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The dynamics of the language development of twins with perinatal difficulties from a neurologopedic perspective

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The present article attempts to evaluate the language development of 6-year-old twins with neurological damage developed during the perinatal period. First, the author discusses theoretical issues related to the most frequently occurring cerebrovascular diseases in children and their consequences leading to speech development disorders. Then, a neurologopedic diagnosis procedure with the use of selected research tools is described.

KEY WORDS: oligophasia, intellectual disability, neurological damage, speech disorders

1. Introduction

The brain is doubtless the most complicated organ of the human body, containing – at birth – over one hundred billion nerve cells, or neurons. In the opinion of certain scientists, the majority of humanity is unable to use, throughout its lifetime, more than 10% of the potential of their nerve cells. A significant group of people functions within society, however, in which even such a small portion of po-

tential cannot be fully utilised[1]. This group includes children with neurological damage emerged in the perinatal period, meaning, until the end of the fourth week of life.

2. The etiology of brain damage in prematurely born infants

The most common vascular diseases of the brain in children include the ischaemic stroke and the haemorrhaegic stroke. According to US data, the ischaemic stroke is found in 1.0 in 1500–4000 live births, and risk factors leading to its emergence may include: haematological dysfunctions, innate and acquired heart flaws, infections and genetic causes. Haemorrhagic strokes in turn are found in infants at a frequency of 1.9 per 100000 live births, with the most frequent causes being, among others, arterial hypertension, vascular flaws, head injuries as well as a lack of vitamin K, liver diseases and genetic conditions[2]. It must be noted that a particular group of patients susceptible to the emergence of the stroke are children born prematurely, meaning, infants born before the conclusion of the 37th week of pregnancy. The shorter the time of pregnancy, the more increased the risk of post-stroke complications, which doubtless include brain damage[3].

Other causes of damage of the central nervous system in children born prematurely include periventricular leucomalation – de-

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[1] K. Pennock, *Ratowanie dzieci z uszkodzeniem mózgu*, Wydawnictwo Graffiti BC, Toruń 1994.

[2] E. Pilarska, *Choroby naczyniowe mózgu u dzieci*, [in:] B. Steinborn (ed.), *Neurologia wieku rozwojowego*, Wydawnictwo Lekarskie PZWL, Warszawa 2017, pp. 983–1021; D. Trauner, K. Eshagh, A. Ballantyne et al., Early language development after peri-natal stroke, *Brain & Language*, 127 (2013), pp. 399–403.

[3] R. Michałowicz, *Mózgowe porażenie dziecięce*, Wydawnictwo Lekarskie PZWL, Warszawa 2001; B. Pietrzak-Szymańska, *Ciąża wielopłodowa a ryzyko zaburzeń rozwoju psychomotorycznego u dzieci*, [in:] B. Pietrzak-Szymańska (ed.), *Wspieranie rozwoju mowy dzieci urodzonych przedwcześnie i niepełnosprawnych*, Wydawnictwo Wyższej Szkoły Pedagogicznej TWP, Warszawa 2013.

fined as necrosis of the white matter of the brain – or hyperbilirubinaemia related to immaturity of the liver. It has been proven that pathological jaundice might cause defects in cognitive development and hearing dysfunctions[4].

All the brain pathologies described below may as a result lead to the emergence of many deficits in later life of the child, including dysfunctions in terms of language development[5]. A review of literature shows that one of the more frequently occurring effects of neurological damage in children that could lead to dysfunctions in speech development, is intellectual disability (ID)[6]. For the purposes of the present paper, in relation to the discussed cases, it shall form the next subject of research – in the context of dysfunctions of speech development that accompany it.

It is worth noting that a group of factors from the perinatal period also exists that are different than damage to the central nervous system, which may also negatively influence the development of speech in prematurely born children. These include, among others, lack of the sucking reflex, dysfunctions in the coordination of sucking and swallowing, an Apgar score below six, breathing dysfunctions, bronchopulmonary dysplasia and a grave form of retinopathy of prematurity[7].

3. Intellectual disability and speech development dysfunctions

The DSM-5 Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association defines intellectual

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[4] E. Gacka, *Zaburzenia rozwoju mowy u dzieci z porodów przedwczesnych. Diagnoza i efekty oddziaływań terapeutycznych*, Wydawnictwo Harmonia Universalis, Gdańsk 2016.

[5] E. Pilarska, *Choroby naczyniowe…*, op. cit., pp. 983–1021.

[6] E. Mazanek, *Rozwój umysłowy dzieci z mózgowym porażeniem dziecięcym*, [in:] E. Mazanek, *Dziecko niepełnosprawne ruchowo, cz. 3. Wychowanie i nauczanie dzieci z mózgowym porażeniem dziecięcym*, Wydawnictwo Szkolne i Pedagogiczne, Warszawa 1998, pp. 73–78.

[7] E. Gacka, *Zaburzenia rozwoju…*, op. cit.

disability as a dysfunction that must fulfil the following three criteria: dysfunctions of general intellectual skills (criterion A), dysfunctions in adaptation (criterion B), and the commencement of emergence of these dysfunctions – both intellectual as well as adaptive ones – takes place in the developmental period (criterion C). The mentioned classification takes into account three levels of gravity of ID: minor, moderate and grave. A slightly different subdivision is presented in the ICD-11 International Statistical Classification of Diseases and Related Health Problems, which assumed four levels of gravity of intellectual development dysfunctions (corresponding, by criteria, to intellectual disability according to DSM-5), namely: minor, moderate, significant and deep levels[8].

The development of speech in children with ID occurs with significant delays, and the dynamics of the process are conditioned, among others, by the level of intellectual disability. As Tarkowski (2005) indicates: „The extent of linguistic impairment expands significantly with the gravity of the disability. The more intense it is, the later do first words and phrases emerge"[9]. The development of speech in intellectually disabled children is also governed by other factors that may include: coexistence of dysfunctions in the area of senses, manifested most commonly by dysfunctions of the hearing organ, presence of dysfunctions in the motor area, the period of commencement of logopaedical activity, the quantity and quality of interactions with the child, the anatomical and functional status of the peripheral speech system, as well as – in case of children with neurological problems – the location and gravity of brain damage[10].

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[8] P. Gałecki, M. Pilecki, J. Rymaszewska et al., *Kryteria diagnostyczne zaburzeń psychicznych DSM-5*, Edra Urban & Partner, Wrocław 2018.

[9] Z. Tarkowski, *Mowa osób upośledzonych umysłowo i jej zaburzenia*, [in:] T. Gałkowski, E. Szeląg, G. Jastrzębowska (ed.), *Podstawy neurologopedii. Podręcznik akademicki*, Wydawnictwo Uniwersytetu Opolskiego, Opole 2005. In education literature, the terms "mental dysfunction" and "intellectual disability" continue to be used interchangeably at times, in particular in somewhat older studies. This article, in line with current trends, however, only uses the term "intellectual disability".

[10] J. Błeszyński, K. Kaczorowska-Bray, *Diagnoza i terapia logopedyczna osób z niepełnosprawnością intelektualną*, Wydawnictwo Harmonia, Gdańsk 2012.

Speech of intellectually disabled children is characterised by the weakly developed capacity of understanding it, using a limited vocabulary as well as difficulties in proper usage of grammar[11]. Verbal communication is also hindered by statements of the disabled persons themselves that could be of limited understandability for their recipients, which, as a result, negatively influences social interactions, leading to behavioural problems and isolation[12]. The cause of limited understandability of statements of intellectually-disabled children are in particular speech impediments. Studies conducted in Bosnia and Herzegovina have shown that almost 89% of children with intellectual disability being the result of neurological damage exhibited speech dysfunctions[13].

Speech disturbances accompanying intellectually disabled persons are referred to as oligophasia[14]. This term, stemming from the Greek word *oligos* – minor, and *phasis* – speech – is related to delays in the development of speech or its complete lack as well as dysfunctions of the form, content and substance of language depending on the level of gravity of intellectual disability[15]. In the logopaedic classification of speech dysfunctions by Stanisław Grabias, oligophasia was included in the group of speech disabilities related to undeveloped skills of perception[16]. Table no. 1 shows selected prop-

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[11] N. Marrus, L. Hall, Intellectual Disability and Language Disorder, *Child and Adolescent Psychiatric Clinics of North America*, 26 (2017), pp. 539–554.

[12] M. Coppens-Hofman, H. Terband, A. Snik et al., Speech Characteristics and Intelligibility in Adults with Mild and Moderate Intellectual Disabilities, *Folia Phoniatrica et Logopaedica*, 68 (2016), pp. 175–182; Z. Tarkowski, *Mowa osób upośledzonych…*, op. cit.

[13] H. Memisevic, S. Hadzic, Speech and Language Disorders in Children with Intellectual Disability in Bosnia and Herzegovina, *Disability, CBR and Inclusive Development*, 24 (2013), pp. 92–99.

[14] M. Szurek, Szczegółowa diagnoza logopedyczna dziecka z niepełnosprawnością intelektualną w stopniu umiarkowanym jako podstawa skutecznej terapii, *Interdyscyplinarne Konteksty Pedagogiki Specjalnej*, 18 (2017), pp. 165–184.

[15] U. Jęczeń, Symptomy oligofazji w upośledzeniu umysłowym, [in:] S. Grabias, M. Kurkowski (ed.), *Logopedia. Teoria zaburzeń mowy*, Wydawnictwo UMCS, Lublin 2012.

[16] S. Grabias, *Perspektywy opisu zaburzeń mowy*, [in:] S. Grabias (ed.), *Zaburzenia mowy. Mowa. Teoria. Praktyka*, Wydawnictwo UMCS, Lublin 2001.

erties of the development of speech in children with intellectual disability with respect to its levels of gravity. It is worth noting that certain limitations in the development of speech in a child with disability or at risk of disability – including intellectual disability – may be reduced, at times – significantly reduced – by early support and therapeutic activity[17], including early logopaedic intervention[18], even though the scope of their efficiency is limited, among others, by the level of irreversible biological damage.

Table 1. Selected properties of the development of speech in intellectually-disabled children

Category	Level of intellectual disability			
	Minor	Moderate	Significant	Deep
Properties of speech development	Delayed speech development; limited vocabulary, difficulty expressing thoughts and creating stories independently, difficulty in understanding the meaning of statements, agrammatisms; sometimes, fear of speaking.	Significantly delayed speech development; poor vocabulary, unclear speech; simple sentences with numerous agrammatisms; the child is unable to use abstract concepts.	Deep speech development deficits; the child does not construct sentences, and speaks using single words or monosyllabic phrases; it sometimes uses simple sentences, however, without declination; speech is gibberish, and active vocabulary is very poor.	Speech not developed; the child is able to master only a few words, and understanding of speech is limited to a few simple commands.

Source: own work on the basis of Błeszyński, 2015; Tanajewska et al., 2014.

[17] D. Podgórska-Jachnik, Uzasadnienie potrzeby wczesnych oddziaływań wspomagających rozwój dziecka jako jednego z głównych kierunków rozwoju współczesnej pedagogiki specjalnej, *Niepełnosprawność*, 1 (2009), pp. 91–102.

[18] D. Podgórska-Jachnik, *Specyfika wczesnego wspomagania rozwoju i wczesnej interwencji logopedycznej w pracy z dziećmi z uszkodzonym słuchem*, [in:] K. Kaczorowska-Bray, S. Milewski (ed.), *Wczesna interwencja logopedyczna*, Wydawnictwo Harmonia Universalis, Gdańsk 2016, pp. 459–496.

4. Analysis of a case of twins with difficulties in the perinatal period

4.1. Research methods, techniques and tools

A case study was performed to compare the dynamics of language development of twins with perinatal period dysfunctions, whereby in one of which the diagnosis indicated a speech dysfunction referred to as oligophasia[19]. As T. Pilch indicates, the case study is a method that is "[…] a mode of research entailing the analysis of the fate of an individual within specific educational situations or an analysis of specific educational phenomena from the perspective of individual human biographies with the aim to develop a diagnosis of the case or phenomenon in order to instigate therapeutic work"[20].

The scientific objective was the presentation of a clinical case study aimed at the presentation of problems stemming from oligophasia, their functional diagnosis and the presentation of a speech therapy programme for a child with oligophasia. The logopaedic study was aimed at the development of a thorough speech therapy analysis with the inclusion of an evaluation of language competence of six-year-old patients: Szymon and Bartosz (names altered)[21]. The execution of the study used the following research techniques:

– observation, allowing the evaluation of the psychological and physical condition of the twins;
– a logopaedic examination[22], taking into account:

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[19] The nosological diagnosis stems from the child's medical documentation.

[20] Quoted per: M. Łobocki, *Wprowadzenie do metodologii badań pedagogicznych*, Oficyna Wydawnicza „Impuls", Kraków 2008.

[21] The author has has the parents' consent to publish the case description, however the first names were altered to protect the children's personal data. For this same reason, the case description is limited to information necessary from the point of view of achievement of the research objectives, mainly in the context of the logopaedic diagnosis.

[22] The analysis of documentation from special examinations as well as the family anamnesis are an integral part of the diagnostic procedure, found within the paradigm of the symptom and cause diagnosis (Grabias 2008, 2014).

- an unstructured, deep anamnesis with the child's parents, the objective of which was to collect information on the development of the boys until that time, with the inclusion of speech development;
- an analysis of medical documents that allowed the study of the location and level of brain damage of the boys, and additionally – in case of Szymon – of other test results concerning e. g. epilepsy, nystagmus and hearing difficulties;
- a current evaluation of the development of speech and language.

The following research tools were utilised:

- *The TRJ Language Development Test* (Pl. *Test Rozwoju Językowego*)[23] – a normalised, standardised diagnostic tool used to evaluate the language competences of a child aged between four years and eight years, eleven months. The *TRJ* is composed of six subtests testing as follows: understanding of words, repetition of sentences, word production, sentence comprehension, word inflection and text comprehension. In every subtest, the patient may achieve a specific score that in the further part must be referred to standards using a stanine scale. The *TRJ* is aimed at an analysis both of the results of individual subtests as well as the results of summary measures of the four subscales (vocabulary, grammar, comprehension and production), and the overall score. The estimated reliability coefficients for *TRJ* subtests fit in the range of 0.50 to 0.94; positive correlations of the results of *TRJ* subtests with the age of the analysed individuals – ranging from 0.42 to 0.59 – indicate the theoretical reliability of the test.
- *A comprehensive logopaedic examination*[24] – a non-standardised tool for the purpose of evaluation of all aspects related to

[23] M. Smoczyńska et al., *Test Rozwoju Językowego. TRJ. Podręcznik*, Instytut Badań Edukacyjnych, Warszawa 2015.

[24] D. Emiluta-Rozya, *Całościowe badanie logopedyczne z materiałem obrazkowym*, Wydawnictwo Akademii Pedagogiki Specjalnej, Warszawa 2013.

a child's speech. The comprehensive logopaedic examination allows for both an initial assessment of the development of the child and its communication, as well as a detailed logopaedic examination, covering, among others, the evaluation of the skill to create and understand statements, the evaluation of dialogue, of forms of inflection, the utilisation of phonemes and the structure of words as well as the evaluation of abilities and tension of the muscles of the articulatory organ, a general examination of hearing and phonemic awareness as well as word memory. The qualitative character of the test enables one to only use the trials that the diagnostician would deem necessary in a specific case.

In course of the neurologopaedic diagnosis of patients, the author used the model of diagnostic activity according to S. Grabias[25], however, for the purposes of the present study, this model was partially modified. For the purpose of the precise presentation of the discussed cases to the reader, an analysis of medical documentation was taken up first, with information acquired through family anamnesis and observation quoted next. Subsequently, an evaluation of the linguistic functioning of the tested children was undertaken.

4.2. Medical history – analysis of medical documentation

Szymon and Bartosz are dizygotic twins born in November of 2012 in the 23th week of pregnancy with an extremely low birth

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[25] S. Grabias, *O ostrość refleksji naukowej. Przedmiot logopedii i procedury logopedycznego postępowania*, [in:] S. Milewski, K. Kaczorowska-Bray (ed.), *Logopedia. Wybrane aspekty historii, teorii i praktyki*, Harmonia Universalis, Gdańsk 2013. The diagnostic activity model by S. Grabias assumes that the diagnostic process is composed of two fundamental parts: the description – covering a test of interaction skills, e. g. motor skills, pronunciation, language, concept structures, dialogue and narrative speech – and interpretation, composed, among others, of an analysis of specialised test results, the family anamnesis and the case finding.

weight amounting to 810 and 770 grams, respectively. The cause of the premature birth was most probably an intrauterine infection by a *Mycoplasma* bacterium. The boys, directly after birth by Caesarean section, achieved the following Apgar scores: Szymon 1, 5 and 7 points, and Bartosz 2, 2 and 4 points – in the first, third and fifth minutes of life, respectively. After birth, both children were diagnosed with grave perinatal asphyxia, breathing insufficiency, inborn lung inflammation, and in Szymon – retinopathy of prematurity.

During the first day of life, Bartosz, during an ultrasound examination of the brain, was observed to exhibit first degree bleeding to the brain chambers. The intracranial haemorrhage was also found in his twin brother, where it took on a more grave form – second degree bleeding to the brain chambers on the right side and fourth degree on the left side. In Szymon, the haemorrhagic stroke contributed to the development of post-haemorrhagic hydrocephalus and dysgenesis of the corpus callosum, as confirmed by a MR examination of the head in December of 2013. Due to the significant progression of the hydrocephalus, leading to extreme collection of cerebrospinal fluid in the brain chambers of the child, in December 2015 a ventricular-abdominal valve was implanted, diverting excess fluid to a different area in the body.

An additional neurological problem of Szymon is epilepsy, described in medical documentation as unspecified epilepsy (G40.9). The first two instances of epilepsy took place in December of 2015 and February of 2017, and were caused by high fever in course of an infection. In both cases, they receded after ca. 40 minutes from the moment of administration of anti-epileptic medication. During a hospital stay following the second epilepsy attach, an EEG examination was conducted that showed changes. In relation to the high risk of re-emergence of the seizure, the decision was made to administer anti-epilepsy medication in the form of *Depakine Chronosphere*. A further epileptic seizure, lasting ca. 10–15 minutes, took place in May of 2018, accompanied by salivation. At that time, the anti-epilepsy medication was switched from *Depakine* to *Trileptal*,

and due to persistent aggression and manic symptoms present in Szymon, the antipsychotic drug *Rispolept* was introduced. The last epileptic seizure, lasting about three minutes, took place in November of 2018.

Further dysfunctions of Szymon include significant nystagmus, which decisively influences the motion functioning of the boy, and slight bilateral hearing impairment[26]. Hearing damage may also be a significant factor hindering the development of speech[27], however for the boy, no decision was made as to the need for technical compensation (with the use of hearing aids or implants), and no specialist surdologopaedic therapy was concluded on. Such a strategy does not only stem from the light hearing impairment but also from the co-existence of other developmental difficulties and the necessity to also consider them in therapeutic work. Due to the nystagmus, Szymon underwent treatment using botulin toxin three times.

Both boys are certified as disabled. Bartosz received his certificate on motor disability that was valid between June 2015 and June 2019. Szymon received a certificate indicating compound disability: moderate intellectual disability (IQ 48)[28], motor disability, weak eyesight and hearing. For Szymon, the certificate is valid between July 2015 and July 2022.

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[26] Analysing specialist test results, the Author found no document about the time of discovery of the hearing disorder. The mother's statement indicates that this was around the time of the child's second birthday, inasmuch as this time is only approximate.

[27] D. Podgórska-Jachnik, *Specyfika wczesnego wspomagania…*, op. cit.

[28] According to specialist literature, a 4th degree intracranial haemorrhage in the perinatal period leads most commonly to death or – in case the child survives – to grave development dysfunctions. The author of the article, during their voluntary logopaedic tour at the 1st University Hospital of Dr Antoni Jurasz in Bydgoszcz, Poland, performed several consultations with child neurologists, neuropsychologists and specialists in neurologopaedics. A minor portion of the mentioned specialists met in their professional careers little patients who, despite having suffered such intense haemorrhages in the perinatal period, continue to function with a moderate intellectual disability. It must be stressed, however, that these situations are extremely rare.

4.3. Data from the anamnesis and observations concerning the development of the twins, including speech

A. Bartosz

The present psychomotor development of Bartosz is correct, despite the fact that for an extended period of time, his development gave rise to many reservations. As in the case of his brother, Bartosz was observed not to exhibit the sucking reflex[29]. Until the third day of life, the boy was only fed parenterally. Then, first attempts were made at the inclusion of enteral feeding, with full enteral feeding – initially with the use of a probe – was initiated in the boy's ninth day of life. Information from the boy's mother indicates that towards the end of the 2nd month of life she made attempts to nurse Bartosz, however, without the expected result. The child had difficulty latching onto the breast and sucking it correctly. Due to the above, the boy was fed using a teat. Noticeable is the fact of inclusion in the child's diet of paste-like and mixed foods already in the seventh month of life and mashed and soft solid foods in the 11th–12th months of life.

The boy started babbling in the seventh month of life, speaking his first words in the 13th–14th month. Towards the end of the second year, Bartosz was able to construct simple sentences. He is provided with logopaedic therapy since September of 2015 as part of early development support. Since then, the boy was noted for dynamic development of speech capabilities. Presently, Bartosz speaks using full sentences, including compound sentences. he eagerly makes verbal contact, he is cheerful and joyous.

It must be stressed that Bartosz started walking independently at 17 months of age, and before that he used to walk held by his hand. Due to motor disability, Bartosz participated for four years in intense motor rehabilitation as part of early development support. Rehabilitation allowed the boy to equalise deficits in this area of development. His intellectual development level is correct.

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[29] The analysed specialist documentation lacks information on other lip and facial movements from infancy.

B. Szymon

The psychomotor development of Szymon is delayed. One of the most significant dysfunctions noticeable in the boy was the lack of the sucking reflex. In the first days of life, the child was only fed parenterally. From the fifth day of life of the child, attempts were made to introduce enteral feeding, however they were frequently interrupted due to leftovers in the stomach probe. Full enteral feeding was introduced in the 17th day of life, initially with the use of the probe. In the 50th day of life, the infant gained full breathing capacity. Information from the mother indicates that after this time, numerous attempts were made at breastfeeding, however, due to improper latching onto and sucking of the breast, the uptake of food was inefficient. From the 82nd day of life the child was fed exclusively by teat. In the discussion on the issues of food uptake, noticeable are also difficulties with its biting and chewing in the subsequent months of life of the child. The majority of foods in Szymon's diet constituted, almost until the fifth year of life, were meals in the form of pastes and mashed solids. Due to the boy being covered by neurologopaedic therapy that included learning to eat, solid foods were introduced as time passed.

The boy started babbling in the 16th–17th months of life, and first words were heard shortly before his third birthday. Considering the moderate intellectual disability, the boy has passive speech developed quite well. Szymon understands simple commands, moreover – in the opinion of the mother – he handles understanding complex commands better and better. The boy communicates using very simple sentences or single words, and his statements are not always suitable for the situation. Szymon most commonly whispers when he speaks, he repeats the last word in a sentence or an entire phrase from a question put to him quite frequently (echolalia). He indicates the will to take care of his physiological needs verbally and also verbally reminds that he would like to be handed a specific item.

Noteworthy is the motor development of the child. Szymon started walking independently aged about 3.5 years. He made attempts at walking before that, however, after the first intense fever-

ish convulsions this capacity disappeared. Since a few years ago, due to motor disability, the boy participates in NDT-Bobath rehabilitation therapy.

In addition, Szymon has his body layout orientation developed well, whereby his spatial orientation is slightly worse. Noticeable are significant difficulties in focusing attention and difficulties in controlling emotions. The boy is unable to organise his free time independently nor play with toys as they are intended to be used. Szymon particularly enjoys music and playing the keyboard synthesizer.

4.4. Analysis of own examination results

1. The *TRJ* Language Development Test

The *TRJ* is a tool, the standards of which were developed on the basis of results achieved by children in the intellectual norm. It is primarily used to evaluate language competences in children that do not exhibit „significant somatic and neurological dysfunctions"[30]. Nonetheless, as the authors indicate, "initial trials show that it can also be used to evaluate the functioning of language development in children, in which dysfunctions were found in this area caused by illnesses"[31]. Moreover, "the *TRJ* can also be used for scientific research, as a tool to control variables related to language competences. In such instances, the researcher is able to modify procedures, however, this *de facto* denotes forgoing the use of standards and relying on the use of raw scores for their analyses"[32].

The patients studied by the Author are children, in which neurological changes were noticed in the perinatal period. However, the location and degree of damage to the brain significantly differenti-

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[30] M. Smoczyńska et al., *Test Rozwoju Językowego*…, op. cit., p. 21.

[31] Ibidem.

[32] Ibidem, p. 109.

ated the continued psychomotor development of the twins. Bartosz is a boy in the intellectual norm, hence in his case the decision was made to use the tool as traditionally, referencing the attained scores to the age norms. For Szymon, due to his moderate intellectual disability, the decision was made to present only the subtest scores, without the score being recalculated using the stanine scale. Table no. 2 presents the results of the boys in the individual subtests of the *TRJ*.

Table 2. Results attained by Szymon and Bartosz in the individual subtests of the TRJ

Subtest		Maximum attainable score	Bartosz's score		Szymon's score	
			attained score	stanine	attained score	stanine
1. Vocabulary	Word comprehension	28	24	7	10	–
2. Grammar	Sentence repetition	34	30	7	14	–
3. Vocabulary	Word production	25	15	6	3	–
4. Grammar	Sentence comprehension	32	31	7	4	–
5. Grammar	Inflection	14	14	8	2	–
6. Discourse	Text comprehension	20	20	9	0	–

Source: own work on the basis of the conducted examination.

1A. Discussion of the score of Bartosz in the *TRJ* test

After the recalculation of the score of Bartosz using the standards table, the conclusion was made that the boy received a high total score corresponding to the 99th percentile. This means that 99% of children achieve results lower than or equal to the score of Bartosz. The results in the subscales of vocabulary, comprehension and production re considered high, and in the grammar subscale – very high. In the discourse – text comprehension test the boy achieved the top score.

The results of the examination clearly show above-average language competences of the child. Bartosz answered correctly on all questions concerning the text he heard, indicating a very well de-

veloped ability to draw conclusions. He handled very well the task that required him to repeat sentences, a proof of correct morphosyntactic development of the child[33]. the active vocabulary of Bartosz is appropriate for his age. The boy was keen to respond to the questions put to him, he worked with engagement and interest.

Table 3. Normalised results of the TRJ test for Bartosz calculated according to general norms

	Comprehension	**Production**	**Total**	**Stanine**
Vocabulary	1. Word comprehension (stanine) **7**	3. Word production (stanine) **6**	1 + 3 **13** → VOCABULARY: recalculated score	**7** → VOCABULARY: Stanine
Grammar	4. Sentence comprehension (stanine) **7**	2. Sentence repetition (stanine) **7** 5. Inflection (stanine) **8**	4 + 2 + 5 **22** → GRAMMAR: recalculated score	**8** → GRAMMAR: Stanine
Total	1 + 4 **14** COMPREHENSION: recalculated score	3 + 2 + 5 **21** PRODUCTION: recalculated score	1 + 2 + 3 + 4 + 5 **35** TOTAL SCORE: Recalculated	
Stanine	↓ **7** COMPREHENSION: Stanine	↓ **7** PRODUCTION: Stanine		7 TOTAL SCORE: Stanine

Source: own examination score processing according to the IBE table pattern.

[33] M. Smoczyńska et al., *Test Rozwoju Językowego*…, op. cit., s. 30. As the authors of the *TRJ* state: „Sentence repetition is a test commonly used to examine language language competences because, as studies show, a strong relation exists between spontaneous speech and sentence repetition. A child may repeat only such a structure that it has already mastered. The task of sentence repetition is thus a reliable and differentiating tool to assess a child's morphosyntactic development".

1B. Discussion of the score of Szymon in the *TRJ* test

On the basis of the conducted examination it was concluded that the boy exhibits quite well developed passive speech on the level of single words, as exhibited by the score in the Vocabulary – word comprehension subtest. In this part of the test, Szymon scored a total of ten points, including five for understanding nouns and five for understanding verbs[34]. The active speech of the boy is weakly developed. In the Vocabulary – word production subtest, the boy scored three out of 25. On many occasions, he made no attempt to respons, and in a few cases the reply was not precise. An example may be the panel showing a cactus, to which the boy replied *tree*. When asked what this „tree" is named, he was unable to answer. Szymon also exhibits deficiencies in the use of grammar structures, as is reflected by the score he attained in the fifth subtest concerning the inflection of selected nouns. During the test, the boy exhibited difficulty focusing attention, he required much encouragement, frequent repetitions of commands and mobilisation to work.

2. Comprehensive logopaedic examination

Table 4. Evaluation of the individual areas of speech in Bartosz and Szymon on the basis of a comprehensive logopaedic examination

Category	Bartosz	Szymon
Evaluation of abilities and muscle tension of the articulation organ	Motions and tension of the lips (e.g. contraction and expansion of the lips), the tongue (extension and withdrawal, pushing cheeks with the tongue, shifting the tongue to the right and left corner of the mouth and the palate) correct. Motions of the soft palate during emissions of [a] and series of [a] are also correct. Approximate	Capacities and tension of muscles of the articulation organ (e.g. tongue, lips) re correct. The child is able to perform exercises in terms of verticalisation and agility of the tongue and contraction and expansion of the lips correctly. Movements of the soft palate during emissions of [a] and series of [a] are correct. Assessment of lower

[34] The assessment of understanding and usage of other parts of speech, such as adjectives, adverbs, pronouns, prepositions and numerals was discussed under the *Comprehensive logopaedic examination*.

Category		Bartosz	Szymon
		assessment of lower jaw mobility without reservations[35].	jaw mobility on the basis of approximate test without reservations. Some tests were not conducted because the patient did not comprehend the command.
Assessment of the structure of the articulation organ		– tongue: size and shape of tongue correct, tongue symmetrical, length and thickness of lingual frenulum correct – lips: symmetrical, length and shape of upper lip correct – hard palate: symmetrical, shape and surface correct – soft palate: symmetrical, surface correct – teeth: patients undergoing tooth exchange – bite: correct	
Assessment of physiological activity around the articulatory organ		– breathing (at rest and dynamic): correct – biting off: correct – biting and chewing: correct	
		– swallowing: correct	– swallowing: infantile[36]
Verbal memory assessment		Child has well-developed verbal memory.	The child's verbal memory is weak.
Assessment of auditory reactions	Assessment of phonemic awareness	The boy is able to differentiate between paronyms. All trials concluded correctly.	Three of 12 trials failed. The boy indicated images in the following paronyms wrongly: *tacka-taczka*, *kasza-kasa*, *sale-szale*. This does not indicate disturbances in phonemic awareness, however[37].[38a]

[35] D. Pluta-Wojciechowska, *Dyslalia obwodowa*, Wydawnictwo Ergo-Sum, Bytom 2019. As Pluta-Wojciechowska states: "The temporomandibular joint and the related mobility of the mandible are evaluated by the speech therapist (approximately) on then basis of the capacities, path and range of retraction of the mandible and an interview concerning any possible occlusion parafunctions", p. 155.

[36] During the first assessment of swallowing performed at the practice, the child experienced strong disquiet when its face was touched (the patient was excitable, clearly nervous due to the examination). The examination result proved unreliable at that time. The repeated assessment, conducted at the child's home, indicated the presence of infantile swallowing. This is indicated by e. g. strongly tense lips and cheeks during swallowing and inserting the tongue between the teeth.

[37] As the test Author indicates: "[…] a child that executes substitutes in place of the required consonant, e. g. in case of parasigmatism: [š ž č ǯ] = [s z c ʒ], frequently indicates the designate corresponding to the word being the effect of its own execution, e. g. *soot* instead of *shoot*. one can thus assume that the sensual-motor paradigm of the word is stronger in the child in this case than the auditory pattern indicated

Category		Bartosz	Szymon
	Approximate hearing examination	The child has correctly functioning physical hearing.	The conducted evaluation did not find dysfunctions in this regard. The result gives rise to doubts to the diagnosis about hearing difficulties, as this information was repeated many times, e. g. in opinions of the psychological and paedagogical advisory facility.
Phoneme execution assessment[39]		All sounds pronounced correctly as isolated, in syllables and words. Sometimes – for phrases and sentences – properties of the expected phoneme were not found, as properties of a different phoneme were heard and observed that was spoken as standard. This applies to the following: – the phoneme /š/ executed as dental (/š/→[s]), – the phoneme /ž/ executed as dental (/ž/→[z]), – the phoneme /č/ executed as dental (/č/→[c]), – the phoneme /ǯ/ executed as dental (/ǯ/→[ʒ]). It must be stressed that the observed phenomenon was only noted in spontaneous speech.	The speech examination showed an abnormal execution of the following phonemes: – the phoneme /š/ executed as an interdental sound (/š/→[interdental s]), – the phoneme /ž/ executed as an interdental sound (/ž/→[interdental z]), – the phoneme /č/ executed as an interdental sound (/č/→[interdental c]), – the phoneme /ǯ/ executed as an interdental sound (/ǯ/→[interdental ʒ]), – the phoneme /r/ executed as an interdental sound (/r/→[interdental l]). Non-standard execution of the phonemes /s/ /c/ /z/ /ʒ/ /l/ is related to dislocation, or dysfunction of the place of articulation. The first four phonemes should be executed as dental, and the pho-

earlier on during the examination. In my opinion, this is not indicative of dysfunctions of phonemic awareness […], but difficulties in the differentiation between phonemes with a specific property, e. g. the point of articulation".

[38] Paronyms left untranslated due to the fact that their significance is only on the auditory and not the semantic level [translator's note].

[39] When assessing phoneme execution, the analytical-phonetic pronunciation test method was used, developed by such researchers are B. Ostapiuk (1997), L. Konopska (2006), D. Pluta-Wojciechowskia (2012, 2019), whereby the description of the method is used by the latter. The author of the present paper used primarily the latter researcher's approach.

Category		Bartosz	Szymon
			neme /l/ – as alveolar. The above phonemic and phonetic changes are the result of missing teeth caused by exchange of milk teeth, concluding with an incorrect position of the tongue.
Assessment of words (their comprehension and use)	Comprehension and use of adjectives and adverbs	The boy is able to correctly indicate and describe item properties (adjectives), and also responds correctly to the question "What is it like here?" (adverbs).	The boy shows significant shortcomings in the comprehension and use of adjectives and adverbs. Many times, the child did not attempt responses or they were not suitable to the presented image.
	Comprehension and use of pronouns and prepositions	The patient has no trouble understanding pronouns and prepositions. Their use during the study as well as during spontaneous expressions of the child, is correct.	The patient shows difficulty using the pronoun „I". Frequently talks about himself in third person singular. The test also showed lack of understanding for prepositions – both with the use of images as well as actual items.
	Comprehension and use of numerals	The child shows no deficits in terms of comprehension and use of cardinal and ordinal numerals.	The test was conducted using toys – animals. When asked, "how many animals are there?" the child responded correctly. However, when asked: "the cow is first, and the cat is…?", the boy could not respond.
Assessment of the ability to create statements		The patient describes very precisely what is going on in the presented images, his statements are detailed and exhaustive. When speaking, the child uses all parts of speech.	The patient shows deficits in the area of creation of statements on the basis of the presented image-based story. The boy does not respond, but lists items/ persons found in the images.
Assessment of dialogue		The boy as the ability to initiate and maintain dialogue, and waits for his turn in conversation. The responses given by the child are free responses, extensive and detailed. During discussions, the patient always faced the examiner, and his statements were amended by gestures and facial expressions.	The boy attempts to initiate dialogue, however his skills at maintaining dialogue are significantly limited. The responses usually do not venture past nominal or simple sentences. The patient would at times lose interest in the topic of conversation and „shift" his attention to a different activity or item.

Source: Own work on the basis of the conducted examination.

3. Diagnoza neurologopedyczna i program terapii

A. Bartosz

The patient shows only slight difficulty in articulation found in spontaneous speech. Continuation of speech therapy is recommended to perfect pronunciation by Bartosz.

B. Szymon

As a result of the conducted examination, the patient was found to have a speech dysfunction termed oligophasia, exhibited through the following:

- delayed development of active and passive speech,
- nonstandard execution of the phonemes /š/, /ž/, /č/, /ǯ/, /r/, as the properties of these phonemes were not noticed, however, properties of other phonemes were noticed (/s/, /z/, /c/, /ʒ/, /l/) that were not executed as standard, e. g. as interdental sounds,
- infantile swallowing,
- usage of incorrect grammar forms,
- reduced verbal memory,
- echolalia,
- speaking about themselves in the third person singular.

The following conclusions were also made:

- reduced motor and graphomotor abilities,
- difficulty focusing attention on tasks,
- difficulty controlling emotions.

Considering the above diagnosis, it must be noted that the boy requires intense stimulation in many areas significant from the neurologopaedic point of view. In the conducted therapy, attention is also turned to the development of the child's language activity, working on articulation shortcomings and difficulties in using grammatical forms as well as the development of social behaviour in the area of establishment of skills enabling functioning in the environment, facilitation of concentration and fine motor skills. Due to the fact that the boy is best motivated to work by music, the suggestion is made to utilise therapeutic methods related to it, e. g. log-

orhythmics and music therapy. These will definitely stimulate the patient's speech development, and serve relaxation and calming of the collected emotions. In work with the boy, importance is the extension of the time needed to perform specific tasks and mobilisation to work. Recommended is also continued regular supervision of Szymon's development progress.

5. Discussion

The logopaedic examination conducted between February and March of 2019 showed significant differences in the development of speech in both patients. As literature shows, language development in children with neurological damage may proceed with delays, as reflected in one of the boys[40]. A compounding factor may also be the uncompensated hearing dysfunction. In Szymon, the development of both active and passive speech is delayed. Additionally, numerous difficulties with articulation were noticed, as well as echolalia and difficulty using grammar correctly. Bartosz in turn – from the neurologopaedic perspective – is a child developing correctly, for whom further therapy should only focus on perfecting pronunciation.

The dynamics of the language development between the boys is varied. Attention should be turned here to the neurological damage observed in the twins in the first week of their lives. In Szymon, the intracranial haemorrhage took place in both hemispheres, and every haemorrhage took on a more grave form than was the case in his twin brother, in whom the intraventricular haemorrhage – in the most minor degree – was observed only on the right side. The above information allows the statement that the level of brain damage determines the further psychological and physical development of the child, and, accordingly, their speech development. Of importance is also the place of damage of the brain. As literature

[40] D. Trauner, K. Eshagh, A. Ballantyne et al., Early language development after peri-natal stroke, *Brain & Language*, 127 (2013), pp. 399–403.

shows, children suffering from a perinatal stroke in the left brain hemisphere seem to make more morphological errors, use less complex syntax and convey information with a lower degree of detail than children with a stroke found in the area of the right hemisphere[41]. Significant seem also other dysfunctions that can accompany perinatal strokes. Ohe of these is the total or partial failure of the corpus callosum, or the connection joining areas of the neocortex, allowing for the cooperation between both hemispheres. It has been proven that flawed development of the corpus callosum may result in delays in intellectual development, speech dysfunctions and epilepsy[42].

The conducted case study also allowed the presentation of usability of the utilised research tools to diagnose speech development dysfunctions in a child with intellectual disability. Presently, logopaedic tests for the diagnosis of oligophasia are lacking, however, the conducted study shows that the TRJ test[43] along with a *Comprehensive logopaedic examination*[44] form a good basis to diagnose the above-described speech dysfunction, the development of a speech therapy program on this basis and the assessment of its relevant effects.

6. Conclusion

The dynamics of a child's language development depend on many factors, and one of them is neurological damage that can lead

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[41] A. Kirton, G. de Veber, Life After Perinatal Stroke, *Stroke*, 44 (2013), pp. 3265–3271; D. Woolpert, J. Reilly, Investigating the extent of neuroplasticity: Writing in children with perinatal stroke, *Neuropsychologia*, 89 (2016), pp. 105–118.

[42] K. Zakrzewski, Wady rozwojowe układu nerwowego, [in:] B. Steinborn (ed.), *Neurologia wieku rozwojowego*, Wydawnictwo Lekarskie PZWL, Warszawa 2017, pp. 609–641.

[43] M. Smoczyńska et al., *Test Rozwoju Językowego*…, op. cit.

[44] D. Emiluta-Rozya, *Całościowe badanie logopedyczne z materiałem obrazkowym*, Wydawnictwo Akademii Pedagogiki Specjalnej, Warszawa 2013.

to disturbances in intellectual development. Logopaedic care for an intellectually disabled child should be based on regular, best weekly, meetings of the patient with the therapist and on individualisation in the development of the therapy programme. All therapeutic activities should, however, be preceded by a logopaedic examination of the little patient, concluded with a thorough and detailed functional diagnosis, in particular in case of additional compounded disabilities. When conducting a neurologopaedic diagnosis of a disabled child, one cannot limit themselves to just aspects related to speech dysfunctions. One must consider the child holistically, taking into account their other difficulties as well. In case of cerebral palsy, these do not only include motor dysfunctions, but also difficulties in terms of memory, attention focusing, perception of reality and emotional problems that do not remain without influence on the course of the therapeutic process. And what is most important, the therapist must not look at the child only from the perspective of their disability; as Maria Grzegorzewska stated: „There is no cripple; there is a human"[45]. The simplest and at the same time the most obvious sign of such an approach is for all therapy – speech therapy as well – to account for a child's strong suits and interests, as was also shown on the example of the presented case study.

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