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## SPEECH THERAPY CRITERIA FOR DIFFERENTIAL DIAGNOSIS OF ACQUIRED SPEECH DISORDERS IN NEUROLOGICAL PATIENTS

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### SUMMARY

Logopedics or speech therapy, currently defined as the science of biological speech determinants, constructs the theoretical foundations for the process of diagnosis and treatment of communication disorders. The speech therapy approach, focusing on analysis of pathological linguistic facts, utilizes linguistic methods of their description, at the same time indicating their biological, psychological and social mechanisms. The paper presents the procedure for speech therapy diagnosis of acquired speech disorders in neurological patients, and the principles of data interpretation in differentiating symptoms of aphasia, pragnosia, dementia, psychoorganic syndrome and dysarthria based on three interaction categories: text, metatext and context. The state of interaction skills in brain-injured persons differentiates the picture of acquired speech disorders. Thus, unlike the dynamic picture of aphasic disorders, performance disorders in dysarthria are characterized by significant constancy of symptoms. Aphasic texts are disturbed in their grammatical and/or semantic order but are pragmatically coherent whereas utterances of persons with additional non-aphasic speech disorders show disorders of all textological categories, inter alia informativeness, situationality, intertextuality, or acceptability. Verbal behaviors of aphasic persons, unlike the actions of dementia patients, confirm their orientation in time and place. Finally, unlike the utterances of frontal lobe syndrome patients, the texts of aphasic patients contain exponents of the control of disordered behaviors. Diagnosis gains new significance when it arises from the needs of treatment, hence the speech therapist takes into account both the destroyed and the preserved linguistic, cognitive and communication capabilities of neurological patients, which make up their interaction skills.

**Key words:** neurological condition, interaction disorders, text, metatext, context

## **THE DIAGNOSTIC PROCESS IN SPEECH THERAPY**

The problem of diagnosis occupies a central position in the methodology for speech therapy research (Pačalska 1999). The term diagnosis (from Greek *diagnosis*) denotes recognition/identification, or more precisely, differentiation. The contemporary interpretation of the term emphasizes its two constituents: collection of necessary data and their critical analysis through reasoning (Lepalczyk and Badura, 1987). Diagnosis (identification) of the state of affairs and its development tendencies is carried out by analyzing symptoms but also on the basis of the knowledge of general rules. The process of speech therapy diagnostics should involve the interpretation of biological, mental and social data rather than just recording of verbal (i.e. linguistic) behaviors. The acquired knowledge on the disorder of speech mechanisms should be then assessed according to the accepted norms and patterns. This is the basis for defining therapeutic measures that should be taken. In the scientific description of speech disorders, diagnosis also performs a special role because it introduces objective procedures, defines the linguistic exponents of particular pathology entities, and first of all it points to the mechanism that explains man's cognitive and communicative functioning under definite biological conditions.

According to Stefan Ziemiński (1973), diagnosis is a process consisting of two stages: exploration and verification. At the first stage of speech therapy diagnosis a speech pathology phenomenon under investigation is identified, and at the second – the accuracy of diagnosis is verified. The competencies of the diagnostician who assesses human behaviors in the biological, cognitive, emotional and social spheres should enable him/her to recognize/identify man's verbal behaviors under all their determinant conditions (Siedlaczek, 1999). A good, i.e. reliable, objective, exact and professional diagnosis is the foundation of any speech therapy measures administered to children, teenagers or adults.

## **DIAGNOSIS OF SPEECH DISORDERS IN PERSONS AFTER BRAIN INJURIES**

The interdisciplinary character of speech therapy requires that descriptions, diagnosis and treatment of speech disorders induced by acquired brain injuries apply a methodology that utilizes neurological data (organic and localization diagnosis), psychological data (functional diagnosis), linguistic data (description of verbal behaviors) and sociological data (age, gender, social background, education, family status). The interference of these factors often creates a mosaic of individualized pictures of pathology (Tomaszewski et al. 2015), which scientific theory tries to classify into model categories and types. From this holistic perspective of diagnosing patients with speech disorders, the available diagnostic tools turn out to be incomplete: they organize the research procedure but at the same time they limit its scope because they allow assessment of only the speech

aspects that are defined in the structure of examination. The contemporary speech therapy knowledge about the biological determinants of verbal behaviors goes far beyond speech therapy practice while the existing diagnostic tools do not comprise the recent research results indicating at certain types of speech pathology symptoms that are associated with the influence of specific pathomechanisms, are part of specific ranges of disorders, and are characteristic of separate nosological entities.

The procedure for speech therapy examination of patients with brain injuries requires that research instruments be broadened, inter alia, with trials enabling diagnosis of the speech disorders that are only recently described as separate nosological entities (e.g. pragnosia). Regrettably, no satisfactory metric tools (scales and tests) have yet been developed; under such circumstances an optimum approach appears to be a qualitative one, in which the selection of experimental/clinical trials makes possible a complete analysis of both human speech functions and verbal behaviors in the analytical aspect (language skills and competence) and in the functional one (communication skills and competence). It should be stressed that the development of research into the effects of brain injury on the picture of linguistic interaction disorders suggests that speech therapy examination procedures be expanded with tests that have not yet been taken into account in diagnostic examination, inter alia, with the assessment of the ways of using linguistic and situational context, with the ability to perform metalinguistic operations, ability to produce and receive messages in the non-verbal subcode, and with the ability to use language in accordance with the rules of a communication system. Moreover, the dynamics of speech disorders, resulting from the course of disease, compensatory capabilities of the brain, adaptation mechanisms of the neurological patient, rehabilitation measures, the patient's clinical condition, his/her general feeling, etc. make it necessary to look at the problem from the diachronic perspective and carry out a speech-therapy diagnosis many times (preliminary, control and final ones), which may necessitate verification of earlier prognostic positions and therapy strategies.

## **THEORY OF SPEECH DISORDERS AND DIAGNOSTIC PROCEDURES**

Speech disorders after brain injuries are usually described in terms of separate nosological entities, to which paradigms of linguistic symptoms are assigned, and corrective management procedures are recommended. The ways of interpreting neurologically-based speech disorders, regardless of the conceptions adopted, came down to a static aspect. There were two causes of this practice: first, investigations were mainly theoretical and their results were not always verified in clinical examinations and speech therapy treatment; second, mechanistic ways of interpreting the functioning of the human brain provided no grounds for observation of the dynamics of cognitive and linguistic processes during convalescence.

The brain injury-related language disorders described in literature are presented within theoretical models: these are remote from the picture of verbal behaviors of individual patients. In speech therapy practice, only in some patients there are language disorders typical of particular speech pathology entities: aphasia, pragnosia, dysarthria, or dementia. In many cases, combined difficulties are detected which mould the picture of disorders in individual patients. Clinical data indicate a high degree of symptoms complications resulting from organic brain injury and close intermingling of many disorders.

Contemporary views on disorders consequent upon neurological diseases evolve, the picture of language difficulties being understood as variable, which necessitates constant verification of speech therapy diagnoses of neurological patients, and thereby modification of treatment procedures. Clinical observations, neurophysical examinations, neuropsychological assessment, and finally speech therapy treatment provide irrefutable evidence for that.

## DIFFERENTIATION OF SPEECH DISORDERS IN NEUROLOGICAL PATIENTS

Classic and non-classic forms of speech disorders occur comparatively seldom as pure textbook cases. Generally, the patient's symptoms show only some resemblance to syndromes known from literature. Regrettably, the established clinical practice is to mechanistically diagnose brain-injured patients, which consists in selectively linking one, not always the main cause, to selected symptoms of language disorders, without taking into account all clinical determinants and the complete description of language and communication disorders.

In contrast, it turns out that there may be many etiological factors – they can disturb the functioning of many mechanisms, and cause combined and interfering pathology symptoms, thereby producing various different consequences in the course of verbal behaviors. Speech therapy practice shows that combined and non-specific speech disorders occur in most patients with neurological conditions, which necessitates differential diagnosis and individualized methods of speech therapy treatment. The grounds for this diagnostic and therapeutic management is neurological diagnosis, results of neuroimaging examinations, the patient's age, results of specialist tests, the patient's social profile, the kind of lateralization, the possibility of bilingualism, and the specificity of speech pathology symptoms (Panasiuk, 2005).

When differentiating acquired speech disorders in neurological patients the possibility of occurrence of many pathology entities should be taken into account:

- a) **aphasia** – assessment of lateralization, location of brain injury, the picture of symptoms of language disorders;
- b) **“non-aphasic speech disorders” (pragnosia)** – assessment of lateralization, location of brain injury, the range of symptoms of disorders of language and communication skills;

- c) **dementia** – the patient's age, multifocal and disseminated neurological injuries, complicated histories of somatic, metabolic, hormonal, and mental diseases; past pharmacological treatment, results of biochemical tests, family history data, dynamics of growing cognitive and language disorders, and specificity of symptoms regarding higher psychic functions;
- d) **dysarthria** – location of brain injury, neurological assessment, specificity and comparatively permanent character of disorders in the realization of spoken utterances;
- e) **deafness** – results of audiological examination, disorders of reception of all sounds in the environment;
- f) **dysglossia** – results of phoniatic, laryngological, and orthodontic examination, specificity and comparatively permanent character of disorders in the realization of spoken utterances;
- g) **aphasic-type speech development disorders** – the patient's age, time of the occurrence of a neurological incident relative to speech ontogenesis, specificity of linguistic symptoms;
- h) **agnosia** – results of neuropsychological examination, specificity of symptoms regarding definite sensory modality, occurrence of perception difficulties on the non-verbal material;
- i) **apraxia** – results of neuropsychological examination, specificity of motor symptoms in programming motor activities and non-verbal acts;
- j) **alexia/dyslexia** – results of neuropsychological examination, specificity of symptoms regarding reading;
- k) **agraphia/dysgraphia** – results of neuropsychological examination, specificity of symptoms regarding writing ;
- l) **acalculia/dyscalculia** – results of neuropsychological examination, specificity of symptoms regarding calculating;
- m) **psychoorganic syndrome** – location of brain injury, results of psychiatric and neuropsychological examinations, specificity of emotional, behavioral and interaction disorders.

The results of differential diagnosis determine the direction of therapeutic management and indicate prognosis in speech therapy treatment. The condition for making an accurate diagnosis of a pathological entity (entities), for programming the model of treatment of current disorders, and for applying optimal medical solutions in the course of the individualized process of linguistic rehabilitation, is to use an analytical model in speech therapy diagnosis of brain-injured patients, in which the causes, pathomechanisms, symptoms and effects of speech disorders are determined.

The methodology for speech therapy management depends on the stage of convalescence, the patient's general clinical condition, conditions under which diagnosis and treatment are conducted (at hospital bed, doctor's office, rehabilitation period). Speech therapy diagnosis requires the analysis of data obtained from medical documentation, medical history and observation, and analysis of

results obtained from specialist examinations and from testing language and communication skills.

## **NEUROANATOMICAL AND LOCALIZATION CRITERIA IN DIAGNOSIS OF SPEECH DISORDERS**

One of the first steps in the procedure for diagnosing neurologically-based speech disorders is to refer to anatomical-neurological criteria and find whether the data acquired as a result of clinical diagnosis, neurological assessment and instrumental examinations indicate that there is organic damage to the patient's nervous system or changes in the functioning of his/her brain structures. Having ascertained the occurrence of structural or functional changes it is necessary to assess which parts of the brain are affected by this pathology and what its character is: focal, multifocal, whole-brain or disseminated. It should however be remembered about compensatory capabilities resulting from the plasticity of the brain, and about the individualized organization of higher cognitive functions in the structure of the central nervous systems of individual persons (Panasiuk, 2013). Hence, a localization diagnosis should be always verified in syndromological and functional assessments.

The clinical picture and prognosis in the case of acquired speech disorders in neurological patients depend on several factors. The most important include: location, the extent and etiology of brain injuries, and also the time that passed from falling ill, the patient's sex, age and handedness. The picture of specific language disorders related to focal brain injuries may be further modified by the co-occurrence of cognitive, emotional, vegetative and motor disorders consequent upon progressive neurodegenerative diseases. Speech therapy practice shows that in most patients with neurological conditions there are combined and non-specific speech disorders, which necessitates differential diagnosis and the use of individualized methods of speech therapy treatment. The grounds for this diagnostic and therapeutic management are neurological diagnosis, results of neuroimaging examinations, and the patient's social profile (Panasiuk, 2005).

Analysis of clinical documentation allows the reconstruction of the patient's history of neurological disease, and determination of the co-occurrent metabolic, cardiological and vascular as well as other disorders. The results of neuroimaging examinations may reveal the occurrence of brain injury foci located outside of the "speech area", or generalized cortical and cortico-subcortical atrophies. Medical history and observation make it possible to ascertain additional factors that determine the picture of speech disorders (the patient's advanced age, severe hearing disorders, atypical lateralization, bilingualism, and disorders of behavior, mood, and the like).

## **SYMPTOMATIC CRITERIA IN DIAGNOSIS OF SPEECH DISORDERS IN NEUROLOGICAL PATIENTS**

A neurological disease, craniocerebral injury, or neurosurgical intervention cause destruction of certain brain structures but they also disturb the functioning of other, not injured structures. The patient's verbal behaviors in an acute or sub-acute condition should however be treated then as a prognostication for the subsequent speech-therapy assessment: speech therapy diagnosis is not recommended at this stage. Difficulties in establishing verbal contact, occurring in the early convalescence period are characterized by the instability of symptoms: some subside to be replaced by others. A special characteristic of speech disorders in the early period is the variability of symptoms, spontaneous regression of disorders sometimes for several hours, days, or weeks. In the picture of speech disorders in neurological patients there are symptoms that are a direct effect of destruction of certain brain structures, and symptoms resulting from disturbances in the functioning of structures situated outside of the injured area but linked to it by a network of fibers. In the former case there is a permanent and complete loss of a function, in the latter – a temporal impairment of speech functions to a greater or lesser extent.

Neurodynamic changes in the early convalescence period are usually interpreted in the context of Constantin von Monakow's conception of diaschisis (Pietrzykowski et al., 1997). Monakow explains the pathophysiological mechanism of disorders occurring right after a neurological incident by reference to the neurodynamic laws of Ivan P. Pavlov, which govern the functions if a pathological factor occurs in the brain. Now, an injury to some region causes a simultaneous disturbance of the functions in the neighboring areas or linked by a network of nerve fibers: a neurological symptom can be cerebral edema, circulatory disturbances, changes in nervous excitability, and speech disorders (Maruszewski, 1966).

Functional disorders that are not a direct result of brain injuries can, by nature, be compensated, but in some cases their decompensation may also occur (e.g. if there are repeated strokes). The fact is also emphasized that a symptom of injury to a specific area can be not only disorders of corresponding functions (negative symptoms) but also the occurrence of certain phenomena that result from the release of some lower centers from the inhibiting influence of higher centers which are injured in this case (positive symptoms). The form of neurological disorders and their dynamics are linked inter alia to the course of the acute period after falling ill, the pace of recession of cerebral edema, the size and location of the injury, the process of softening of the cerebral structures, further hemorrhages or the development of collateral circulation. The performance of brain-injured patients is significantly influenced by the pharmacological treatment applied (Kozubski, 2004).

Another group of factors determining the final development of the symptom complex in patients after brain injury is the circumstances in which the patient is placed. The social situation or environment in which s/he is found can produce a number of psychic changes. It should be stressed that disorders in the psychic sphere may be both organically based (i.e. they may result from brain injury, e.g. a catastrophic reaction after frontal lobe lesions of the left hemisphere) and they can be psychic (i.e. they appear as a reaction after realizing one's disability, e.g. depression or logophobia).

At the early stage of convalescence the patient's condition - determined by the configuration and variability of vegetative, motor, emotional, cognitive, interactive, communicative and linguistic symptoms caused by injuries of different brain structures and by occurrence of many neurodynamic symptoms – makes it difficult or impossible to pose a speech therapy diagnosis.

## **ASSESSMENT OF LANGUAGE AND COMMUNICATION SKILLS IN NEUROLOGICAL PATIENTS**

Speech therapy diagnostics of patients with neurological conditions consists in describing the state of their language and communication competences, in showing which skills are retained and which are lost, in determining mechanisms of communication disorders and the ways of the patient's participation in linguistic interactions. The results of examination show the kind and severity as well as mechanism of speech disorders in the patient while a clinical assessment explains the causes of the observed disturbances (Panasiuk, 2007, 2010/2011). The presented goals are best implemented using experimental-clinical and functional techniques which are based on the assumption that psychic functions, and, consequently, language functions of every person are characterized by a high degree of individualization (Luria, 1976a, 1976b).

The model of speech therapy diagnosis of brain-injured patients derives from the achievements of physiological methodology based on the experiments by I. P. Pavlov, the author of the theory of two signal systems. Hence, two kinds of stimuli should be used in the examination:

- concrete (sensory) stimuli, exerting an effect on the first signal system and stimulating concrete thinking, and
- abstract (words) stimuli referring to abstract (conceptual) thinking (Pavlov, 1952).

The examination of each language function (repetition, understanding, naming, etc.) should involve stimulation of different types of responses (auditory-verbal, auditory-visual-gestural, visual-verbal). Assessment also covers linguistic, social, situational and pragmatic determinants of contact with the patient (Panasiuk, 2007). When selecting and interpreting language material for diagnostic purposes, sociological variables (the patient's sex, age, education, and where



s/he lives) should be taken into account because the level of a person's linguistic competence is determined by his/her education and linguistic experience, and kinds of activity in social life.

Because of sociological and clinical determinants as well as the character of speech disorders the techniques and materials used in examining individual patients should not be uniformized. The collected material should be representative, i.e. it should contain a varied repertory of verbal behaviors in different communicative situations. The whole of linguistic capabilities of the patient being examined should be presented in the context of his/her emotional and communication behaviors under diverse social conditions.

## **EXAMINATION OF SPEECH<sup>1</sup>**

1. Differentiation of sounds in the environment and giving them meanings;
2. Realization of non-verbal messages:
  - a) in the prosodic subcode:
    - intonation patterns (declarative, imperative, or interrogative sentences),
    - logical stress,
  - b) in the kinetic subcode ,
  - c) in the proxemic subcode ;
3. Understanding of non-verbal messages:
  - a) in the prosodic subcode
    - intonation patterns (declarative, imperative, or interrogative sentences),
    - logical stress,
    - emotionally marked utterances ,
  - b) in the kinetic subcode,
  - c) in the proxemic subcode;
4. Understanding of spoken texts in situational context and outside of it
  - a) dialogical texts (answering questions for the text)
    - direct speech acts
    - indirect speech acts;
  - b) monologic texts (answering questions for the text, giving a title)
    - with a literal meaning ,
    - with a metaphorical meaning
5. Understanding of the meaning of written texts (answering questions for the text, giving a title)
  - with a literal meaning ,
  - with a metaphorical meaning;

<sup>1</sup> The presented procedure for speech examination was developed based on the analysis of interactive behaviors of 200 brain-injured persons (Panasiuk, 2012). Methodological needs require the use in the assessment of neurological patients the diagnostic tests necessary for differentiating symptoms characteristic of particular nosological entities. Before conducting a speech therapy examination one must not decide what kinds of language disorders have occurred in the patient (if, in particular, the results of localization diagnosis do not correlate with the results of syndromological analysis as for example in crossed aphasia or paradoxical aphasia).

6. Understanding of grammatical structures in spoken and written texts
  - a) Passive Voice
  - b) syntactic inversion,
  - c) grammatical government,
  - d) comparative expressions,
  - e) prepositional phrases;
7. Understanding of names in spoken and written texts
  - a) activities
    - physical,
    - mental,
  - b) objects and phenomena
    - concrete,
    - abstract,
  - c) attributes of activities, objects, and phenomena
    - sensory,
    - mental,
  - d) names of feelings;
8. Differentiation of meanings of words
  - a) synonyms,
  - b) paronyms,
  - c) antonyms,
  - d) homonyms,
  - e) polysemes;
9. Differentiation of the sound of opposing syllables;
10. Differentiation of the sound of neologisms;
11. Sounding;
12. Spelling;
13. Repetition of:
  - a) vowels,
  - b) syllables,
  - c) opposing syllables,
  - d) names,
  - e) name sequence – assessment of the range of repetition
    - objects,
    - figures;
  - f) sequence of neologisms – assessment of the range of repetition,
  - g) simple sentences,
  - h) compound sentences;
14. Realization of automatic sequences
  - a) figures 1-10,
  - b) names of days of the week
  - c) names of months,
  - d) memorized texts,
  - e) attempts to sing known songs;

15. Construction of verbal utterances

- a) dialogue skills (speech acts)
  - topics emotionally important to the patient,
  - neutral topics;
- b) monologue skills (genre and style forms)
  - topics emotionally important to the patient,
  - neutral topics;

16. Creating written texts

- a) singing
- b) on topics emotionally important to the patient,
- c) on neutral topics,
- d) writing dictation of
  - figures,
  - letters,
  - syllables,
  - words,
  - sentences,
  - texts;
- e) copying,
- f) assigning captions;

17. Naming

- a) activities
  - physical,
  - mental;
- b) things and phenomena
  - concrete,
  - abstract;
- c) features of activities, things, and phenomena
  - sensory,
  - mental ;
- d) emotional states;

18. Defining of names

- a) activities
  - physical,
  - mental;
- b) things and phenomena
  - concrete,
  - abstract;
- c) features of activities, things and phenomena
  - sensory,
  - mental;
- d) emotional states;

19. Actualization of a sequence of names
  - a) by semantic criteria,
  - b) by formal criteria;
20. Assessment of the correctness of propositions
  - a) in formal-linguistic terms,
  - b) in semantic terms,
  - c) in pragmatic terms;
21. Identification of phonetic errors
  - a) in written words (visual-literal analysis),
  - b) in heard words (auditory-phonetic analysis);
22. Identification of the form and content of the pictures seen
  - a) realistic drawings,
  - b) schematic drawings,
  - c) distinction of details that differentiate drawings ,
  - d) graphic symbols,
  - e) absurdities in drawings,
  - f) humorous cartoons,
  - g) semantic categories;
23. Orientation
  - a) in space
    - in the schema of one's own body ,
    - on a map ,
    - on the watch ;
  - b) in time
    - giving the date,
    - defining time brackets;
24. Drawing
  - a) from memory,
  - b) according to a pattern;
25. Counting
  - a) solving equations,
  - b) completing mathematical signs in equations,
  - c) solving text-based mathematical problems,
  - d) conducting numerical operations in memory;
26. Praxis
  - a) oral,
  - b) dynamic,
  - c) symbolic,
  - d) postural praxis,
  - e) constructional praxis;
27. Memory
  - a) recalling biographical data,
  - b) remembering information received through sight,
  - c) remembering information received through hearing;

28. Realization of social linguistic rules

- a) rank
  - equivalent,
  - non-equivalent;
- b) type of contact
  - formal,
  - informal,
  - permanent ,
  - impermanent;

29. Realization of situational rules

- a) time
  - an utterance concerns events and persons currently perceived ,
  - an utterance concerns events and persons from the past or the future;
- b) place
  - utterances in an open place,
  - utterances in a closed place;
- c) topic of conversation (autobiography, family home, work, profession/occupation, studying, school, free time, cultural life, services, ideology and others),
- d) number of interlocutors,
- e) genre of utterance (monologue, dialogue);

30. Realization of linguistic pragmatic rules

- a) emotional function
  - positive emotions,
  - negative emotions;
- b) information function
  - declarative sentences,
  - negations ,
  - affirmative sentences,
  - questions;
- c) modal function
  - certainty,
  - supposition,
  - modal indeterminacy,
  - doubt,
  - exclusion;
- d) function of action
  - interests in action,
  - readiness to act,
  - stimulation to act .

The theoretical foundation for analysis of diagnostic data is Alexander Luria's concept of functional systems (1967). The main assumption of this concept is the thesis that the realization of each psychic function involves brain structures which can be divided by the functional criteria into the following blocks (systems):

block I, which regulates the tension of the cortex and the waking state; block II, which receives, processes and stores information; and block III, which programs, regulates, and controls psychic functions. Each block has a hierarchical structure and consists of cortical areas with a varying degree of functional complexity: primary (projection) fields collect impulses from the periphery; secondary fields integrate the information received into organized systems; and associative fields process the information from various peripheries into supramodal systems (Luria, 1976a; 1976b). By participating in psychic processes in a specific way, each of the distinguished blocks contributes to creating conditions for normal activity.

The dynamic system regulating particular functions creates networks that run across different cerebral areas, sometimes remote from one another. And although the founder of the theory accepts the functional diversity of particular brain structures, he links their activity only to the most elementary functions. The realization of more complex functions, speech being one of them, takes place with the cooperation of different centers that make up a dynamic functional system. Therefore, if psychic activity is a complex functional system realized by various regions of the cerebral cortex, damage to an area causes the breakdown of the whole functional system. It thus does not produce an isolated disorder of one of language functions (speaking, understanding, reading, writing, etc.) but it causes a complex of disturbances in their programming and course, thereby resulting in comprehension disorders and/or speaking disorders. These irregularities have one factor in common, called the basic defect. The kind of this disturbed factor is an indicator for diagnosing a specific type of aphasia. Identification of disorder types permits determining the direction of and procedures for speech therapy treatment, which should serve to reorganize the dynamic functional speech system in such a way that the injured link in this system could be replaced by including other retained functions in the process of programming speech (Luria, 1967, 1976a).

The detailed description of the linguistic activity of the patients should also take into account what forms and genres of utterances they use; how they realize their communication intentions; how they address the interlocutor and whether they follow the linguistic etiquette; what the properties of their style are – whether they use collocations, proverbs and stereotyped expressions; what are the syntactic, grammatical, semantic-lexical and phonetic characteristics of their utterances; whether they understand the heard and read texts; and whether they can produce written texts. The assessment of language disorders should be made in the context of assessment of the state of other higher cognitive functions.

Interference of pathological factors, a complicated case history, the large extent and high severity of brain injuries, social profile and other individual features (personality, interests, attitude to one's own disease) impact the diversity of symptoms of language disorders manifesting in speech therapy examinations of individual patients (Panasiuk, 2005).

The description of the language used in linguistic interactions permits determination of the communicative capabilities of brain-injured persons who, having a limited store of linguistic means, make use of the data based on context (verbal

and non-verbal), speaking situation, the interlocutor's social profile, and the assumed knowledge of the world of the interlocutors. What is assessed is the effect of communication behaviors, regardless of the structure of the function that made it possible or impossible to achieve it.

The assessment and interpretation of linguistic facts present in the utterances of brain-injured patients should take into account the mechanisms of how they arise. Some changes in phonetic, inflectional, derivational or syntactic phenomena are caused by the inertia of the cortical structures, and they arise as a consequence of disorders in the mechanism of cerebral excitation or inhibition (perseveration). It may also be difficult to evaluate the collected linguistic material because, in some milder cases, confirmation of the occurrence of pathological language facts may be doubtful since deviations from linguistic norms are also found in the speech of healthy language users, in whom they are a symptom of lack of concentration or general tiredness (Klemensiewicz, 1959). Repeated trials checking performance in particular speech functions make it possible to resolve these interpretation dilemmas in a conclusive way (Panasiuk, 2007).

## **INTERPRETATION OF SPEECH DISORDERS IN LIGHT OF INTERACTION THEORY**

Human actions follow certain rules. People contact one another by conveying symbols: words, facial expressions, gestures or any other signs that mean something to them and to others. Symbolic gestures express human moods, intentions or the manner of conduct, and conversely – by reading gestures of other people one concludes what they are thinking and how they are going to behave. This happens even when other people are not physically present. A person receives reality mainly through symbols<sup>2</sup> and uses these signs to adapt to the others, to create notions of him/herself and the situations in which s/he finds her/himself, and to construct definitions of what will be or should appear in particular situations. "Symbolic interaction" (interpretive interaction) thus refers to a certain and special type of interaction that occurs between people. This specificity stems from the fact that people do not respond to their actions in a simple way but mutually interpret and define them. Human interaction takes place through symbols, by giving a meaning to the behaviors of others –between stimulus and response there is the process of interpretation, the essence of social life being interactions occurring between people undertaking joint actions (Blumer, 1969).

In sociolinguistic interpretation, interaction has a linguistic character and is effected through language because it is language that gives human behaviors a special character, thus differentiating between human behaviors from the be-

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<sup>2</sup> *The theory of social interactionism, which says that social reality emerges from interaction, was adopted as one of the fundamental research paradigms of twentieth-century sociology (Hałas, 2006). The conception based on the philosophy of American pragmatism of Charles S. Peirce, William James, John Dewey, and first of all George H. Mead, was developed by American sociologist Herbert Blumer, who was recognized as the author of the theory of interactive symbolism.*

haviors of other living beings. Language objectivizes cognition of reality, by imposing upon individuals the intersubjective categories of the view of reality. The human being gets to know the world through the senses: they provide him/her with subjective, unique knowledge not accessible to other individuals. And although the senses of every person function within the biological determinants of the species, it is sensory experiences that provide individual data, thereby deciding the diversity and uniqueness of human experience. It is language that organizes these sensations in intersubjective structures shared within social groups. Language intellectualizes cognition by transforming biological, sensory orientation in reality into a mental view.

Linguistic categories have a structure of mental beings. According to S. Grabis (2007) these are: (a) grammatical categories – as entities organizing the subsystems of language, (b) concepts – as universal models, specific to the human species, of organizing experiences (c) text categories – as universal structures determining human action (dialogical forms of utterances) and reflection necessary for understanding the world (narrative forms of utterances). Finally, language is the most precise tool which makes it possible to transmit knowledge in accordance with the sender's intentions, enabling him/her to get at the intentions of the receiver.

Efficacious communication with persons with speech disorders, which serves cognitive purposes, is possible only in dialogue, when people reveal and agree on their interpretations. Interlocutors negotiate what a fact or an event means. The receiver who enters into interaction with an aphasic partner takes part in explicating the meaning of the communications formulated by the latter, and s/he formulates his/her utterance in such a way that it would be most communicative in the situation determined by the speech disorder of one of the interaction participants. Without effective cooperation from the healthy interlocutor, effective communication by the patient would be often impossible<sup>3</sup>.

An interaction in which an aphasic patient participates requires, to a greater extent than in interactions between healthy persons, that the interlocutors refer to their shared knowledge of the world and conclude from it about the meaning of verbal messages: disturbed and incomplete, or incomprehensible to the patient. The range of interactive behaviors comprises both verbal and non-verbal behaviors. The latter comprise both conventionalized behaviors that replace language signs and non-conventionalized individual and occasional behaviors.

From the methodological interactive perspective stems a set of theoretical assumptions which allow constructing a model for describing an interaction participated in by an aphasic person. It should be assumed that human actions are organized and goal-oriented. The factor that frees, moulds, and determines the direction of human interactive activities is intention. When the realization of the assumed com-

<sup>3</sup> Compare the *et cetera* principle functioning in ethnomethodology, which defines an interactive situation in which the interaction partners accept oblique statements by the other side, complementing their utterances or waiting for continuation of interaction.



municative intention is restricted by language disorders (aphasia), the course of interaction is different. The specificity of interaction participated in by an aphasic person stems from a special utilization of three interaction categories (Panasiuk 2012):

1. text (the message sometimes assumes the form of a pathological text);
2. meta-text (in the text-forming and /or meta-linguistic function);
3. context (the knowledge of the sender and the receiver resulting from textual or /and non-textual conditions).

Text is a verbal result of an act of linguistic communication, i.e. the necessary conditions for a text to exist are:

- a. intentional behavior as a result of which the text arises;
- b. its substantial character consequent upon the functioning of realization skills (speaking, writing, signaling);
- c. verbal character expressed in the phonetic-morphological-syntactic, semantic and pragmatic structures;
- d. communicative situation in which both the sender and the receiver are its obligatory participants.

The receiver's perspective is connected with the coherence of the text, a property that makes it possible to decode the sender's intentions by the receiver. There are three types of verbal behaviors in speech pathology:

1. text,
2. pathological text,
3. non-text.

The status of texts is accorded to substantially expressed verbal behaviors that are grammatically, semantically and pragmatically coherent. Pathological texts are utterances whose linguistically coded intention is legible despite a pathological and often fragmentary realization. Non-texts are behaviors entirely dominated by non-verbal communication. This group also includes utterances constructed using the signs and rules of language, whose substantial, grammatical, semantic and pragmatic organization does not make it possible to decode the sender's intentions (Panasiuk, 2000, 2012; Panasiuk, Woźniak 2001).

Metatext is an exponent of knowledge of the inventory of signs and rules of combining them in large wholes: the knowledge is actualized in a concrete act of speaking, writing, and reading; hence each linguistic message contains reference to a code in the selection and combination of its constituents. On the surface of the text these operations manifest themselves in the form of metatextual formulas of "utterance about utterance" that are an exponent of the metacognitive mechanism controlling and integrating verbal behaviors. If the control concerns the process of constructing the text, metatextual formulas perform a metatextual function, whereas if the control pertains to the selection of signs, the metatext performs a metalinguistic function. Controlling of utterances oscillates between close analytical reflection on the text and a general assessment of the text made on the peripheries of attention. Constructing utterances is organized by two basic and independent types of linguistic reflection:

1. *I know how...* (metalinguistic competence);
2. *I know that ...* (linguistic competence).

The introduction of this theoretical distinction brings significant consequences in the way of interpreting facts of speech pathology in persons who have previously acquired both types of competence, and it produces additional research problems. The knowledge revealed in the utterances of aphasic patients about what the element of the linguistic code used in the text mean indicates metalinguistic reflection. Manifestations of the knowledge that this is how a correct and meaningful utterance should be constructed refer to the speaker's linguistic competence (Panasiuk, 2005, 2012).

Context is the sender's and the receiver's knowledge about both textual determinants – the structurally closest environment of units of the language system, i.e. the verbal environment of a word in the text, and about non-textual determinants – the sender's and the receiver's knowledge about culture, social relations, a communicative situation, and the like. Linguistic abilities of aphasic persons present in the broad range of their verbal behaviors indicate that a significant role in interaction is played by the use of context which facilitates both understanding and reception of speech. Contextual clues are provided by the text itself, including the pathological text, the situation of language use, and the store of knowledge of the sender and the receiver (Panasiuk, 2012).

The adopted methodology makes it possible to determine the dynamics of interaction i.e. to establish the rules by which the goal of communication is achieved through special structuring of the conversation chain. Interaction in aphasia therefore involves a special use of three elements understood as interaction categories which have to be assessed in the process of speech therapy diagnosis. They are:

1. verbalized (text/ pathological text) or non-verbal message;
2. utterances about the message (metatext) in two functions – organization of the message and the semiotic status of the means used);
3. the sender's knowledge and the receiver's knowledge stemming from textual and non-textual determinants (textual and situational context) .

The pattern of interactive situation participated in by aphasic persons is fulfilled in an individual way. In order to achieve discursive coherence, the speaking subjects construct a characteristic message consisting of verbal, verbal-pathological, and non-verbal exponents in accordance with the intention and previously adopted goal of interaction. Between the speakers there is a feedback relationship, they attribute to each other a definite image that allows regulation of patterns, principles, and mechanisms of action in a specific interaction situation. When the patient, while controlling his/her utterance, notices that the quality of the realized text is disproportionate to the planned formal and semantic shape, or s/he is not sure of the quality of execution, or receives a signal of failure to understand the text by the sender or when his/her message does not realize the planned intention in formal or contentual terms, then signals appear that indicate correction of the utterance – metatextual formulas. Differences between the speaker's ability to assess the text and his/her language proficiency are a significant factor differentiating the picture of aphasia. Identification of the mecha-

nism of aphasic disorders permits defining the applicative dimension of aphasia diagnosis.

Diagnosing acquired speech disorders in neurological patients requires assessment of their proficiency in understanding and constructing the text, in taking into account and using context, and in controlling verbal behaviors. It should be also remembered that on the one hand aphasic disorders restrict interaction capabilities but on the other hand they stimulate the action of compensatory mechanisms owing to which particular interaction categories: a) text, b) metatext and c) context are constantly transformed and assimilated in the dynamics of the interaction process, thus revealing man's natural form of existence in the world.

## PRINCIPLES OF INTERPRETATION OF DIAGNOSTIC DATA FOR SPEECH THERAPY DIAGNOSIS

In interpreting the linguistic material obtained during examination the patient's ability to realize the three interaction categories: text, metatext, and context should be taken into consideration. The assessment of the text is concerned with understanding and intentional production of linguistic structures. The analysis of particular language functions (repetition, naming, writing, reading, etc.) allows the identification of mechanisms that disturb the category of text, and the kind of the disorders that may pertain to the grammatical, semantic and pragmatic coherence of spoken and written utterances or several of them at the same time.

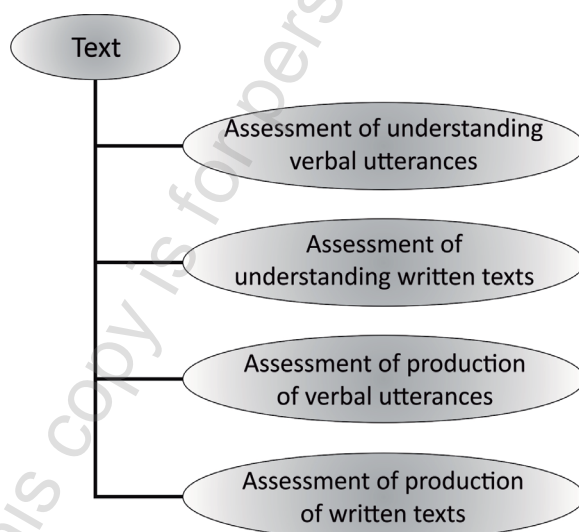


Fig. 1. The category of text in speech therapy diagnosis  
Source: own work

The assessment of metatext refers to the patient's ability to evaluate the course of linguistic functions in modal terms: certainty, supposition, modal indeterminacy, doubt, and exclusion. By assessing the adequacy of exponents of linguistic control for the quality of the text being realized the character of aphasic disorders is established: they may concern the sphere of performance (*parole*) i.e. language skills, or access to linguistic (*knowledge that*) or metalinguistic (*knowledge how*) competence.

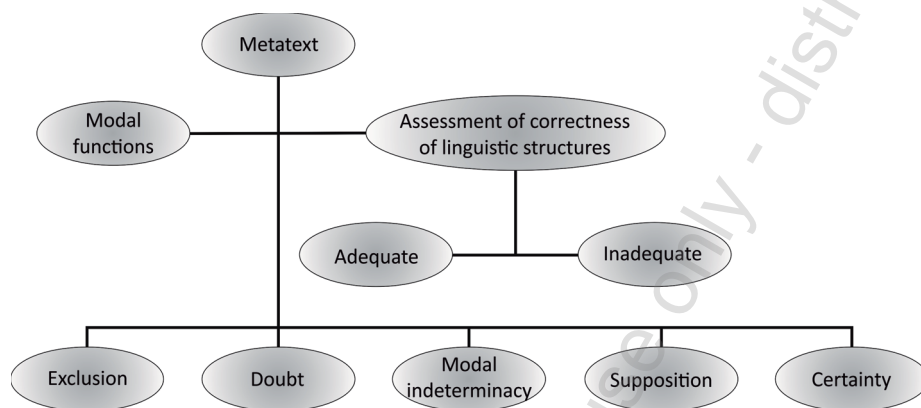


Fig. 2. The category of metatext in speech therapy diagnosis  
Source: own work

The analysis of the text and metatextual formulas allows ascertaining whether the patient:

1. Understands verbal utterances but has problems with producing a text
  - a. s/he adequately assesses her/his difficulties,
  - b. s/he inadequately assesses her/his difficulties;
2. Does not understand verbal utterances, has problems with producing a correct text
  - a. s/he adequately assesses her/his difficulties,
  - b. s/he inadequately assesses her/his difficulties.

The assessment of metatext takes into account a broader view of the patient's behaviors, associated with his/her functioning in daily communicative situations, during speech therapy examination and performing diagnostic tests, and during treatment activities. The adequate understanding and production of situational and linguistic contexts is a significant element that improves communication of language-disorder patients and is typical of persons with aphasia and combined aphasia- and dysarthria-type disorders. In contrast, difficulties in recognizing, taking account of and referring to contextual clues are specific to combined speech disorders, particularly aphasia and pragnosia, aphasia and general cognitive disorders in dementia, and to aphasia and psychoorganic syndrome.

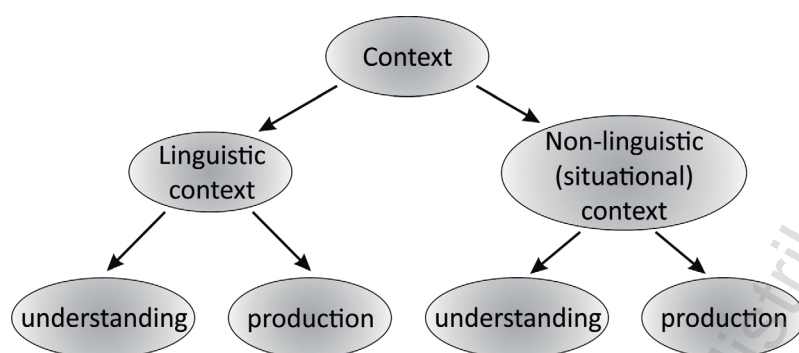


Fig. 3. The category of context in speech therapy diagnosis

Source: own work

The interactive approach involves the need to present the interaction categories: text, metatext and context in dynamic terms, i.e. taking into account the rules of their mutual transformation during interaction, and in spatial terms, i.e. taking into account all elements of multidimensional communicative space, in which the interaction is taking place (see also Pachalska et al. 2015).

Tab. 1. Profiles of disorders of interaction categories in particular speech pathology entities

Interaction categories	Speech pathology entities				
	aphasia	pragnosia	psychoorganic syndrome	dementia	dysarthria
<b>text</b>	-	+/-	+/-	+/-	+
<b>metatext</b>	+/-	+/-	-	-	+
<b>context</b>	+	-	+/-	-	+

Source: own work.

The results of investigations make it possible to determine the profiles of language disorders specific to individual entities of speech pathology. In injuries to the “speech area” in the dominant (usually left) hemisphere, what attracts attention are disturbances in the realization of formal language subsystems: phonological, morphological and syntactic. The breakdown affects the access to linguistic competence and/or language skills, which manifests in difficulties in constructing the text in accordance with the rules of language organization. The effects of such disintegration are termed aphasic disorders<sup>4</sup>. In cases of focal injuries to brain tissue, especially after past traumatic injuries or repeated strokes, the possibility of occurrence of a pathology focus in the other, subordinate hemi-

<sup>3</sup> Recent studies on the functional characteristics of the individual hemispheres show that with regard to processing the lexical-semantic, extra- and paralinguistic information of language both hemispheres cooperate with each other (Osiejuk, 1996). There is also an increase in the importance of the right hemisphere in processing linguistic data in persons with the incomplete lateralization of speech functions (Osiejuk, 1994).

sphere (usually the right one) should be taken into consideration. In such cases the picture of aphasic disorders tends to be additionally determined by disorders in the realization of communicative competence and it causes difficulties during interaction with the patient. Patients have problems constructing the text compatible with the situation, person, and goal of communication; they do not take sufficient account of the elements of linguistic and situational context, and may show discrete disorders of systemic skills at the phonetic, morphological and syntactic levels, and in semantic relationship. These symptoms are called dyspragmatism (Pąchalska 2007; Pąchalska et al. 2015), pragnosia (Herzyk 2005, Panasiuk 2012) or non-aphasic speech disorders (Grabias 1997).

In injuries to deep brain structures, dysarthria-type realization difficulties may occur, whose language symptoms often impede diagnosis of the co-occurrent symptoms of motor aphasia. However, in dysarthria cases there are no problems in programming utterances (e.g. in writing in speaking difficulties), the ability to assess the quality of the realized text in formal and semantic terms is maintained, and the patient does not have difficulties using contextual clues (Jauer-Niworowska, Mirska, Jastrzębowska, 2014).

When there are additional multifocal and disseminated changes in the cortico-subcortical structures, in neurological patients disorders of various higher psychic functions occur, inter alia disorders of emotional-motivational, cognitive, and executory processes which impede orientation in the environment and control of one's verbal behaviors, which significantly interferes in the course of interaction. They usually involve personality disorders (characteropathy) and are defined as a psychoorganic syndrome.

In patients with co-occurring neurodegenerative conditions there may also additionally occur symptoms of dementive disorders which manifest themselves most clearly in the sphere of control of verbal behaviors and orientation in the environment; with time these neuropsychological symptoms are joined by language skills disorders. Hence, when examining patients after neurological incidents, account should be taken of the possible interference of aphasic symptoms and language disorders related to growing dementive changes. Specific aphasic disorders are usually accompanied by disorders of other higher psychic functions, emotions, and the motor organ.

A special disorder of linguistic interactions are cases of psychoorganic syndrome, which may be the result of both focal and multifocal brain injuries with different locations in the cortico-subcortical structures. The symptoms of psychoorganic syndrome have a dual character: they may be related to personality disorders (characteropathies) or intellectual disorders, which makes the picture of the observed difficulties resemble dementia symptomatology (Roszmann, Żuralska, Sitek, Sławek, Skrzypek-Czerko, Domagała, Mziray, 2014).

In speech therapy practice only in some patients there are language disorders typical of particular entities of speech pathology: aphasia, pragnosia, dysarthria or dementia. In a large number of cases, combined difficulties are detected which mould the picture of disorders in particular patients in an individualized way. Clin-

ical data point to a high degree of complication of symptoms consequent upon limited brain damage, and to the close interweaving of many disorders. The speech therapy diagnosis and treatment of such disorders require individualized procedures adjusted to the nature of disorders.

Fig. 4 illustrates differentiation of symptoms of disorders in language, communication, interaction and performance skills, and assignment of particular speech pathology entities to each of them in the process of speech therapy diagnosis.

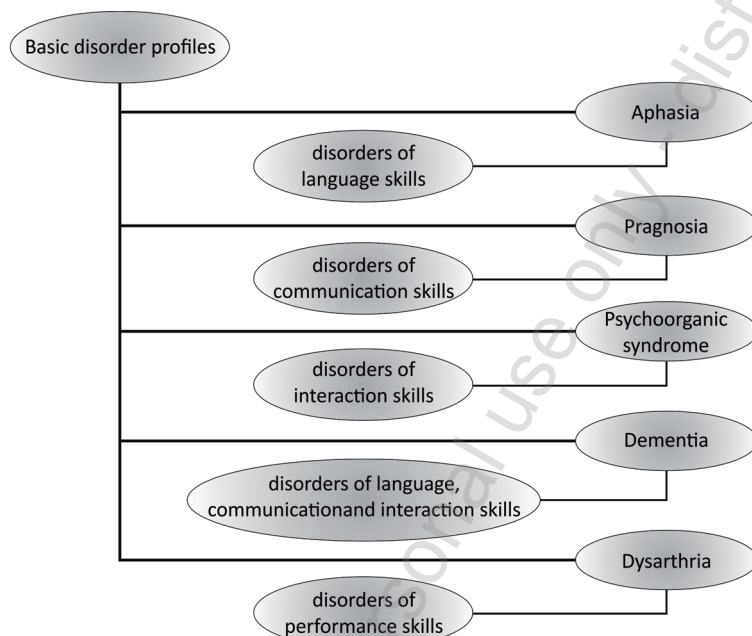


Fig. 4. Basic disorder profiles in cases of disintegration of language, communication, interaction and performance skills  
Source: own work

The co-occurrence of many entities of speech pathology is most often related to the occurrence of complex pathomechanisms of disorders in extensive brain injuries, to a complicated case history, complex treatment, and the patient's age, but also to growing deficits in the period long after the time of from falling ill. In such cases the possible co-occurrence of many entities of acquired neurologically-based speech disorders: aphasia, pragnosia, symptoms of psychoorganic syndrome, dementive disorders or dysarthria should be taken into account.

Speech therapy diagnosis should therefore answer the questions about the etiology of speech disorders, their pathomechanism and symptomatology, and then, by indicating the type of disorder, it should select therapeutic procedures taking into account, on the one hand, the degree of disordered language functions, and on the other the state of the patient's interactive capabilities, and finally, determine the duration and efficacy of rehabilitation.

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