

DIFFERENTIAL DIAGNOSIS OF SPECIFIC LANGUAGE IMPAIRMENT – SLI

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Abstract: The article focuses on the subject of differential diagnosis of Specific Language Impairment (SLI) and compares the symptoms of other developmental disorders such as: developmental aphasia and speech retardation. Specific language impairment is defined as child's difficulties in mastering language skills when no other intellectual deficits, hearing impairments or unfavorable environmental conditions are detected.

The review of contemporary study reveals a more frequent occurrence of this disorder among boys. The percentage of children with SLI is between 3 and 6 of the whole population. Due to the adoption of various diagnostic criteria in different countries, the accurate data is not specified and may vary. The difficulties in differential diagnosis of SLI are due to uneven and varied character of symptoms. Thanks to the cooperation between numerous specialists from various fields, including speech therapists and psychologists, a precise analysis of child's skills can be conducted. In order to provide reliable and comprehensible diagnosis, it is necessary to use proper diagnostic tools.

Due to similarities between SLI symptoms, developmental aphasia and speech retardation, most specialists aiming to provide diagnosis adopt etiology or the time the developmental disorders occurred as a differential criterion. The other criterion is to distinguish specific symptoms and compare them to those that are characteristic to particular disorders.

The aim of this work was to present the difficulties in conducting differential diagnosis among children with specific language impairment, reveal distinctions in abnormalities among those people and compare them with other language disorders.

Key words: SLI, Specific Language Impairments, Developmental aphasia.

Introduction

'Speech' as a term is used in various disciplines. It is connected with such fields of knowledge as: psychology, pedagogy, linguistics or applied linguistics. Each of them provides a different answer to the question on what child's speech is. For it may refer to the period when a child acquires the ability to verbally communicate with the surrounding in which it develops or to the acquisition of communication elements in early childhood that is individual for every child. In the literature, the term 'speech' is as frequently used as the term 'language'. These terms are very often used interchangeably, but it is worth highlighting that 'language' is also understood as a system of signs indispensable in certain social group's communication and the term 'speech' constitutes its wider scope [1, 2]. For the above reasons, some speech therapists differentiate between speech and language disorders.

The main aim of the work was to specify the difficulty in differential diagnosis of children with specific language impairment, reveal distinctions in abnormalities among those people and compare them with other developmental disorders. Specific objectives were to reveal the following:

- What language deficits occur in children with SLI;
- What difficulties are connected with it;
- Interdisciplinary approach necessary in diagnosing children with SLI;
- Difficulties with differential diagnosis caused by differences in syndromes and unknown etiology;
- And the characteristic of symptoms including the symptoms of other disorders, such as developmental aphasia and speech retardation.

Specific Language Impairment – SLI

In the International Statistical Classification of Diseases and Related Health Problems ICD 10, prepared by the World Health Organization, developmental disorders of speech and language were attributed to the group of psychological development disorders [3].

They are to be found under the heading 'F80 – Specific developmental disorders of speech and language', which includes [3]:

- F80.0 Specific speech articulation disorder;
- F80.1 Expressive language disorder;
- F80.2 Receptive language disorder;
- F80.3 Acquired aphasia with epilepsy;

- F80.8 Other developmental disorders of speech and language;
- F80.9 Developmental disorders of speech and language, unspecified [4].

ICD-10 classification presents detailed diagnostics criteria, enabling the distinction between specific developmental disorders of speech and language from other disorders with similar symptoms on the basis of differential diagnosis. The basic criterion to attribute disorders to F80 category is the presence of irregularities in speech development in the early stage. The disorders may occur with different intensity, however, regardless of the conditions, there are irregularities in all aspects of speech [4].

Defining the term Specific Language Impairment (SLI) and providing its detailed clarification is not an easy task in the context of numerous discussions and controversies related to it. SLI is classified as a specific disorder. It means that language losses are not accompanied by intellectual deficits. The literature includes the definitions dedicated to scientific objectives and also those that focus on specialists' needs [4].

A considerable part of definitions highlights the difficulties in speech and language acquisition and excludes intellectual level reduction, brain damage, hearing loss or social deprivation [4].

According to Bishop, SLI constitutes a distinguished speech deficit existing with a lack of accompanying developmental deficits [5].

Rapin [6] defines SLI as: 'Improper language acquisition by children who were not diagnosed with brain structure damage, hearing loss, considerable general impairment in learning and who were not deprived of contact with the surrounding'. A considerable part of the scientific environment agree that limited language skills in SLI cannot be explained by one specific factor, such as emotional problems, hearing loss or reduced intellectual level, but they rather indicate its multidimensionality and complex image [5].

Epidemiology Of Specific Language Impairments

According to L.B. Leonard, the history of scientific research into Specific Language Impairments dates back to as early as the 19th century [7]. All the available scientific publications confirm that SLI occurrence frequency is much greater in boys than girls. This proportion amounts to 3:1. It is explained by the fact that women with diagnosed SLI have three times more sons. This phenomenon is associated with stress connected with motherhood and increased testosterone levels in mothers. Children from families, where speech deficits occurred, are also prone to increased risk of impairments [8].

According to specialists dealing with Specific Language Impairments, due to the diversity of diagnostic criteria, the percentage of children with SLI constitute about 3-6% of the population, however, depending on the publication, the data vary. Bruce Tomblin's research revealed that SLI pertains to about 7.4% of five-year-old children.

The trial to determine the frequency of SLI occurrence was carried out also by Laurence B. Leonard, whose research project lasted 30 years and the results were published in 2006 in the book 'Children with Specific Language Impairment'. It is estimated that 1.5-7% of children in the preschool age are affected by this disorder [3].

There are no specific statistical data pertaining to the frequency of SLI occurrence in Poland, however, Polish speech therapists and psychologists assess that it may be affecting about 300 000 children in the age between 4-14. In recent years, activities have been conducted aiming at focusing parents and pedagogues' attention to this issue, as a considerable part of children with SLI functions with wrong diagnosis and receives inadequate therapy [3].

Causes of SLI

SLI belongs to the group of developmental disorders, the reasons for which are still not fully detected [4]. The majority of hypotheses assume the coexistence of numerous factors that constitute the reason for irregularities [9].

In the light of the current studies, the most credible theories are those pertaining to genetic and neurodevelopmental etiology. Recording numerous cases of SLI in a couple of members of the same family became the trigger to search for the reasons for this disorder in heritability. There are documented cases of an impaired child's parents or siblings suffering from SLI, but there are also a great deal of examples when only one person in the family was afflicted with this impairment [4].

According to Hulme and Snowling, more frequent occurrence of SLI in monozygotic twins than the dizygotic ones explains the genetic background of this impairment. In the research conducted by them, they confirmed the influence of genetic factors on language skills. The most considerable impact of those factors pertained to expressive skills and the weakest to passive vocabulary that was more influenced by the environment [10].

The results of the research that has been conducted up to now do not clearly determine the genetic markup as the only reason for SLI. They confirm the fact that specific language impairments are of a complex character and heterogeneity observable at the behavioral level may influence the varied genetic etiology [10].

According to Bishop, SLI occurrence does not depend on the presence of a single gene, but on a certain number of

various genes, which correlate with environmental variables and thus it constitutes the risk of problems with language [5].

Due to neurobiological research development, there is more information available on the structure and functioning of the brain of people with SLI. Magnetic resonance imaging demonstrated that most frequently the anomalies occurred in fronto-temporal areas as well as in the left hemisphere next to the Sylvian fissure. These are the structures and areas directly linked with language functions [11].

Neuroimaging not only revealed differences in CNS structure, but also in its functioning. Main attention is paid to other activities of left cerebral hemisphere mechanisms as well as to an attempt to compress language skills attributed to the areas of right cerebral hemisphere, which: receives information in a simultaneous manner, recognizes and remembers it by relating to the information obtained. The process of transforming images is carried out in a comprehensive manner with the use of all the senses. Right cerebral hemisphere is closely related to mathematical thinking. It is also responsible for recognizing vowels, onomatopoeia or speech prosody. On the other hand, the left hemisphere functions in a global manner, reproduces new incentives and recognizes the features such as contour, brightness and color. It reads emotions, recognizes mimics, enables to understand emotional social behaviors. Thus, right hemisphere is not properly prepared to precisely receive and perceive left hemisphere language stimuli, mainly because it does not reveal the ability to differentiate the distinctive features of phonemes. It is confirmed by the received language stimuli, which are processed slower and without paying attention to relevant details. That is why the hemispheres interaction plays such a significant role in the process of shaping and developing speech. The more it is disturbed, the more negative influence it may have on human functioning [12].

SLI Symptoms

According to the definition, the Specific Language Impairment symptoms result from language system deficits. They may cover all its subsystems: phonological, morphological and syntactic, lexical, semantic, pragmatic. The most frequently occurring and the most characteristic to SLI are difficulties connected with proper application of the native language grammar. The described deficits have a significant influence on:

Expressive language:

- speech sound disorder (in pronunciation);
- inflexion errors;
- limited vocabulary;
- difficulties in evoking words;
- difficulties in constructing sentences at a complex level adequate to a child's development.

Speech perception:

- Limited understanding of words;
- Difficulties in understanding sentence constructions, especially the complex ones [4].

SLI symptoms are characterized by high dynamics. The issue of short- and long-term nature of symptoms is currently a widely discussed one in the literature [4]. The deficits registered up to the third year of age can entirely disappear, reduce or utterly change their character. At the age of three, a great part of children reduces lexical deficits, however, the ones at different levels can maintain. They relate mainly to phonology, morphology and lexis as well as narrative abilities. Children at the age of 7 improve language skills, however, there may be difficulties in learning to read and write. Hulme and Snowling [10] research has shown that part of children as early as in the preschool age were able to cope with language problems and that their intensity decreased with age. However, it is noted that in great majority of people the deficits exist until adulthood.

Magdalena Smoczyńska, by studying 2-year-olds' vocabulary range, selected the group with language system acquisition disorders. The research revealed that 50% of children with persisting language deficits in the future fulfilled the SLI's diagnostic criteria [4].

The research conducted by Hulme and Snowling proved that from 50% to 90% of children with language disorders in their childhood, also found it difficult to learn how to read (respectively to intensifying language deficits). The prognosis for children whose early language problems were solved before going to school is relatively more optimistic than for those whose language deficits were present until the school period and did not emerge earlier through difficulties in learning how to read [10].

It is said that among the SLI symptoms, there are: reduced motor skills, sight and movement coordination deficits, manual clumsiness, problems with focusing attention, memory or laterality impairments [4]. Children also have difficulties in the field of classification, abstraction, comparing, analogical or cause and effect thinking [13]. The multitude and variety of symptoms cause numerous consequences. Deficits in all or most of language subsystems cause that learning to speak takes a lot of time for children with Specific Language Impairment and is very troublesome. The decreased level of language functioning influences the psychological, social and emotional sphere of children. They lose self-esteem and do not demonstrate communicative initiative [9]. It results very often from a lack of understanding and inability to memorize words, phrases or sentences. Children with diagnosed SLI, by not being able to understand questions and commands, do not respond or do it in an inadequate, improper or incomplete manner [13].

The group of children with SLI is extremely varied and the way they communicate is very individual for each of them depending on which part of language is mostly impaired and how large discrepancy there is between the level of understanding and speech production [13]. Not all the people are observed to have disorders of identical language areas. Some of them have problems with syntax and morphology, others have pragmatics or lexical disorders. There may be a situation when a child does not fulfill any SLI criteria, but finds it difficult to acquire language. Then, a very detailed and individual differential diagnosis for each individual case is of utmost importance [13].

Diagnosing SLI

Providing SLI diagnosis is very problematic for specialists due to uneven character of the disorder. The diagnosis is made at numerous levels and should be conducted by an interdisciplinary team. Clinical, psychosomatic and differential diagnoses are important elements during the research process. Thus, it is important to exclude all the medical aspects, carefully describe the differences between the level of an examined child's functioning and the developmental norm and also take into consideration the fact that a child's problem concerns also its close surrounding, which participates in the full diagnosis and intervention [4].

Distinct and individual manner of language acquisition by children in the first three years of their lives is a natural phenomenon. The differences occur in the level and pace of it. There is a group of the so-called 'late-speaking' children, who develop correctly and are not diagnosed with SLI. This diagnosis is connected with numerous aspects. From the point of view of a practitioner, in order to provide diagnosis, specialist diagnostic tools are necessary. Either a speech therapist, a psychologist as well as any other member of the research team, when identifying a problem, must take into account the applicable criteria. Speech therapy examination is necessary to assess language functioning and the psychologist's role is to analyze the level of intellectual development, cognitive abilities as well as a child's functioning with relatives or its relationship with peers [4].

First and basic condition to identify SLI is the in-depth assessment of the results obtained in the course of conducted language tests [9]. The role of a speech therapist is very significant as his aim is to detect and identify language deficits noticeable in child's utterances. In standard tests assessing language skills, children with SLI achieve results at a level of about 1.25 of a standard deviation or lower [7].

Psychological examinations serve to determine intellectual level of a child in order to exclude intellectual disability. It is conducted on the basis of two scales: verbal and non-verbal. In children with specific language impairment, the level of intelligence equals on average 85 or more and

lies within the norm [8]. A psychologist also estimates the impact of language problems on child's social functioning. Children with SLI have problems with establishing contacts and more rarely enter interactions with peers, they occupy a lower position in a group, are helpless, often prefer not to speak. The task of a psychologist is to assess whether the aforementioned problems constitute the essence of the disorders or a secondary effect of difficulties in verbal communication [9].

It is important to note that until the age of 3 children are not diagnosed with SLI as a child may belong to the group of late-speakers. It is an important factor included in the process of the whole diagnosis [14].

Among the causes of language deficits, there are such factors as: work of speech organs inadequate to age, hearing impairments, nervous system diseases, emotional disorders, or environmental negligence visible in a child's behavior. Thus, in these kinds of situations, there is no need to diagnose SLI. These are the factors, which constitute the basis to exclude the presence of this impairment in children [14].

For an early diagnosis of SLI, the following things are implemented:

- Mac Arthur – Bates Communicative Development Inventories CDI's [9]. In Poland, the scale was adopted by Magdalena Smoczyńska. It is a kind of an interview conducted with parents, which constitutes the basis to assess level of understanding, child's active vocabulary, its behavior as well as gestures essential in communication [15];
- Language Development Survey – LDS [9].

In a way, a child's age determines the options for specialists. In the case of the youngest children, information is gathered from inventories provided by parents or from potential observations. In preschool and school children, the picture of disorders is provided by the results of the conducted language skills tests. It aims to provide an objective, accurate and reliable diagnosis [4].

The usage of standardized tools will be essential. They should be normalized and well elaborated in psychometric terms. In Europe and the United States, practitioners distinguish and use a couple of tests, which versions may vary depending on the country [16].

These are the main tests used to assess language skills:

1. Test of Language Development (TOLD) by Phyllis Newcomer and Donald Hammill. This test is in English and was normalized in the USA in 2008. The subject of assessment is perception and expression of a child's utterance and its evaluation in terms of grammar, phonetics and semantics. The test serves to examine children between 4 and 18 years of age and due to this it is available in two versions [16].

- Primary – designated to younger children (from 4 to 8;11 years); a child is examined on understanding words, defining notions, understanding and repeating sentences, distinguishing phonemes, the accuracy of articulation. It is based on 9 tasks, where six are the basic ones and three – additional subtests [16].
 - Intermediate – prepared for older children (from 8 to 17;11 years). It gives the possibility to check a child's ability to build sentences, recognize similarities between words, assess grammatical accuracy. The overall time for test examination is about 30 to 60 minutes [4].
2. Clinical Evaluation of Language Fundamentals (CELF) – American test developed by Eleonor Semel, Elizabeth Wiig and Wayn Secord. Apart from the assessment of syntax, phonology and semantics, it includes an expressive and perceptive language aspect, verbal and working memory. It is considered to be the most comprehensive test, practical either in the psychomotor and clinical diagnosis of a child. The test comprises of 16 subtests. Depending on a child's age, there are two available versions:
 - CELF-3 from 6 to 21 year of age;
 - CELF-4 from 5 to 16 year of age.
 3. Oral and Written Scales (OWLS – II) – developed by Carrow-Woolfolk in 2011. It helps to evaluate language skills of children and teenagers as well as young adults, from 3 to 21 years of age. The test includes the scales: listening comprehension, speaking, writing and reading [16].
 4. The New Reynell Developmental Language Scales (NRDLS) – developed by Edwards, Letts and Sink in 2011. It is a British tool, which serves to diagnose language development disorders in children in the age from 2 to 7.5 years. It covers two scales: understanding and producing utterances. The examination takes about 30 to 45 minutes [16].
1. Picture Vocabulary Test – Understanding (OTSR) – by Haman and Fronczyk, 2012. It assesses child skills in the field of passive vocabulary. It is intended to examine children in the age from 2;0 to 6;11. Understanding words is checked by presenting a child with four-picture cards and then asking questions about one of them.
 2. Vocabulary Test for Children – TSD (Psychological Test Laboratory Team, PPA, 2013) – helpful in examining children in the age 4;0 – 7;11. It consists of 4 subtests evaluating child's knowledge of words. However, it is available only to a group of psychologists [16].

Both tests are not intended to examine a child with the risk of SLI. They focus on the assessment of a vocabulary range, but do not provide a complete evaluation of child's language skills [16].

The newly developed and currently standardized tool is the Language Development Test TRJ. It provides the possibility of a precise measurement of child's language competencies. It was designed in the Educational Research Institute in the course of the project 'Specific Language Impairment (SLI) – diagnosis and intervention'. In practice, it is used by speech therapists and psychologists for individual examination of children in the age 4;0-8;11. The adopted age range is justified by the fact that children with SLI should not be diagnosed until they turn 4. It is also adjusted to the Polish system of education as it covers preschool and early school age. TRJ enables and facilitates differential diagnosis of language difficulties (including specific language impairment – SLI).

Language Development Test is composed of 6 subtests enabling the assessment of child's competencies either in the field of active and passive vocabulary (two subtests), understanding and using relevant grammatical structures (three subtests) as well as listening comprehension (one subtest). Apart from general results collected in TRJ, Vocabulary and Grammar can also be analyzed – they constitute two subscales as well as Understanding and Speech Production (also two subscales). The examination with the whole test takes about 40 minutes [16].

The tool is adjusted to the work of either speech therapists as well as psychologists. It is connected with close cooperation of the two groups of specialists in the process of diagnosing children with SLI. Until TRJ was created, SLI in Poland could not have been fully diagnosed on the basis of quantitative criteria due to the lack of proper tools [16].

Stanisław Grabias includes differential diagnosis as a third part of speech therapy problem interpretation process, next to the detailed analysis of specialist examinations, conducted family interview as well as recognition of the case [18]. Other approach to differential diagnosis is pre-

The tests enumerated above were developed mainly in the USA and possess specific norms for people whose first language is English. The advantage of these tests is the possibility to evaluate children in various age groups. Either TOLD as well as CELF are composed of numerous trials assessing possibilities and deficits in a child's development and communication [16].

Unfortunately, Poland still lacks standardized and regulated psychometric tools, which would enable precise evaluation of a child and its language competences. Nowadays, two psychometric tests are used in practice [16, 17]. These are:

sented by Jagoda Cieszyńska. According to her, differential diagnosis of language communication is a type of continuous, polymodal indispensable in speech diagnosis therapy, which uses interpretation strategies, such as:

- Synthesis – the characteristics of a child's/patient's problems in terms of his cognitive and physical skills.
- Sequence – it determines the stages of a child development, controls the behaviors that did not emerge or disappeared [18].

The unfavorable aspect influencing differential diagnosis of speech disorders is the terminological ambiguity. In practice, it is revealed by using terms with different meanings in the field of one specialization [19].

The first 3 years of a child's life is the time when it is difficult to conduct differentiation of development speech disorders and other disorders with distinct etiology, among others, aphasia. The first problem is to determine and provide terminological diversification of the impairment [20].

Polish literature includes a great number of terms describing speech disorders in children, however, they do not hold specific meanings. It became the source of many diagnostic and therapeutic difficulties. Most popularly adopted terms are: child's aphasia/dysphasia, alalia, developmental and inborn aphasia, specific language development impairment, speech delay similar to aphasia, SLI [20, 21]. By analyzing the literature, there is no clarity in using terms related to speech impairments.

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