (noun, verb, adjective) to which the word belonged.

Two parts were included in this series. In the first part, words (nouns and adjectives) were presented where the contents, did not enter into any conflict with the word's form (bread, table etc. for nouns, to go, to run for verbs); ⁷ in the second part there was a conflict between the content and the form of words: abstract nouns (such as liberty, development, boredom) were given or even nouns expressing actions (a trial, a flight); the same concerned verbs which this time expressed not actions but rather passive states (to sleep, to rest etc.). Patients had to classify these words telling which of them were nouns and which of them were verbs¹⁾.

In the last part of the experiment an immediate experience evoked by the word was not sufficient to provide an adequate grammatical evaluation of the class ~~to~~ which the word belonged.

1) In Russian nouns and verbs don't have such external markers as "the..." or "to..." as in English. This's why their classification has to use less expressed markers.

It was shown by a series of psychologists and psycholinguists that an adequate evaluation of the class to which the word belongs becomes possible after 3-4 years of schooling, and by the 5th year of schooling the child is able to overcome all conflicts which led to a false classification of the word.

That was not the case with our patients; even patients of a high cultural level (engineers, economists, etc.) had distinct difficulty overcoming the tendency to evaluate the word's class according to its content, and as a rule, classified nouns with a content of actions (a trip, a flight) as verbs, and verbs with passive contents (to sleep, to rest) as nouns or as "dubious".

Here is an example of such difficulty:

Patient Avt. "A dog bites a small boy" Where are the nouns? "A small boy! ... no... a dog..." And the verb? "The dog bites... The verb is "dog"... " No, the verb expresses an action! Where is here the verb? "The important is that the dog's bite! That's why the verb is "dog". I shall give you two words: "the bite" and "to bite" (in Russian: "ukusit" and "ukus"); which one is the verb? "The mean is the bite. The dog's bite. The action starts with the dog... and the small boy - that's something quite different".

It is clear that the patient deals not with the grammatical form of the word but rather with the event itself, and if

"the dog was active" - it is designated as a verb, and "the boy" - "is something quite different".

Similar difficulties were seen when separate words were given to the patient, and he was asked to evaluate the grammatical class to which the word belongs. All of our patients could easily solve the first ("non - conflict") part of the experiments, but right answers never appeared in the second ("conflict") part.

Here are some examples:

Patient Sosn.

In the first steps the patient had marked difficulties in grasping the problem given. After he was given some examples, he could easily put words in the right grammatical categories in the first ("non-conflict") part of the experiment, but remained unable to give the right answers in the second ("conflict") part.

(a) Cow - "noun", To go ("khodit") - "verb", horse - "noun", mushroom - "noun", to play (igrat') - "verb".

(b) To live (shit') - "It's a dubious word". The sky (niebo) - "I really do not know." Liberty (sveboda) - "That's a verb". To die (umeret') - "who knows what it really is..." To sleep (spat') - "No, I don't know..."

Patient Pros. (economist, tumor of the left temporo-parietal lobe)

(a) book-case "That's a noun" To go (khodit') - "That's a verb, that's clear" Red - "That's an adjective" etc.

(b) The flight (beg) - "That's a verb!" "Why?" "That's a movement... All what result in a movement, an action - is a verb!" "Liberty" - "That's an adjective..."
Doubt - "I really don't know..."

Patient Avt.

Please tell me some nouns: "Day, night, sun, moon, lake..." And "emptyness"? "Emptynes... (the patient is confused) an empty space... that's not a noun!..., Nouns are: sun, moon, day... and emptyness?... No, I don't know..." And how is it with "Liberty"? "No, "liberty" isn't a noun! A noun has to be something quite definite: day, night", And "apple"? "That's a noun!" Stone? "That's a noun too." Pencil. "Of course, that's a noun!"

And "a flight" (begstvo) - "A noun... oh, no... excuse me... "flight", "jump" - that's something different... what is that really... It seems not to be a noun!" Why do you doubt? "Because it is linked towards something..."
 "Run" (beg) is perhaps a noun, but "flight" (begstvo) it seems to be the same but it is not..."

Please give me some examples of verbs: "he went", "he came", "he jumped"... And to sleep" (spat'?) "No, that's again not a verb... to sleep (spat') that's a sleep (son)
 The verb is an activity, and "to sleep" - no that's something different!..."

It is clear that patients of this group deal with the contents (substantences designated by the words), the semantics

of the word, and it is very difficult for them to make an abstraction from the immediate contents and to move to a formal (grammatical) analysis of the word.

When we investigated carefully a group of ten patients with lesions of the left temporo-occipito parietal zones and with semantic aphasia - the results we received were always the same: ~~as~~ mistakes in evaluation nouns or verbs were made by the patients only when a conflict between the grammatical form of the word and its immediate significance took place.

2. Change of grammatical form and constancy of grammatical categories

The fact that the patients in our group were not able to deal constantly with the formal structures of language, i.e. to link their attention not to the semantics, but to the form of the words themselves, suggests that they had severe difficulties in including words in some formal systems of codes.

This will be seen in the following series of experiments, when we changed the cases of the words and asked whether the patient's evaluation of the class to which the words belonged was preserved. To put it overwise, it is the problem of the constancy of grammatical evaluation of words in our patients.

As a rule words can exist in two basic forms: in a "dictionary form" - as separate units given in a neutral

form (or a "null-form" as it was called for a time), and in a "speech form" - being a part of living, permanently changing speech. The changes the words undergo when included in fluent speech can be easily observed in such languages as Russian, where different kinds of inflections are used and where suffixes are markers of these inflections. "The table" is in Russian "stol"; the genitive of the same word is "stolá" (of the table); dative "stolú" (for the table); instrumental case is "stolom" (with the table) etc. It is easy to see that only in the dictionary or null-form (nominative) are objects denoted in a stable, resting condition; in all other cases some action with the object is mentioned.

The same is the case for Russian verbs, where the infinitive "chitat" (=to read) has a permanent, stable meaning whereas "chitayu" (I read), "chital" (I red), "chitayetsia" (it is red) etc. has a less stable, more individual, situation-bound character.

What was the attitude of our patients toward grammatical changes of these words? Does the patient preserve the same grammatical evaluation of the word when its form is changed? Is the grammatical classification of the word stable or does it change in association with changes of the word form?

Data we obtained from our observations showed that our patients were much more semantic-bound than ordinary subjects, that they felt much more the semantic changes undergone by the word in the course of the changes in its form,

and as a result - their grammatical evaluation of the word was much less stable and much more dependent on the word's use in living, fluent speech, than was the case in ordinary subjects. Our patients felt much more the component of action included in nouns in indirect cases, or the components of stability in the dictionary forms of verbs (infinitives).

Fragments from the protocols can show this very clearly.

Patient Dan. (hemorrhage in the left infero-parietal lobe, semantic aphasia) was asked to name the grammatical categories separate words of a phrase belonged to. "The boy has a dog" (malchik imet sobaku). Please tell which are the nouns and which the verbs. "The boy" - it is a noun... "has" - is a verb. "A dog" (sobaku - accusative)... I really do not know... A dog is with the boy (U malchika est' sobaka)... "U malchika (malchika = genitive)... I don't know... with whom... a dog (sobaka) - that's a noun..." "There is not a dog with the boy (U malchika (gen.) niet sobaki (gen)... "U malchika... that's an adjective... there is not (niet)... I don't know... (the patient is confused).

The gun fires with a bullet (Ruzhie streliaiet pulci (instrumental)). "The gun is a noun; fires - a verb; with a bullet (pulci-istru.) - perhaps that's an adjective?... I really don't know.

Patient Chukh. (the same diagnostics)

What is the word "dog" (sobaka)? "Dod... dog... - that

is a noun!" And "to the dog" (sobake=dat.) is that a noun or not? "I really don't know". And "to the mother" (mater=dat.)? "That's not clear... I can't say..."

And mat' (mother)? "Oh, that's a noun."

The master feeds the dogs with meat (khoziain kermit sobak (-accus.) miassom (-instrum.)). "The master - it's a noun; feeds - a verb... with meat (miassom=instr.)

I do not know is that a verb or a noun?"

It is seen clearly that only nouns in their dictionary (null-) form (nominative case) are evaluated as nouns; every noun in an indirect case is not evaluated a noun; the indirect cases which are in Russian expressed with changes of suffixes are associated by the patients as something which includes action, and evaluated as verbs, adjectives, "something doubtful" - but not as nouns.

All of our ten patients evaluated correct nouns given in null-forms as nouns, but the most part of our patients, changed the correct evaluation when the noun was given in other cases than nominative (genitive, dative, instrumental etc.); when these cases were used, the most part of our patients expressed doubts whether the words are nouns and began to classify them as "verbs" or "adjectives" etc.

The instability of the grammatical categorization of words can be seen with the operation of the grammatical analysis itself or when the actions the patient takes to relate the word to a category are analysed more carefully. It is seen that instead of using some formal grammatical

rules - our patients use some practical operations with the objects (designate), and this can result in a series of mistakes.

Here are a few examples.

Patient Dan. is asked to define the grammatical class of the words given.

Paper - "That's a noun". Why? - "Who? What? - that's a noun". "Sun" (solnyshko=diminutive)? That's an adjective! "my sun" (moye solnyshko). A cry (plach)?

That's a verb. One has to do it... no... oh... no... how should it be? Cry (plach)... that's a verb" "Red?

That's a noun! What is that? Of course it's a noun".

"Stout"? "A noun! Who is stout? A man!... or may be it is an adjective?!... "How stout he is!"

Patient Chuh. "Red"? "A noun. What is it? red..."

"Stout?" "A noun! What is red? who is red? A noun!"

It is seen that, formal grammatical operations dealing not with objects or events designated by the words, but with some grammatical qualities of the word itself become rather difficult even for highly educated subjects, and the auxiliary questions they use are linked more to an analysis of reference rather than to an analysis of words and their grammatical relations. This is an additional symptom of the basic disturbances of mental activity the illness has evoked.

The patients become scarcely able to operate within the formal codes of the linguistic system and very easily slide

to operations with the relations of the immediately perceived environment designated by words.

3. The breakdown of the operations with the relation categories

The analysis of operations with grammatical forms in patients with semantic aphasia showed that our patients had a ~~clear~~ ^{clear} tendency to neglect formal (categorical) grammatical systems having preserved a more immediate reflection of the objects, actions and events to which the words refer. That is why when both approaches came into conflict, the immediate reflection of concrete events dominated.

The inability of our patient to deal with formal grammatical systems was seen especially clearly in cases when the patients had to deal immediately with the grammatical relations between words themselves and when changes of the inflective parts of words inevitably resulted in changes of syntactical interrelations of separate words.

Two kinds of ⁱⁿ changes of grammatical forms of the words can be distinguished. One is when a change of the word form is associated with a change of the substantial meaning of the words; the transition from singular to plural is of such a category (for example: table - tables, star - stars reflects one object as many objects). The other kind is a change of the word which is associated not with substantial meaning of designated objects, but rather with a syntactical or synsemantic relations. This happens when changes in cases of the words take place and when changes of the cases indicates

changes in relations of the word with other words, i.e. when new syntactical or syn-semantic relations of the word are involved. This type of relation was during recent decades very carefully studied - in structural linguistics, beginning with the classical work of N. Chomsky (1957), and the changes of interrelations of words caused by changing cases was the object of a long series of studies mentioned elsewhere (cf. A.R. Luria, 1975). Here it has to be said that whereas in English cases are marked by auxiliary words such as "to", "from", "by" - in Russian they are marked by inflexions: topor (axe, nom.) - topera (of the ax, gen.) - toperu (to the ax, dat.) - toperom (by the ax - instrum.) etc.

The basic aim of our further studies was to compare the patient's attitude towards concrete changes of nouns (such as transition from singular to plural) and their attitude towards the relational (or syntactic) changes of the words.

We could suppose that whereas our patients remain aware of concrete changes of the word and that no difficulties will be seen in discrimination of singular and plural, - they will have marked difficulties in dealing with syntactical or syn-semantic changes of the words, and the definition of cases will be much less easy than the definitions of the markers of quantity.

This hypothesis was supported by our observations. Here are a few examples:

Patient Dan. (she had studied grammar in school a few months before her illness).

Please tell what words are singular and what are plural?

Derevia (trees) "Plural", Zemlia (earth) - "singular"

Loshady (horses) - "plural" etc.

Do you remember which cases there are in the grammar?

"Of course! Nominative, genitive, dative etc." Let us

go through all cases with the word "sobaka" (dog). "No..

I don't remember... genitive... no... it's lost!" Let

us make it reverse. What case is "sobake" (to the dog,

dat.) After a long pause the patient tells: "No, I

don't remember any cases".

Patient Pros.

"Poterial/y" (they have lost). Is that singular or plu-

ral? "Plural!" Zvesdy (stars). "Plural!" Derevo (tree).

"Of course singular, I know that well!"

What case is "korove" (to the cow, dat.) "Nominative,

genitive... (the patient is confused)... instrumental...

No... I really don't know!"

As is seen, operations with the markers of number are fully preserved, operations which require conscious analysis of the relational (syntactic and syn-semantic) functions of the forms of the words (as it is in the case of changing cases of the nouns) are impossible. This can mean that patients have lost their ability to analyse the grammatical system for expression of relations whereas the grammatical means for

expression of concrete features of objects (their number, gender) are preserved. Further observation support that assumption.

Patient Avt.

What does it mean when I say "korove" (to the cow) but not "korova" (the cow)? "Korova (the cow)... that means ... the cow ^e does not move... The cow is closed in the stall... "korevam" (for the cows, dat. plur.) it means plural..." And how must you say "korevam nie daly vest" ("They had given food to the cows") or "korova nie daly vest" (= "The had given the food... the cow" (nom.)). "Korove" (dat. sing.) when there is only one cow, and it there are many - then korevam (dat. plur.)" Why can't you say "khoziain nie dal korova (sing., nom.) vest??" (The farmer gave no food ^a cow (sing., nom.)? "That's not right... that's singular..." What is the difference between "korevam" (dat. plur.) and "korevami" (instr. plur.)" (What is the difference between "for the cows" and "by the cows")? "Korevam" (dat., plur.) it means that now, at the right moment, the cows are here, and "korevami" (instrum. plur.) that's the future!"

Of the utmost importance is the fully preserved ability ~~but~~ to use, practically, the forms of cases (their performance) and the full breakdown of awareness of them, of the ability to analyse consciously the significance of these forms. Our patients can easily correct a mistake in the practical use of

case, but when they are asked to analyse the essence of the case and to shift their attention to the conscious analysis of the syntactical or syn-semantic meaning of grammatical forms themselves, otherwise - to deal consciously with the grammatical forms of the language itself - they remain unable to do it.

All these defects can be especially easily seen when we come to the description of the patient's analysis of sentences.

IV. Disturbances in the analysis of the grammatical relations of separate words in a sentence.

Studies of the development of child language describe series of findings which show that the child acquires the performance of fluent syntactical speech long before he becomes consciously able to analyse these relations, otherwise said - to make the formal grammatical relations the subject of his theoretical reasoning, and ~~that such~~ ^{To start} a theoretical attitude towards grammatical codes. ~~That~~ becomes possible only a result of a special activity developed in the school.

That is why some dissociation of the practical performance with linguistic system in speech and the theoretical analysis of the formal codes of language can be possible, and that the fact that our patients can use the most part of syntactical forms in their speech does not yet mean that they are able to analyse consciously the system of linguistic codes they practically use.

In the next series of experiments we shall move to refer to this problem.

1. The analysis of the relations between words in a sentence.

The data we have already mentioned show how difficult it is for our patients to understand the relational question which the cases of the noun correspond to. The following experiments will show that such a disturbance is not associated with the understanding of the practical meaning of grammatical form but rather with an inability to answer the question asked, i.e. to analyse consciously the grammatical relations of one word to another. Instead of relating one word to another, the patient tries to relate words to the immediate events they designate.

In starting our experiments, we can choose either of two ways. First of all, we can relate the question the patient is asked to the concrete situation which the relations of the sentence refer to, requiring from the patient an analysis of the situation itself. This ~~is~~ kind of questions has nothing to do with the analysis of formal grammatical relations: relations of words included in a sentence; the right answer to such a question can be given only if the patient's attitude is linked to the formal organization of the sentence itself, in other words - if the patient has preserved his "theoretical attitude" toward his own speech.

Thus, if we should give to the patient the sentence; "The farmer gave to the cows such hay" - an example of the

first kind of question would be: "Who gave the hay?" "To whom was given the hay?", "How much hay was given?" etc. The subject can easily answer these questions by a simple analysis of the concrete situation mentioned in the sentence. Examples of the second kind of question could be in the reverse, such as: "Which question does the word 'farmer' answer?"; "Which question does the word 'much' answer?"; "Which question does the word 'hay' (in Russian: *sienas* of the hay, gen. sing.) answer?" etc. Here a correct answer requires an abstraction from the situation referred to in the sentences and linking of the subject's attention to the grammatical relations included in the sentence itself.

It is easy to hypothesize that in patients with "semantic aphasia" we shall not find any trouble with answering the first kind of question (the significant difficulties which can be evoked in asking questions involving complex paradigmatical relations will be analysed below (cf. as well A.R.Luria, 1966, 1970, 1972, 1973, 1975 et al.), but the patients will have severe difficulties in trying to answer the second kind of questions. This assumption was proved in our experiments: none of our patients showed any difficulty in answering the question of the meaning of simple sentences which expressed "communication of events" rather than "communication of relations" (that classification proposed by Svedelius, 1897, will be discussed later); but all of them showed marked difficulties in dealing with the second type of question.

Here are some examples illustrating the findings:

Patient Prog.

He was given the sentence "The farmer gave to the cows much hay".

(a) What words answers to the word "how much"? "Of course "much" (mnogo). And "to whom" (komu)? "Korevam" (to the cows, dat. plur.) Who? "The farmer". What? "The hay" (sena, accus. sing.). What did he do? "He gave them!" etc.

(b) What is question answered by the word "khoziaia" (the farmer)? "The farmer... well, he remains a farmer..." (The experimenter explains the question and gives some examples). "What?!... no... it isn't "what". I really do not remember..." What is the question answered by the word... "sena" (of the hay, gen. sing.)? "I remember only that it is a noun". And what question have you to ask to have the answer "sena" (of the hay)? "Perhaps to buy it... no... it's not what you want..." And what is the question answered by the word "korevam" (for the cows, dat. sing.)? "Perhaps "much"!"

Patient Avt.

He was given a sentence "A man received a leave and went to Crimea".

(a) What word answers the question "who"? - "A man".
"Where?" - "To Crimea", etc.

(b) What is question have you to ask to have an answer "to Crimea" (v Krym)? "That means a spa?" Perhaps it is the question "what" or "whom" or "why" or "where"? "Well... it could be Sochi or Caucasus... or "whom" - no that is not right!" Perhaps "why"? "Well, you can ask "why"... To have a medical treatment... One can ask "where" - but it does not fit!" (The question was repeated). "To have medical treatment... to have treatment in Crimea... Why for? To the Crimea - why? Here you can say: to the Crimea for medical care... Where? Here you can say as well: in a sanitarium, in Crimea, with a boat..."

It is clearly seen that a question referring to the situation does not evoke any difficulties, and the patient can easily answer, taking into account the details of the situation. On the other hand, a question which requires a conscious analysis of the relations of words in the sentence is not grasped by the patient, and the patient remains with his analysis of the concrete event mentioned in the sentence.

It is of interest that the patient shows a tendency to overcome the difficulties mentioned by using some fragments of conventional conversational speech. When such an inclusion of conversation is impossible - difficulties were seen even more clearly.

Patient Avt.

He was given the sentence: "The farmer gave the cows

much hay. What word tells how much hay the farmer gave to the cows? "The hay... much hay". And what is the word I asked you to find (the question was repeated)? "The hay t.. to whom did he give hay? To the cows (korovam, dat. sing) (The question was repeated). "Plural... there where many cows..." What word tells what the farmer did? "He did... (the patient reads the sentence)... much hay... that is plural (muchplural!). What word tells who gave the hay? "To the cows" etc.

Opposite data were obtained when direct questions were given to the patient:

Who gave much hay? "The farmer". To whom he gave hay? "To the cows" (korovam, dat. plur.). etc.

If the question dealt with the situation, mentioned in the sentence - the patient could easily answer it; if the question presumed a conscious analysis of the syntactical codes themselves - it was seen the patient remained unable to shift his attention from the real events designated in the paragraph to the essential relations of the syntactical relations of the words themselves.

All these defects became especially clear when in a special series of experiments when we asked the patient to select an adequate question from several alternatives.

Patient Av.

The patient was given a simple statement: "Vania khore-shii" (Vania is nice).

1) (b) What question has one to ask about Vania to receive the answer "nice"? "Vania... of course he has to be nice..."

(a) How is Vana? "He is nice!"

(b) That means which question has one to ask to receive the answer "nice"? "Vana... he is nice now!"

A sentence is given: "Kolya lives in Kharkov".

(b) What question has to be asked to have an answer "he lives in Kharkov"? "What does he do there..."

(a) Where does Kolya live? "In Kharkov".

(b) Now, what question does one ask to learn that he is living in Kharkov? "Kolya lives in Kharkov, I remember, how I answered this question... Kolya - where? In Kharkov... He is working in Kharkov, learning in Kharkov... Because he came from another place... let us say Siberia..."

Patient Supr.

Vanya is nice. What question have you to ask to receive the answer "he is nice"? "That is hard to tell what one has to ask. He is nice - and that's all. I know only that he is nice. (the answer is related to the real situation, not to the linguistic reality). What have you to ask to receive this answer! "Where?" "What?" "What does he do?" "I should say: Vanya behaved nicely on the street!"

(A full explanation of the process needed to find the

- 1) We marked with (a) a direct question and with (b) question which requires an abstract grammatical operation.

question was given and examples were added).

"Vanya is a boy" "Wait a minute, I shall find questions ... Where? A boy..." (an additional explanation was given). "You see, I really can't understand that. I can't imagine what have I to ask about the boy...". "Vassya is ill" "That's the boy or he is ill? That is just the same... no... "where?" We are not told where... "Who is ill?" No, I do not understand!" etc.

All these fragments of our protocols show a complete break between immediate statements related to real events and the process of operations with formal grammatical relations. Whereas the first are fully preserved, the second remain impossible, and the patients turn each time to an analysis of the real situation, being unable to shift their attention towards the reality of verbal codes which express these relations.

2. Operations with relational words.

After all we have said, it is entirely probable that being aware of the auxiliary parts of speech and being able to evaluate them consciously could hardly be preserved in our patients.

At first glance, we see that practical operations with relational parts of the sentence remain fully preserved in our patients (what was afterwards called "syntagmatic organisation of speech vs its paradigmatic organization (cf. R. Jakobson, 1971, Benson, 1967, Kerichensteiner and Poek, 1972 et al.), showing to disturbances. Our patients don't

show any difficulties in a practical using such auxiliary words as "while", "because", "although" etc.

Patient Avt.

Please give me a sentence which would contain the word "although". "Although I am leaving, I should be glad to remain here..." Now please give a sentence with the word "if". "I shall move quickly if the Railroad Office will improve the train".

All these auxiliary parts of speech which the child is hardly able to use and the performance of which requires special acquisition, remain, it seems, fully preserved in our patients.

Does it mean that the essential semantic relation expressed by these auxiliary words remains really preserved, and that they remain unaltered even if they become the basic subject to the patient's consciousness?

As in our former experiments, we shall try to answer this question with shifting the attention of our patient from the immediate events towards the conscious analysis of the verbal codes which can express the semantic relations.

We presented to our patients sentences or paragraphs with omitted words, using the well known Ebbinghaus technique. In a part of our experiments the omitted parts were nouns verbs or adjectives, in the second part the omitted words were auxiliary (relative) parts of speech. An example of the first type of the experiment was the sentence: "A big, dark (cloud) approached us without any (noise, wind)" An example of the

second type was the sentence: "The physician lectured (on) different diseases (of) the nervous system" or a more complicated sentence: "The acrobat moved very skillfully on a string (although) it was very difficult".

Data we received showed clearly that both types of problems were basically different. Whereas the restitution of the text with omitted significant parts (nouns, verbs, adjectives) did not evoke any difficulties in our patients, restitution of phrases with omitted auxiliary words remained impossible in the predominant number of the patients. It is especially interesting that in the last type of experiments, errors could be seen both in cases when simple auxiliary parts (such as "and", "about") and semantically complex ones (such as "although", "while" etc.) were omitted. In all these cases it was clear that the attention of the patient was aimed at the concrete events designated by the sentence rather than at the formal grammatical relations or the auxiliary words which express them, or in other words, the patient ability to analyse consciously the system of verbal codes was much more deranged than the practical use of these codes in his communications.

Patient Prog.

This patient was given sentences with omitted words of both types (in parantheses are words with which he filled the blank spaces).

(a) A big dark... (cloud) approached us without any (vibration); it very... (quickly... no... nearly) towards us"

etc. The aggrammatical components were realized and corrected.

(b) After the supper was over the physician gave a lecture (concerning) the different diseases.: "He gave a lecture... different... something is missing... He gave a lecture... lectured the different diseases... no I cant!" What is missing? "I really can't say... Here it is he gave a lecture... He described different deseases ... That's right. Now it will be all right!" "Ya posta-vil metlu (u) stiony" ("I put the broom close (to) the wall" "The wall... It seems to be all right here... We have a broom., and we put it... and the wall... The broom is standing... and that's all right..." (a full explanation is given and the lack of the auxiliary word "to" is explained. To prove the transfer the first sentence was given again. "Something is not in order here... We have to change something..." What have we to add? "I really can't realize". Perhaps it is "to" which is missing? "No..." Perhaps it is "about"? "No, it does not fit! "To.." .. To different diseases would do, and "about" - it does not fit!"

It is clear that the patient's attention is linked to the situational components of the events the sentence refers to, and that is why any omission of concrete, situational details is corrected, and new concrete details (objects, actions) are added; but the patient remains unable to analyse the gramma-

tical relations in the sentence, and lack of the auxiliary, relative words is not evaluated clearly, although the patient "feels" that something is lacking.

The same is seen in another patient of this group.

Patient Avt.

(a) A man of a high... (intelligence) died. The boy fell down and... (wept)... He finished the school and went... (to work, to study, to live, to sing!...)

(b) The man fell down (...) he lost his balance. What do you have to put in the blank space? "The man fell down... He lost his balance... The man fell down when he was swimming... his attention was aimed at a fish, he lost his balance, shaked, and had to swim... If he couldn't swim - he drowned and perhaps he is down!..." And does the word "although" fit here? "Yes, it does... Although he lost the balance he fell down..." Why do you say "although"? "He lost his balance and still he fell down... But he need not fall down... He could sit down..." And if you put here the word "nevertheless" (in Russian "Nie smotria na" = not looking at): "No... that's impossible... How could it be that he was not looking (here "not looking at" is used in the sense of concrete event) and he fell... perhaps he tried to look, and then he felt giddy ... and he fell down" And perhaps it would be right to put here the word "because"? "Because he fell down... in the water... because he lost his balance... Oh course,

that fits too... He lost his balance because he fell down... And now he is down, and no balance is needed any more... If he fell down... there is no more danger... When he fell down, he decided that he does not need any balance, that somebody will take care of him..."

It is easy to see that although the patient still uses practically all the auxiliary words in his fluent speech, he is not clearly aware of their meaning and does not know which of the auxiliary words given, has to be used. What is possible in the flow of his preserved, practical fluent speech, becomes very difficult at the moment when the aim of the patients activity is changes and when his conventional, well imprinted fluent speech becomes itself the subject of conscious analysis.

It is worthwhile to note as well, that the content of the patient's analysis is very easily aimed at discussion of details of the concrete situation, and that it is rather difficult - if not impossible - to aim his attention at the reality of the language and of the speech processes themselves.

This dissociation of preserved fluent speech as a well imprinted skill and the inability to make this speech the subject of conscious (theoretical) analysis is one of the most important facts typical of our patients with semantic aphasia¹⁾.

1) In this paper we deal only with patients with semantic aphasia. Patients with other forms of aphasia are not discussed here, and as it was seen they can show a different kind of difficulties.

To prove this assumption and to make it more reliable, we continued our experiments moving to the next series in which we presented our patients with two kinds of unfinished sentences. The first kind of sentence (type (a)) had at its end such words as "because", "although" etc. and the patient had to finish the sentence adding some concrete details of the situation mentioned. In the second kind (type (b)) the auxiliary parts ("because", "although" etc.) were omitted and the patient had to fill the gap, selecting one of three alternative words: "because", "although" or "if".

The results obtained were very clear. If the practical use of auxiliary words referred to in the patient's fluent speech gave the impression that the meaning of these words as a means of expressing relations was preserved, our experiments when the patient had to make a choice and to select the proper relational word from three alternatives showed that the conscious analysis of the linguistic syn-semantic relations was very difficult. The patient remained able to understand the real meaning of the relational words ("although" "while" etc.) only if their practical use was well imprinted and when these words were included in the practical fluent speech of the patient. A very important deduction can be made from this assumption. Let us assume that theoretical linguistic processes are available for our patients only by means of their preserved, practical fluent speech, and that they master paradigmatical relations only via their preserved syntagmatical verbal processes.

Here are some examples which support this assumption.

Patient Pros.

(a) Tests with sentences which had a relative word (because... although etc.) at the end and where the patient had to add some details of events, were completed easily.

(b) Sentences were given where the patient had to make choice from three alternatives of relational words.

"The men fell down in the water ("although", "because") he has lost his balance". (The patient reads the sentence three times). "The man fell down in the water... and he lost his balance... and there is nothing else". Is that so? "No it isn't". "Why?" "Something is missing... No... it can be said so: The man fell down in the water - and he lost his balance..." And would it fit if you would add "although" or "because"? "Although... no, it doesn't fit.. and what have I to do?... perhaps..." because? (The patient is not sure.)

Patient Avt.

(a) Tests requiring the completion of a sentence with a relational word on the end are completed easily.

(b) "The man walked on a wire while he skillfully balanced ("although", "because", "if") it was very difficult". What have you to choice as a missing word? "Of course "because"! because it was very difficult... But he was skilled enough and he walked on a wire... He mastered that because he was skilled..." And does "if" fit? "That does fit too. If it was difficulty he had to have a skill! If

rences. Please tell me what they are (both sentences - one with "although", the other with "because" were given to the patient). "Of course, there is a difference - that is a different kind of behavior. "Because" - it is an order. "Because the father had forbidden" - that's an order of course. And here - "although the father had forbidden it" that is doubtful... She went to movie with a doubt..." What was the doubt? "A definite order... to deprive her of the movie... to forbid it... And if Olga wanted to go to the movie and there was not an order... The difference is that "because" it is a definite request, and "although" is only an assumption..."

It is clear that definite logical meanings of the words "although" and "because" are replaced by a fine psychological analysis which is preserved in the patient, although the ability to single out logical relations has broken down. Thus - the processing of logical relations and the logico-grammatical analysis of the sentence becomes impossible although a psychological and practical analysis of the contents of the sentence remains preserved.

Our patients remain clever people and fine psychologists, but they are no longer structural linguists.

3. Understanding of complex grammatical structures.

All we have stated shows that some important disturbances can be seen in our patients when operations on grammatical relations are observed.

Does it mean that even the understanding of several grammatical structures suffer in these patients too?

To answer this questions we have to move to a series of more general problems and to try to analyse more closely which forms of the understanding of grammatical forms remain preserved in patients with semantic aphasia and which are broked down. We have to describe as well what kind of disturbances in the understanding of these complex grammatical structures are observed and what factors underlie^y these distructions:

Although in a series of the later publications these problems were carefully studied (cf. A.R.Luria, 1966, 1970, 1972, 1973, 1975) - we shall try to describe our data in a group of special experiments.

(a). Disturbances in comprehension of the relation of words in a sentence.

After all we have said above, it can be supposed that an understanding of these inter-relations of words in syntactical constructions which reflect specific logico-grammatical relations and which cannot be deduced from immediate experience of the concrete events mentioned - could undergo a "certain destruction. In other words - we could suppose that "communications of events" would be preserved, whereas "communications of relations" (Svede^(Lius, 1897)) or a certain part of them would be deranged.

We can hypotesize that whereas the fluent syntagmatic organization of speech remains to a certain point normal in our patients, - the paradigmatic relations included in fluent,

syntagmatic speech will evoke significant difficulties in understanding.

Let us turn to some protocols in an effort to gain control of this assumption.

We shall start with the understanding of some simple sentences where the change of a sequence of words results in a change of its meaning (or - to use a more modern term - its deep grammatical structure.

Patient Avt.

Two sentences were given to the patient:

- (a) A sentry was standing by a storehouse with arms[#].
 (b) A sentry with arms was standing by a storehouse.¹⁾

The patient was asked to find the difference in the meaning of both sentences. He read to sentences several times and after a long pause said: "Here (a) most important is the sentry with arms... most important are arms to be preserved, to be not stolen... the most important are the arms of the sentry, but not the storehouse". And what is the meaning of the second sentence (b)? "In the storehouse... no... mainly in the storehouse... Oh, I am not sure..." Where were the arms? "In the storehouse..." How do you know that? "A sentry was standing here... by the storehouse... and they were by the storehouse... most important may be that it was with arms..." (the patient

1) In Russian this sentence means unambigous that the arms were preserved in the storehouse, whereas the second phrase means the arms were in the hands of the sentry.

is confused).

Both sentences were given simultaneously written on a piece of paper. What is the difference? "Here... a sentry with the arms is standing... It means firstly arms were brought, and then the sentry came..." And here (sentence "b")? And here the words were placed differently... there came a man to tell the number of arms... Only a displacement... nothing else...["]

Patient Pros.

He was given the same sentences and asked the same question. Is the meaning of both sentences identical or not? "I cannot combine them... that is the same, only the words are placed differently... and that's all!" Wasn't the meaning changed? "No, the meaning is the same". Where were the arms in the first sentence? "In the street..." And in the second? "I really can't tell, it is too difficult. I am feeling something... but in general... oh, I don't know" What are the arms related to; to the sentry or to the storehouse? "May be to the sentry... because he is standing" It is obvious that a sentry has to have arms" (the patient is reading the sentences once more). What are the arms related to? "To the store house... to the sentry... No, I can't understand it!"

We shall not turn to other illustrations (they are identical). It is quite clear that the patient can easily grasp the fact of the changing the sequence of the words in a sentence; but such change does not result in the understanding of a semantic

change of the one sentence, and the patients remain unable to pass from the superficial structure of the sentence to its inner structure.

We can see as well that all these defects are closely associated with the patients inability to aim their attention at the semantic relations evoked by the changes in the order of the words.

(b) Defects in comprehension of the paradigmatic role of syntactical forms. (impressive agrammatism)

All we have said means that the semantic relations underlying the processing of grammatical structure, are in our patients markedly different from what they are in normal, well trained adults. Our patients understand the meaning of several grammatical structures quite differently or sometimes they ignore the real meaning of grammatical changes. The understanding of the sentence's meaning depends much more on the ^{real} relation of the objects included in the situation than on the formal grammatical structure of the sentence itself. The sentences were understood mainly as a "sequence of events" rather than as "followings of words" in a grammatical structure.

This can be shown in a special series of experiments, where the sequence of events comes into conflict with sequence of words.

In Russian, as well as in most Indo-European languages there is a certain correlation of sequence of word in the sentence with sequence of events. So, in a sentence "The boy

hit a girl", The sequence of the words reflects the sequence of events and the grammatical scheme of the sentence does not come into contradiction with the logical scheme, both being $S \rightarrow P$. The same is true for more complex sentences "I took the ax and chopped the wood" ($S \rightarrow P \rightarrow O \rightarrow (S) \rightarrow P_1 \rightarrow O_1$) or even to the most complicated of phrases, such as: "I took the book and then I drank coffee". The reverse is the case of ergative constructions or the construction of the passive voice, which are only secondary in Indo-European languages but which are basic for some Caucasian languages (for instance the Georgian language).

In a sentence "The girl was hit by a boy" there is a clear conflict between the sequence of words and the structure of real events, which can be reflected in a scheme \Leftarrow ($O \Leftarrow P \Leftarrow S$). The same can be seen in more complicated sentences where some auxiliary words are used which determine such reversals. This is the case in such sentences as: "I chopped wood after I drank coffee" where the sequence of words comes in conflict with the sequence of events because the word "after" turns the semantics of the phrase backwards.

Very similar cases can be seen in sentences which use the auxiliary word "by". Whereas in the sentence "The sun lights up the earth". There is no conflict between the order of words and the order of events, - in the sentence: "The earth is lit by the sun" - a clear conflict of the structure of the phrase and its semantics results from the reversal of the word sequence.

We may suppose that phrases with an isomorphism of sequence of words and of events could be easily understood; sentences with a conflict between these two sides will be understood with much more difficulty by our patients, and in some cases will not be understood at all.

Let us turn to some facts.

Patient OI. (hemorrhage to the left interior parietal lobe, amnesic aphasia) was given a sentence: "Sobaku oblayala lohad'" (The dog was barked at by the horse) and she was asked whether the sentence was right. The answer was: "Of course it is right!" What does it mean? "That the dog recognised a horse out started to bark on it".

It can be clearly seen that the patient grasps the sequence of words and treats them as isomorphic to the sequence of events, neglecting to relation evoked by the word "by". It has to be mentioned that in Russian there are suffixes (sobaku, - is meaning dat. sing.) which make the semantic differences of the passive voice even clearer.

Patient Kor.

"Fonar' osveschayetsya ulitsei" (The lantern is lit by the street, "ulitsei" meaning instrum. sing., and osveschayetsya - "sya" meaning the passive voice). Is that right? "Of course, it is!" And: "Ulitza osveschayetsya fonariom" (the street is lit by a lantern, the marker Fonariom om - meaning instrum. sing. case). Is that right?

"That is right too..." (an explanation is given and some examples were given). Is it right to say "Fonar' osveschajetsia ulitzei (the lantern is lit by the street)?"

"Of course that's right!" (The explanation is given once more). "No... you have to say "The lantern is lit by the street"... and "The street is lit by the lantern" - that is false. To say it right you have to say "The lantern is lit by the street!"

We see again that it is the sequence of words, not the grammatical form of the passive case which determines the understanding of the patient.

Patient Avt.

The patient is given two sentences:

- (a) The sun is lit by the earth, and
- (b) The earth is lit by the sun.

The patient reads both very attentively: "Both are right, they are identical... No, listen: there is a difference! It is obvious that, ["]the sun lit by the earth, that is clear. But "the earth is lit by the sun" - it can happen only when the sun appears on the horizon, and "the sun is lit by the earth" - that is true in all cases!"

Patient Sel.

"The sun is lit by the earth! OIs that right? (The patient repeats the sentence). "Of course, it is right! It is lit by the earth..." And "The earth is lit by the sun?" "No, it's not right! It cannot be... But "the sun is lit by the earth" - that's right!"

The examples we mentioned suggest that in our patients syntactical markers have not the semantic functions they have in normal language, and that these syntactical markers are neglected by our patients who are dealing only in the events mentioned and with the sequence of the words which is isomorphic to the sequences of events. That is why the patients do not notice the real meaning of syntactical structures and are following only the orders of events mentioned.

The defects of understanding take, in our patients, the form of a kind of "impressive agrammatism". The basic ^{rules} ~~laws~~ of semantic agrammatism have to be carefully studied. The few facts we offered were only the beginning of this work. The studies published later, and especially the author's book "Basic Problems of Neurolinguistics" give a much more expended and detailed study of these data.

(c) Disturbances in the comprehension of complex forms of grammatical structures.

It is obvious that if the comprehension of comparatively simple sentences can evoke a series of difficulties in the patients we presented, comprehension of complex grammatical structures can be much more difficult. T

The group of complex syntactical structures include sentences with distant constructions (where one sentence is embedded in another), sentences with a hierarchical subordination of their parts, sentences with inverted structures and so on. Here a careful analysis of the syntactical structure is needed, and if this operation fails, it can be clearly

seen that an immediate reflection of the contents of the communication which is limited by immediate reflection of the real events is in no case sufficient to understand the meaning of the construction.

Let us start with the description of how our patients understand a complicated phrase where there are factors of complex alternative relations and multiple subordinations of the separate parts as well as the factor of embedding.

Patient Avt.

A complex communication was given to the patient: "To the school, where Dunya studied, a woman worker (rabotnitsa, - isa means feminine) came from the plant to deliver a paper concerning the woman's day" (The sequence of the words in Russian is ^{slig} slightly different and more complicated for understanding. The text remains before the patient the entire time.

Who delivered a paper? "Dunya delivered the paper... no, let us see... Where Dunya studied... the deliver a paper... That means Dunya wants to deliver a paper... she wants to do it... To whom is the paper addressed? The paper is on the Woman's Day... Well, it's clear that a worker woman-worker came... the woman from the plant... where Dunya studied... to deliver a paper on the Woman's Day... A woman-worker came... It means — that somebody delive red the paper... Maybe it was the — Director of the factory?... It means that somebody de- — livered the paper..."

Patient Sel. (Hemorrhage in the left temporo-parietal lobe, amnesic aphasia).

The same sentence was given to the patient. Who came from the plant? "Dunya". Where did you see it? "From this school... Dunya had to be in the school... And from the plant... Dunya is speaking, the woman-worker is telling that Dunya came..." (the patient is confused). Who delivered the paper? (The patient examines the text once more). "... to deliver a paper... A woman-worker came to deliver a paper... It seems that the woman- from the plant had to deliver a paper..." Well, it is Dunya or the woman-worker who delivered a paper? "Here it seems that maybe Dunya... and maybe the woman from the plant... that means... Dunya sais the woman from the plant..." And who had to delives a paper?"... Maybe this second person (the woman) delivered a paper... No, it's Dunya who delivered it..." (the patient is confused).

It can be seen that both patients were completely confused by the problem of selecting the proper relation between two alternatives, and that both persons mentioned in the complex communication could be chosen as subjects with equal probability. This means the complex grammatical form with an embedded sentence evoked severe difficulties in the process of a proper choice and that no selective processing according to syntactical rules was possible. These facts led to the assumption that the process of relating several components of the sentence and thus - the process of moving from the superficial syntactical structure to the deep one, formulating

the proper semantic relation, would be difficult for our patients.

To prove this we presented to the patients complex sentences with adequate and with inadequate grammatical interrelation of the words; we tried to show whether the evaluation of correct or incorrect structures remained possible for our patients, and if they were able to correct inadequate relation of words in a phrase.

Patient Pros.

A sentence was presented to the patient: "The beggar reached out the hand for a coin which trembled from the frost and excitement (In Russian auxiliary "which" is used, but a past participle form: drozhaschei = "which trembled"). Is the sentence correct? "Of course, it is quite correct!"

The phrase was given: "The peasant's axes make a noise in the yards, which prepared (in Russian ..nalazhiwawshikh " participle past; "which" or "who" is omitted and is implicated in this form) "ploughs and harrows" Is it correct? "Yes, it is". What are the words "which prepared" - to the axes, to the ploughs or to the peasants? "Well... axes the peasant used - it is of course right; they make a noise in the yards which prepared ploughs and harrows...?" (The patient does not realize the false position of the words in the sentence which means that the yards prepared ploughs and harrows).

Patient Supr.

The phrase was presented: "The beggar stretched out the hand to have a coin which trembled because of frost and excitement". "Well... it means that the beggar stretched out his hand to receive a coin... and that somebody gave him a coin holding it in the hand which trembled from frost and excitement... That means the beggar was not accustomed to beg..." Are the words in the sentence placed correctly? "Oh, yes... very correctly... The beggar... (the patient is reading the sentence once more). Seems to me - all is correct!"

It is clear that the syntactical structure can not become at once the subject of the patient's attention, and that patients deal with the events designated by the sentence rather than with the formal structure of the sentence itself.

(d) Disturbances in comprehension of logical relations in a sentence.

We can now discuss the last problem of this paper - the problem of the understanding of the logical relations in a sentence.

Some of these logical relations reflect real events and can be understood from the events mentioned rather than from the grammatical structure of the sentence. So in the sentence "The boy hit a dog" it is obvious that the subject who hit was the boy, in the sentence "The hen pecked a grain" the subject who pecked was a hen, and the object which was pecked

is the grain. These sentences come in one group.

There are different kinds of sentences, where no immediate events are existing and where it is impossible to deduce the contents of the communication from practical experience. In such sentences the listener who is trying to comprehend the contents of the communication has only one choice: to analyse grammatical markers and to infer from this analysis the contents of the communication. In such sentences as "John bit Peter" or "Peter bit John" or "John was bitten by Peter" etc. as well as "The triangle is under the circle" or "The circle is under the triangle" - there is no immediate experience of events which can be used to understand the meaning of the communication, and only grammatical markers (the sequence of words, the relative meaning of the auxiliary word "under" etc.) can give a clue to the meaning of the sentence.

Another example of both kinds of communication could be such phrases as "I ~~lit~~ lit the light and began to read" (where the opposite order could contradict phractical experience) or "I made coffee and then I read the paper" (where the sequence of events is not an obligatory one and where both sequences are possible). It is obvious that in the last cases grammatical markers are of a decisive importance.

The role of grammatical markers for the understanding of communication is even more important when the contents of the sentence come in conflict with real events. So the sentence "The man became ill although he died" is nonsense; but to understand that the sentence is incorrect one has to

overcome the impression of immediate events (The man became ill - and he died) and to single out the logical meaning of the auxiliary word "although".

Our last experiment consisted in presenting to the patient some sentences which have an incorrect meaning, where the mistake could be grasped only as a result of a grammatical analysis of the phrase itself.

It could be predicted that the processing of such grammatical analysis involved in our patients marked difficulties. All these difficulties were due to the fact that our patients were, as a rule, focused on the events designated in the communication, rather than on the grammatical structure of the communication itself, and that to grasp the logical relations expressed in the grammatical structure of the communication was for the patient a rather difficult task (this aspect will be the problem of further discussion elsewhere).

Let us give some examples of the fact we described.

Patient L-v. (gunshot wound of the left temporo-parietal zone, amnesic aphasia).

A sentence was given to the patient: "I smoked a cigarette after I lit the match" What did I do first? "Maybe the cigarette was already in work, and then I have lit the match" (The patient follows the sequence of words which relate immediately to the sequence of events mentioned; the marker "after" which has a semantic function of inversion of the sequence is ignored). "I became ill after rains started" What was first, and what followed?

"Of course, firstly it rained, and afterwards I became ill". Now a second sentence: "Rains started after I became ill". Are both sentences identical? "Oh, sure, their contents is identical, only the form is different!..."

Patient Pros.

"I lit the match after I began to smoke the cigarette"

What did I do first? "Of course I lit the match, and then I took the cigarette. It couldn't be otherwise!"

Please repeat the sentence. (The sentence was repeated as it was given). Well, what I have done firstly? ... I

lit the match, and after then I took the cigarette...

Of course, one has firstly to take a cigarette and only

then I lit a match and then one can start smoking, and

here it is different: one lit a match and then took a

cigarette". So the sentence is incorrect. "Sure, it is

incorrect" (The patient grasps the "inadequate" meaning of the sentence, comparing its meaning (which he did not comprehend, with the imaginary situation he created).

The defects of understanding of the meaning of a sentence are not limited to the comprehension of sequences of events; the same can be seen in comprehension of the relation of cause - consequence. Special observation show that whereas the real relation of cause and effect is well understood, the patient fails to understand the formal, grammatical formulations of the same relations if they come in conflict with the real events and that the incorrectness of a sentences is never grasped at once.

Patient Ol. (amnesic aphasia as a result of a hemorrhage to the left temporal lobe; experiments were done by Dr. Ph. Bassin).

"Please tell me in your own words the meaning of the sentence: "It is raining because I took my galoshes"

"Well... it was raining, and not to become wet I took my galoshes..."

"It was a long time that I didn't receive letters from N. because I worried a lot". What is the sense of the sentence? "It is clear: there were no letters from N. during a long time, that is why I worried..."

And is this sentence correct? "Of course it is correct".

"The next train is leaving in 40 minutes, because I feared to be late". Is this sentence correct? "Of course it is". And what is the sense of this sentence?

"The sense is that the train leaves in a short time, and that is why I feared not to reach it..."

Patient Pros.

Two sentences were given to the patient:

(a) "I am taking the drug because I am ill".

(b) "I am ill because I am taking the drug"

Is the sense identical? "Of course it is identical. Here

(b)... if he is ill - he has to take the drug. .. I am ill... because I am taking the drug... One can say so, but it is better to say: "I am taking the drug because I am ill..." But in both cases the meaning is identical: he is ill, and he takes drugs".

In all these examples, the patient's defects are of the same nature. Logical relations included in a syntactical structure were ignored and our patients dealt only with the causal relations of the real events. As a result - the structure of the comprehension of the sentence changed, and the patients became unable to grasp the formal logical relations mentioned in the grammatical communication.

Defects of the awareness of logico-grammatical relations included in syntactical structures were they associated with severe deterioration of comprehension.¹⁾

V. The breakdown of intentional (conscious) operations upon the verbal structures.

All the defects in conscious operation with grammatical forms results, of course, in an inability to manipulate verbal processes at the voluntary level. It is easy to foresee that even in cases when fluent syntagmatic speech was preserved - conscious operations on grammatical structures were markedly damaged in our patients.

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- 1) In the 40s, when this paper was ^{firstly} published, the basic disturbances of comprehension of complex grammatical structures and of the transition from superficial syntactical structures to the deep ones, had not been studied as carefully as it should have been. That is why a special systematic study of the process of transition from superficial syntactical structures to the deep (or basic) ones must be done. That has to be the program of the next investigations (The author's remark, 1975).

To realize operations with verbal processes at a voluntary level means, first of all, to be able to make verbal processes the aim of his own conscious awareness, to aim not at the events of reality but at the processes taking part in speech itself.

It is well known that in the course of its development, practical performance and conscious awareness of verbal processes themselves are divided by a series of steps and - as was already indicated - children of 3:0 - 3:5 can master practically a wealth of speech performances, whereas even children of 6.0 are yet lacking the ability to concentrate consciously on speech and to fulfill formal operations on verbal structures (A short period of early childhood when children from 3:0 to 5:0 perform all kinds of artificial constructions with words in their play does not contradict our statements).

That is why we decided at last to turn to a more detailed study of the difficulties of voluntary operations on speech in patients whose fluent speech was preserved in practice (the basic opposition of fluent vs non-fluent aphasia was intensively discussed ca 20 years after the ^{fact} publication of this paper in 1946).

(1) Analysis of syntagmatically incorrect structure of a sentence.

Up to now we have dealt with some changes in position of words which resulted in semantic changes of a sentence.

Now we shall move to another series of experiments. We presented our patients with sentences which had not semantic incorrectness, but some mistakes and in-coordinations in their syntagmatic organization and we asked the patients firstly to find the mistake and then to construct a sentence with a similar mistake. Such experiments made it possible to compare the immediate perception of a syntagmatical mistake with the ability to operate on the speech structures consciously.

In the experiments we mentioned, the syntagmatic mistake did not evoke any semantic (paradigmatical) change or incorrectness. That is why our patients who could not grasp the logical-grammatical mistakes or changes of speech, grasped very easily defects in its syntagmatical organization, and corrected the mistake by using the well imprinted usual syntagmatic form¹⁾.

We presented the patient a sentence with a marked mistake in co-ordination of words, such as "Parokhod idet po vodi" (instead po vode, instrumental case instead dative) (an English equivalent "The boat is sailing of the water" instead "on the water". An identical English version can not be found because English inflections are not expressed by

1) Ca 30 years after this paper we had an opportunity to show that in patients with anterior lesions of the brain and with non-fluent aphasia the whole picture was reverse (cf. A.R.Luria, On two forms of disturbances in understanding of speech. "Linguistics", 1975.

suffixes). The patient had to tell whether the sentence was right, to correct the mistake if it was found and last, but not least, to make a transfer, constructing a sentence with an analogous mistake in its structure.

It was seen that all our patients were able at once to realize the mistake and to correct it, but all attempts to construct an analogous mistake in the structure of a sentence failed and the patients replaced the formal (syntactical) mistake he was requested to make by a concrete semantic mistake.

Let us turn to some examples.

Patient Pros.

The sentence: "Parokhod idet po vodoi" (instead "po vodie") (The boat is sailing of the water) is given and the patient has to grasp the mistake, to correct it and to tell of what the mistake consists). "No, one has to say "Parokhod idet po vode" (correct). And where is the mistake? (The patient reads the sentence several times). "Po vode... po vodoi... No I really cannot definitely tell where is the mistake... Perhaps "po" is incorrect ("po" remains in all cases). No I can't..." Both sentences, the incorrect and the correct one are presented to the patient simultaneously. The patient reads but still remains unable to tell what is the real mistake. After an immediate, step-by-step comparison of both sentences he corrects the mistake but he still remains not fully aware of what is the real mistake.

Patient Avt.

The same ungrammatical sentence was presented to the patient. He said at once: "No, it is not correct. "Parekhod idet po vodei" is incorrect, one has to say "Parekhod idet po vode" (correct). What has one to change to have a correct sentence? "Parekhod idet no vode... One has to change the sequence of words: "Po vode idet Parekhod" ("On the water a boat is sailing"). What did you change in the sentence? "Idet po vode" and not "po vodei" ("on the water" but not "of the water")... because... it has to be determined... no... I don't know" (the patient is confused). Please take a pen and show me what was incorrect. "It was incorrect... that the boat is sailing... not on a quantity... on the water... or on the bank... not on the water or on the waterside ... Well... on the water the boat is sailing... how should I determine?!... (The experiment was continued but the patient who made the practical correction is unable to analyse the formal mistake in the construction).

The next experiments went a step further. They show that the patient tries to replace a formal re-organization of the incorrect sentence by its semantic re-organisation and instead of trying to find a formal in-~~co~~ordination of the parts of the sentences, he begins to change the concrete contents of the phrase.

Patient Pres.

After a full explanation of the formal mistake in the

sentence "Loshad bezhit po ulitzei" (instead "po ulitze", instrumental instead of dative case) (The English equivalent being "The horse is running by the street" (instead of on the street)).

The patient is asked to make a similar mistake in the sentence "The sun shines upon..." ("Solnze svetit nad...") The patient starts trying to find the answer: "The sun shines upon... the sun.... upon the earth... No, the last is correct... I can't find... over the earth... well it can be correct too..." (further explanations and examples were given)... "Oh the earth... No, I can't... The sun shines upon a bad earth... a bad country... No, it isn't that... I can't!..."

Patient Avt.

After the sentence with a mistake "Parokhed idet po vodei" instead "po vode" = instrum. instead dative) was analysed, the patient was asked to write a sentence with a similar formal mistake. The patient wrote: "The train stopped... no locomotive is available".... No it isn't what you want... Why did the train stop?! The train - that means people... Why did it stop?..." Where is here a mistake? "The mistake is that no locomotive is available". Please tell why the sentence "Ya khochu guliat' po derevne" (I want to walk through a village" incorrect) (after a pause)... Just a minute (a pause)... I went to walk under the earth... no... it can't be... on the earth, but not under the earth!...."

It is clearly seen that instead of operating on the grammatical structures and their formal constructions, our patient operated on the level of concrete contexts designated in their speech. In

It is seen as well that although they preserved fully the practical performances with syntactical structures in their communicative speech, conscious analysis of these structures remained inaccessible. In other words it is clear enough that patients, who preserved the immediate communication by speech were unable to perform any conscious operations on the speech they used practically.

(2) Experiments on equivalent grammatical forms.

We shall turn now to the last link of the series of experiments already mentioned.

If our patients are unable to deal immediately with some formal grammatical structures, - it will be very probable that a conscious transition from one grammatical form to another one which is semantically identical but grammatically different would be of certain difficulty for our patients.

As an example of such operations we chose that of a conversion of direct speech to the indirect one.

Patients were given both kinds of speech fragments and asked to find the difference or, in some cases to make the conversion from one form to the second by themselves.

Needless to say, only patients with the highest educational background were chosen for this experiment.

Let us turn to some examples.

Patient Pros.

He was given two sentences:

- (a) "The hostess asked the guests: "Are you hungry?"
 (b) "The hostess asked the guests whether they were hungry"

The patient had to compare these sentences and to tell what is the difference. After a long pause, and after reading each of them several times, the patient says: "Here is the word "You", and here - "they". That means there are two different guests... or perhaps three... No... it's not the essence... (a) "You" - is a polite expression (in Russian "you" is used as a polite form, and "thou" as an intimate form) ... and that (b) ... There are many guests... maybe so..."

Patient Avt.

(the same experiment)

"Well... (a) is the hostess... and (b) is not the hostess, but it is unknown who it was ... Well it is the same, but it is expressed differently..." And what is the difference? "Isn't he hungry... well... a transposition... Here (a) there is somebody and he was questioned "Are you hungry?" And if he would ask the hostess would give him... The sense is different... Here is a self. Sustained sense, and here is somebody's request to another

person... Here (a) she met her friend, and the initiative comes from the hosters, and here (2) if somebody came the hosters asked whether he is hungry... The sense is equal, but the meaning is different. Here the goal (in Russian: meaning = "znachenije", "goal" is "naznachenije")... The hostess asks: "Don't you want to eat?" and in (b) - somebody came and asked to eat... Who's initiative is in (b)? "Somebody is hungry, and the hostess asked... That is his initiative, and in (a) - the hostess' initiative!..."

The data of the protocols shows quite clearly that both patients are operating on the contents of both sentences rather than on their formal structure. They are trying to analyze the differences with a certain psychological precision, trying to find slight differences in motivation, in emotional background, in the situation, but they yet are unable to make an abstraction from the immediate contents and to direct their attention to the formal grammatical structure of the phrases. They deal with real actions and events rather than with formal differences.

It is worthwhile to mention, that the patient who easily changes the forms of his speech in his immediate communication - remains unable to do it in a conscious voluntary way, if this special problem is given.

Additional fragments of our protocols show this.

Patient Pres.

After a detailed explanation of the differences between direct and indirect speech forms, the patient was asked to give his own examples of both forms.

"Children asked their grandfather: "Please tell us a story". "That's direct speech! Those are his immediate words!" And what would be the indirect speech?: Children asked their grandfather: "Please tell us a story!" ... no... it's different... I am not sure. (the explanation of the differences of the both forms of speech was repeated). "Children asked the grandfather to tell them a story... no... I am really unable... Children asked the grandfather to tell them a story!... No, I can't (The patient who gave the solution needed, remained unaware of it and continued to try to find a right solution).

Patient Avt.

After a detailed explanation of the rules of the conversion of the sentence from a direct to an indirect form, and after using a series of examples, a sentence was given: "The old man said: "Please visit me in the summer". "The old man said: please visit me in the summer... Wait a minute... When will you come to me? That means that is condensed!... Now: come to me in summer..." (The patient is prompted: "to visit...") To make me... to make her... to visit (the patient cannot grasp the form given)... He said "Please, do come! Please, do

start!" (the explanations and the examples of conversion of direct form of speech to indirect are repeated). The old man asked him, to..., "Come here!" - that would be right! I should tell that myself with pleasure... Well it may be... (a pause)... "Please, wait for my arrival!"

It can be seen that even in cases of prompting, our patient attention is linked to real events, practical forms of invitations, but never is aimed at formal grammatical operations dealing with grammatical structures rather than the events designated by the sentences.

The formal grammatical analysis of the verbal structure remains inaccessible for our patients. They try to analyse the slightest changes in situation, motivation, emotional attitudes of the persons mentioned, but they are unable to pass to the structural analysis of speech itself. They never cease to be clever people and sometimes fine psychologists but in the first stages of these experiments, never became linguists.

CONCLUSIONS AND PERSPECTIVES

The analyses we made led us to quite a new area of research.

During the final pages of the paper we have been predominantly concerned neither with the analysis of what changes of practical use of language were seen in our patients nor with changes in their practical understanding of language (that will be the subject of different studies).

What we wanted to explore was: how patients with lesions of the posterior (temporo-parietal) parts of the brain can be aware of language itself, how far can they become conscious not only of the events the language is designating, but of the formal (grammatical syntactical) structures of language itself?

We started by mentioning that a conscious attitude toward language or speech itself is a rather late result of the child's development. We asked whether this level could be especially deranged in cases of so-called "semantic aphasia"?

What we have found was unambiguous. All our patients (and only patients with high educational background and with lesions of the left temporo-parietal lobe with the syndrome of "amnesic" and "semantic aphasia" were selected) - had neither severe disturbances in their own practical speech nor in understanding the meaning of simple communications. Their fluent speech was fully preserved (which was broken only by

some attempts to find the proper words), and they had difficulties only in understanding of complex logico-grammatical constructions (that problem is not discussed here, it ~~is~~ was the subject of a series of special publications). What is clearly seen - is the difficulty the patients showed in any conscious approach to the formal, grammatical structures of speech itself.

They showed some troubles in singling out words and counting them; they suffered in ability to classify parts of speech according to formal grammatical rules; they were unable to pass from the superficial syntactical structures to the deep one, analysing the formal, structural features of a verbal communication. In all these cases they showed a tendency to deal with immediate objects, actions or events mentioned in the communication, and remained almost unable to deal with the formal grammatical structures of the language. As a result of such difficulties, the patients, who could easily use syntactical forms in their own fluent speech, changing them according the contents they wanted to express, - remained unable to acquire another attitude and to direct their activity at the formal structures of language.

All we have said up to now was a clear description of some basic facts.

Now the question remains, how can these facts be explained?

We could scarcely accept K. Goldstein's assumption that our patients had lost "The abstract attitude" or "categorial

behavior". This assumption would be too vague, and the loss of "abstract attitude" or of "categorical behavior" itself is rather a problem, the roots and mechanisms of which have to be explained, than a starting postulate which does not require any explanations.

The question remains: what are the basic changes of the brain processes which underly the defects we described? What factors are responsible for this basic change of attitude?

Are there some more general and physiologically more understandable factors which inevitably result in the deviations of verbal behavior we described?

And last but not least: what are the defects in mastering some forms of linguistic constructions which can be seen in our patients?

A careful psycholinguistic - or it would be better to say "neurolinguistic" analysis of the verbal behavior of our patients is necessary, - and a series of further studies will deal with these problems.

After the text of this paper was published in 1946 thirty years passed.

They were years of a tremendous development of linguistic science. New fields were elaborated, new concepts were proposed. The field of "structural" or "transformational" linguistics was established, basic problems of the relation of morphological, syntactical and semantic events were carefully studied. New problems of generative semantics were approached.

It is clear that all this progress was to become a basic background for further neurolinguistic studies.

Some attempt at a better understanding of the problems mentioned was made in the author's books "Traumatic aphasia" (1970), "Higher Cortical Functions in Man" (1966), "Human Brain and Psychological Processes" (v.I-1966, v.II-1970), "The Working Brain" (1973), "Neuropsychology of Memory" (v.I-1973, v.II-1975, English version 1975), and - last but not least - "Basic problems of Neurolinguistics" (1975-76).

This papers reflects only the first steps in the new area, and hence all its findings, and all its shortages.

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July 1975.