

OLGA PRZYBYLA

University of Silesia in Katowice,
Center of Logopaedic & Audiodescription

Central Auditory Processing Disorders. A Case Study of an Eleven-Year-Old Boy

SUMMARY

The article contains a description of the case study of an eleven-year-old boy with the central auditory processing disorders. The case study method is analytical. In the etiology of central auditory processing disorders, the most frequently spoken of auditory perception disorders include impairments of the receptive (hearing) function and disorders of sound discrimination. As therapeutic observations confirm, it is therefore interesting to examine auditory attention (selection and intensification of sound stimuli processing) and assessment of the ability to discriminate acoustic speech sound.

Key words: the central auditory processing disorders, auditory perception disorders, disorders of sound discrimination, case study

CENTRAL HEARING LOSS AND ITS EFFECT ON THE FUNCTIONING OF THE CHILD

As defined by the International Classification of Diseases ICD-10, central auditory processing disorders are not a disease entity but a term indicating a set of syndromes resulting from a hearing disorder on the level of the central nervous system, with the peripheral part of the organ functioning efficiently.

According to the American Speech-Language-Hearing Association (ASHA), central auditory disorders are diagnosed when at least one of the higher auditory functions is disordered, which are: sound localization and discrimination, assessment of sound patterns, temporal aspects of hearing, speech comprehension in the presence of a deafening signal, and comprehension of distorted speech (Skoczylas et al. 2012: 11–12).

Robert W. Keith defines these disorders as a “deficiency in auditory information processing, manifested in difficulties in hearing, speech comprehension, language development and in learning” (Keith 2008: 7–8), while Anna Skoczylas et al. emphasizes that the essence of such disorders is the “impossibility to fully utilize the heard acoustic signal with its correct reception in the peripheral structures” (Skoczylas et al. 2012: 51).

The cause of CAPD is all kinds of damage on the level of the central nervous system. This is both damage are arisen during the prenatal, perinatal and neonatal period and the damage caused by injuries, cancer diseases, strokes, or toxic damage. A risk factor is also the delayed or disordered maturation of the central nervous system or auditory deprivation caused by long-lasting hearing loss. It should be added that CAPD does not occur only at the developmental age but also affects adults with age-induced degenerative changes in the nervous system.

This disorder comprises an extremely wide range of symptoms, the occurrence of at least one of them being a reliable reason for diagnosis. The symptoms indicating problems with central auditory processing are: delayed speech development, difficulties in understanding speech, particularly when it is not directly addressed to the receiver, problems with adequate comprehension of questions and commands, especially if they are long and complicated, and weakened auditory memory manifested in the inability to repeat and remember received information. Furthermore, there are reports of attention concentration disorders and the short time of maintaining it, as well as hypersensitivity to sounds preventing discrimination between vital signals and those that only disrupt appropriate and essential information. These indications are also often accompanied by somatic symptoms, i.e. headache and vertigo, and tiredness felt after having stayed in a noisy room. All these signals fully manifest themselves during the school period, translating into failures in learning to read, write, and acquire foreign languages, or finally they result in many spelling mistakes when writing down texts by ear.

CLINICAL PROFILES OF CAPD PATIENTS

According to differences in the location of damage and the dominant symptoms requiring different therapeutic management, three basic clinical profiles are distinguished:

1. Hearing disorders on the phonological level,
2. Auditory attention disorders and hearing in noise disorders,
3. Auditory-visual integration disorders (Skoczylas et al. 2012).

Table 1. Clinical profiles of CAPD

Clinical profile	Hearing disorders on the phonological level	Auditory attention disorders and hearing in noise disorders	Auditory-visual integration disorders
Frequency of occurrence	the most frequent form of central auditory disorders, up to 50% of cases	affects ca. 30% of patients with central auditory disorders	affects ca. 20 % of patients with central auditory disorders
Difficulties	<ul style="list-style-type: none"> – disorders in identification, discrimination and remembering the acoustic features of speech sounds, – difficulties with phoneme (phone) discrimination – reading and writing problems – high risk of co-occurring speech defects 	<ul style="list-style-type: none"> – inability to understand speech in noise , – difficulties in understanding speech which is accompanied by competing factors (several persons speaking simultaneously), – disorders in understanding the rapid rate of speech or distorted speech, – problems with focusing attention and maintaining it, -decreased auditory memory – emotional disorders, i.e. impulsiveness and hyperactivity (ADHD, as a co-occurring factor) 	<ul style="list-style-type: none"> – diminished skills that result from cooperation between the right and left brain hemispheres; consequently, difficulties will manifest themselves in the following areas: • understanding by ear, • writing and reading, • drawing, • dancing, • use of prosodic features of speech
therapeutic management	<ul style="list-style-type: none"> – practicing phonemic hearing using both natural speech and computer-modified syllables (lengthened consonants) – practicing temporal resolution, – practicing discrimination of sound length and pitch. 	<ul style="list-style-type: none"> – use of systems supporting direct speech perception – FM systems, – sitting in the front desks, – speaking directly to the patient, avoiding speaking behind his back. 	<ul style="list-style-type: none"> – carrying out therapy employing the sensory integration method, the Tomatis method or the Johansen method, – practicing auditory attention and lateralization, – practicing synthesis and analysis, – practicing sound localization, – practicing interaural separation and integration.

Source: own compilation of CAPD profiles based on the lecture by I. Urban, MD/PhD (2014) and the article by A. Skoczyłlas et al. (2012: 13).

CAPD – DIAGNOSTIC MANAGEMENT

The basic requirement that needs to be met prior to beginning appropriate diagnosis is that the child must turn seven because the process of maturation of the hearing system still continues. Psychological-pedagogical consultation is also necessary: its goal is to examine the child to determine his intelligence quotient because diagnosis for CAPD is possible only in intellectually normal children. A preliminary medical appointment should include a detailed medical history taking into account risk factors, physical examination, determination of the lateralization profile, diagnosis of hearing to exclude central hearing loss, and referral to specialist consultations: to neurologists, ophthalmologists, physiotherapists, speech therapists, and the above-mentioned psychologist (Kasica, Przybyła, Kasica 2011). The next stage is the diagnostic assessment of the auditory organ involving basic testing which consists of tonal audiometry, impedance audiometry, verbal audiometry, otoacoustic emissions (DPOAE or TEOAE) and ABR test. After they have been made it is necessary to take tests that evaluate the higher auditory functions. They consist of dichotic hearing tests, temporal resolution and auditory perception tests, and low redundancy speech tests. Then the patient is subjected to electrophysiological tests involving the evaluation of exogenous auditory evoked potentials. The documents thus collected enable, through medical audiological-phoniatric consultation, to make a diagnosis and a plan for possible therapeutic management.

THE PROFILE OF THE STUDIED CASE

Wiktor is a fourth-grade primary school pupil and is not covered by special needs education. Already during the early education period his parents noticed his learning difficulties. The greatest problem was learning to read and write. The child confused and transposed letters, and could not make a synthesis or analysis of words. The graphic quality of his writing was also very low. Furthermore, the child had difficulties with transcribing a text by ear or writing down a remembered text. The boy's parents noticed his problems with concentration and maintaining attention. The child appeared to be absent-minded and to fail to understand commands addressed to him. Similar difficulties were reported by the class tutor, other teachers, and the guidance counselor. Alarmed by the situation the parents sought consultations at the Psychological and Pedagogical Counseling Center, from where they were referred to the Silesian Center of Hearing and Speech "Medincus" in Katowice.

MEDICAL DIAGNOSIS

In December 2014, Wiktor was given a series of medical tests, on the basis of which the central auditory processing disorder was diagnosed. The set of tests (on the basis of the presented results) comprised the following:

– *Gap Detection Threshold (GDT)* test – a psychoacoustic test evaluating temporal resolution; it is the most sensitive in detecting disorders at the level of the auditory cortex (improper temporal resolution of the auditory system causes difficulties in speech comprehension, which is observable particularly in difficult acoustic conditions);

– tests evaluating the perception of sound sequences; *FPT (Frequency Pattern Test)* – the test of sequence of tones of varied pitch) and *DPT (Duration Pattern Test)* – the test of sequence of tones of varied lengths) – they are the basis for diagnosing possible anatomical or physiological damage to the hemispheres and their connections;

– dichotic hearing test, *DDT (Digital Dichotic Test)* – it enables determining which ear has a better connection with the hemisphere in which speech comprehension takes place; the test evaluates the speed of information transmission between both hemispheres in the corpus callosum;

– low redundancy speech tests (the understanding speech in noise test, i.e. white noise or cocktail-party noise, and the filtered speech test) enable evaluation of the integrity of the central part of the auditory system.

It follows explicitly from the medical diagnosis that despite unimpaired peripheral hearing, the child functions in a very similar way as a hard-of-hearing child. The parents were offered therapy for the child at the Day Center for Hearing and Speech. The use of the FM system was also suggested for consideration.

PSYCHOLOGICAL DIAGNOSIS

The pupil was administered a psychological test at his mother's request, in connection with testing of hearing. The testing with the WISC-R scale showed that Wiktor's general intellectual development was within the norm, on the average level. It was found that the child's strengths include memory in respect of its duration, which translates into a broad range of his general knowledge of the world. Thinking at the perceptual level also develops well. The child makes correct conclusions and predictions. New information is best acquired via the visual channel. His cognitive abilities are also developing suitably to the age, in respect of visual-motor coordination, logical thinking based on digital material, verbal-conceptual thinking, and the ability to abstract and generalize.

Low performance is seen the child's auditory memory. The boy is learning more slowly through stimuli transmitted via the auditory analyzer. Perceptiveness

– the ability to distinguish essential defects and irregularities in the perception material – is poor. His knowledge and understanding of socio-cultural norms is also low. Wiktor has an average store of verbal concepts. In his utterances there are many phonetic, inflectional and semantic irregularities.

PEDAGOGICAL DIAGNOSIS

Pedagogical tests evaluated the ability to read, write, to auditorily analyze and synthesize, and to produce utterances; mathematical abilities were also assessed. With regard to reading, it was found that Wiktor uses a mixed technique, often distorting or guessing words. The rate of reading was described as slow. Comprehension of the read text is also reduced. The child finds it very difficult to produce spoken utterances. They are incomplete, requiring prompts and clues. Writing tests showed numerous spelling mistakes, omissions and transpositions of letters, words, and other marks. A particularly large intensity of errors was reported in writing down nasal sounds and in the selection of correct inflectional endings. The auditory analysis and synthesis of words is also disrupted, and the graphic quality of writing is lower. The child performs much better in operations on figures.

The ability to add and subtract is at a satisfactory level. The pupil also partly knows the rules of multiplication and division of figures. The boy finds it difficult to solve text-based mathematical problems.

LOGOPEDIC DIAGNOSIS

In light of the recent speech therapy tests the boy's speech on the articulatory level is properly developed. In the past, the child had great difficulties which were gradually improved due to the conducted therapy. Wiktor correctly articulates sounds, mostly produces correct grammatical constructions and complex utterances. Phonemic hearing is reduced, which is observable particularly in poor phoneme discrimination and in decoding of words. The boy finds it difficult to remember auditory sequences, and has auditory memory disorders (Przybyła, Kasica 2012).

PRESENTATION OF MATERIAL AND ANALYSIS OF RESULTS

In order to observe deficits in central auditory processing, a series of tests was conducted to make an in-depth investigation of systemic realization based on various language behaviours, and to define the clinical profile of CAPD, which consisted of the following tasks:

1. Write down by ear;
2. Read a text aloud;
3. Divide words into syllables and hyphenate words onto two lines;
4. Identify rhymes;
5. Produce utterances based on the picture seen;
6. Write down utterances on the picture seen;
7. Interpret proverb and abstract expressions;
8. Draw a clock.

The first task was *writing by ear*. The dictation text was read out three times (the whole text, then divided into sentences, and finally sentences divided into phrases) with appropriate punctuation, clear intonation, at a slow rate.

The text:

Wczoraj, przedwczoraj ... – już dwukrotnie Atanazja przyszła zapłakana ze skargą, że koleżanki dokuczają jej z powodu imienia. Czy jest naprawdę aż tak dziwaczne? Atanazja – fantazja – inwazja – Azja – wykrzykują. Nauczycielka zastanawia się skąd w dziecku taki brak wiary w siebie, takie niskie poczucie własnej wartości, że nie potrafi przezwyciężyć niedużego przecież problemu. Atanazja niezbyt dobrze radzi sobie też z nauką. Ciągłe dopytywanie się o treść zadań, prośby o powtórzenie poleceń oraz o wydłużenie czasu potrzebnego na przepisywanie z tablicy niecierpliwą nauczycieli. Jedyne niezawodna pani od polskiego, wychowawczyni Atanazji, okazuje cierpliwość i zrozumienie. Mimo nieprzeciętnej pracowitości dziewczynka rzadko otrzymuje wymarzoną piątkę. Najulubieńszym jej przedmiotem jest muzyka. Dziewczynka chętnie słucha, kiedy pani gra na pianinie, a także lubi, kiedy może śpiewać chórem wraz z innymi dziećmi. Popołudniami niecierpliwie czeka na zakończenie zajęć, bierze tornister i idzie prędko do domu, gdzie czeka jej ukochany owczarek Puzel.

The text contains multisyllabic words with consonant clusters, and interrogative sentences and compound-complex sentences. The objective of such planning of the test text is to check the boy's ability to identify, discriminate and remember acoustic features of speech sounds; and to evaluate the level of auditory memory with the analysis of how the boy uses the prosodic features of speech.

Wiktor's production:

Wiktor, 5
 W swojej przedmowa jest dwa krotnie Antanazja przyzna zaproszenia
 ze Karolem ze koleżanki dokonujemy jej z powodu imienia, czy
 jest to naprawdę aż tak dziwaczne Antanazja fantazja
 imitacja wykrzyknik. Skąd ~~ma~~ nauzytelna zastanawianie
 Noyd w daleku taki brak wiary w siebie teakie miłkie powtórzenia
 wartości ze niepotrzebnie i przy ciężki nie dużego przeciw problemu
 Antanazja ~~to~~ nie zbyt dobrze radzi sobie z matką.
 Ciężko dopuścić się o treści zadani prozyl o powtórzenie
 poleceń o raz o wyodrębnienie czasu potrzebnego na przepisywanie
 z tablicy niecierpliwia nauzytelni Jedyni Jedyni nie zawodzi
 panie polskiego wyłowawczy Antanazji okazuje się niewoli
 i zrozumnie. Mimo nie przeciętnej pracowitości dziewczynka matko
 dostaje wymarzonej piątkę. Naj ulubionym jej przedmiotem jest muzyka
 Dziewczynka świetnie studiowała kiedy pani gra na pianinie a także kiedy
 może śpiewać wraz z innymi dziećmi

Table 2. Specification of errors committed in the text written down by ear

Description and examples	No. of errors
PHONETIC ERRORS ON THE LEVEL OF WRITING A WORD	
Omission of letters/letter groups: ■ in consonant clusters: <i>przezyciężyć;</i> <i>prolemu (problemu);</i> ■ in words with difficult spelling: <i>powtorenie (powtórzenie);</i> ■ in word fragments with alliterative features: <i>zrozumnie (zrozumienie).</i>	5
Addition of letters (letter groups) ■ persistent addition of /n/ in an unknown word: <i>Antanazja (Atanazja);</i> ■ addition of letters suggested by rhyming (contamination error): <i>fantanazja</i> <i>(fantazja+Atanazja);</i>	5

c. d. tab. 1.

<p>Changing of letters (letter groups):</p> <ul style="list-style-type: none"> ■ use of the /-om/ letter group instead of /-ą/ at the end of a word: <i>ze skargom</i>, <i>dokuczajom</i>; ■ realization of /-ę/ as /-e/ at the end of a word: <i>naprawde</i>; ■ transcription of a voiceless sound consistent with its phonetic realization: <i>rzatko</i>; ■ transcription of a voiced sound consistent with its phonetic realization: <i>proźba</i>; ■ transcription approximating the heard phonetic pattern: <i>z nalką</i> (<i>z nauką</i>); ■ changing of letters in inflectional endings: <i>na przepisywania</i> (<i>na przepisywanie</i>). 	10
Transposition of letters: <i>dopywywanie się</i> (<i>dopytywanie się</i>);	1
Omission of words: in the excerpt: <i>a także [lubi], kiedy może śpiewać wraz z innymi dziećmi</i>	1
Addition of words (repetition of a word): <i>Skąd nauczycielka zastanawia się skąd w dziecku taki brak wiary w siebie...</i>	1
Changing of words but retaining their meaning: <i>dostaje (otrzymuje)</i> ; <i>po południu (popołudniami)</i> ; <i>z polskiego (od polskiego)</i> .	3
Wrong division of words : <ul style="list-style-type: none"> ■ suggested by morphological division: <i>dwu krotnie</i>; <i>nie cierpliwia</i>; <i>naj ulubieńszym</i>; ■ suggested by the spelling of prepositional phrases: <i>w czoraj</i>; <i>przedw czoraj</i>; <i>o raz</i> (<i>oraz</i>). 	6
Connecting words	0
SPELLING ERRORS ON THE LEVEL OF WRITING A WORD	
<i>kolerzanki</i> ; <i>może</i> (meaning: <i>móc</i>); <i>przecież</i> ; writing <i>nie</i> with verbs as one word: <i>niepotrafi</i> ; writing <i>nie</i> with adjectives separately: <i>nie przeciętnej</i> , <i>nie zawodna</i> , <i>nie dużego</i> ; writing <i>nie</i> with adverbs separately: <i>nie zbyt</i> , <i>nie cierpliwie</i> ; writing proper names in lower case: <i>Puzel</i> (dog's name).	7

c. d. tab. 1.

GRAPHIC ERRORS / REPRESENTATION ERRORS		
Omission, addition or distortion of graphic element: writing /ł/ as /l/: <i>przyszła</i>		1
Lack of sentence boundary		0
Hyphenation of words: avoiding hyphenation of words onto two lines		4
Punctuation: no commas, dashes or question marks		15
Graphic level of writing: crooked writing, slightly sloping backwards but legible; varied letter patterns and sizes; irregular letter width; unfinished line of letters.		
Writing organization: horizontal arrangement of page, crooked line of the left margin		

Source: own compilation.

The next task consisted in reading aloud texts which the boy did not know; one of the texts was less difficult – it contained simple, high-frequency words composed chiefly of open syllables. The other text contained polysyllabic words with consonant clusters. The texts were compiled for the needs of the test so that it would be possible to indicate the ranges of difficulties of the distinguished basic CAPD profiles.

Text for reading aloud no. 1: Apples

Grażynka bardzo lubi owoce. Uwielbia jabłka, gruszki, śliwki, czereśnie i wiśnie. Ostatnio pojechała do swojego wujka, który ma własny sad. Na drzewach rosły już soczyste, dorodne jabłka – antonówki. Razem z wujkiem zaczęli zrywać owoce i układać je w przygotowanej wcześniej drewnianej skrzynce. Aby dotrzeć do najpiękniejszych sztuk, wujek Grażynki musiał skorzystać z drabiny. Wszedł na nią ostrożnie i podawał zerwane jabłka dziewczynce, a ona układała je w skrzynce. Wujek powiedział jej, że ważne jest, aby nie rzucać owoców, ponieważ mogą się poobijać. Gdy skończyli pracę, wyruszyli do domu wujka. Skrzynka była bardzo ciężka i dlatego zapakowali ją do samochodu. Gdy dojechali na miejsce, ułożyli część owoców na półmisku, żeby każdy mógł się poczęstować. Grażynka zaprosiła swoje koleżanki, aby również one mogły spróbować, jak smakują jabłka z sadu jej wujka. Ciocia Grażynki obiecała, że zrobi później z pozostałych owoców pyszną szarlotkę. Dziewczynka była bardzo zadowolona z tego, że mogła zbierać owoce w sadzie. Tego samego dnia obiecała wujkowi, że jeszcze przyjedzie i pomoże mu w zrywaniu jabłek.

Text for reading aloud no. 2: A Wayfarer

Promienie słońca gładziły twarz odpoczywającego wędrowca. Dźwięczała wokół puszcza. Źródło szemrało w pobliżu. Czyżyki ćwierkały niemiłosiernie. Czerniły się jagody wielkości czereśni. Pachniała ziemia zryta nocą przez dziki poszukujące pędraków. Wilgoć o zapachu paproci unosiła się w powietrzu. Wiatr przywiał ją znad trzęsawiska. Muchomory czerwieniły się w wybujalej trawie. Podgrzybki maskowały się wśród igliwia. Te wszystkie wrażenia chłonął zdrożony człowiek jak energię potrzebną do dalszej wędrówki.

It was observed that while reading the first text aloud, the boy correctly read out the first line. Then there followed: a gradual increase in the number of committed errors, unnatural prosody – incorrect accentuation and rhythm in the read-out text, many stops and slowing-down of the pace. Many repetitions were also observed – especially in the first part of words, including repetitions of initial sounds (e.g. *anto-antonówki*, *dotrze-dotrzeć*, *poo-poobijać*, *dzie-dziewczynka*, *zry-zrywaniu*, *pysz-n-szną*), which shows unsuccessful attempts to read longer and more difficult words as a whole. While reading the other text the boy additionally changed or omitted inflectional endings (*dźwięczały* instead of *dźwięczała*, *czyżyk* instead of *czyżyki*), changed neighboring sounds even in short words (*wy wbujalej* instead of *w wybujalej*, *od* instead of *do*), added sounds and morphemes (*popachniało* instead of *pachniało*, *wilogoć* instead of *wilgoć*), omitted sounds or replaced them with others (*niemiłosiernie*, *zdrożny* instead of *zdrożony*), changed the form and meaning of words (*uniosła się* instead of *unosila się*, *zrywała* instead of *zryta*), which also may indicate attempts to read out words as a whole. On the suprasegmental level, apart from the abovementioned ellipses, heterotopias, metatheses or sound anticipations there were also irregularities in dividing the read-out words (*trzę-sawiska*, *chło-nął*). When the text was read out, there were many attempts of global reception of words, while at the same time inflectional rules were disregarded, words in the text were replaced with similar words but having a different meaning, and there were difficulties in reading out less-known words with the co-occurring inharmonious speech rate and variable melodic line of speech. The low level of auditory attention accompanied by a falling intonation was also observable. After the moment when the reading out began fluently and correctly, the number of committed errors and returns to the beginnings of words and sentences rapidly increased.

When comparing errors in reading out with *writing by ear*, many analogies can be pointed out. Similarities are seen particularly in omitting letters (or sounds in the read-out text) and parts of words. This applies mainly to inflectional endings. The concentration of such errors shows that the words are treated globally – as a whole.

The change of segments – mainly letters and parts of words is comparable. Changes in the read-out text are caused mainly by phonological difficulties in identifying, discriminating and remembering the acoustic features of speech sounds, and by reduced auditory memory. The realization mistakes occurring in direct proportion in the text *written by ear* areas follows: errors in endings, writing down of palatalized sounds as hard or soft, and soft sounds as palatalized, and omission of parts of words in cases of alliteration.

Addition of segments occurs far more often in reading out than in writing, which is connected with the necessity to often return to the beginning of a word, repeat its middle part or ending in order to finally produce the correct form of the fragment being decoded. These realizations are an attempt to match the overall pattern to the given visual information, e.g. the boy read the word *sposzregawczości* as: *sposzrega-ga-wczo-noś-ko-czości*).

Wiktor omits some words, which happens more often in writing. The addition of a word occurred only once and consisted in placing at the beginning of a sentence the word which was repeated in the sentence again – in the right place.

Division of words when writing them reflected the way of hearing the words and was the consequence of using breaks because of difficulties in decoding (the division of words had little in common with the morphological division): *dwu krotnie, nie cierpliwą, naj ulubieńszym, w czoraj, przedw czoraj*.

Significant consequences for understanding the content resulted from changing words when reading out, which was connected with reduced auditory memory and poor use of the prosodic features of speech. This fact points to Wiktor's problems with the degree of understanding information given both orally and in writing (in either case a high efficiency in decoding texts is necessary,

In the analyzed material the boy made a successful compensation attempt in the written text (he substituted the more difficult-to-spell word *otrzymuje* for *dostaje*, without changing the meaning of the utterance context). In contrast, in the read-out text, the incorrect changes of the grammatical category, done by Wiktor, made it impossible to remain in the semantic field of words: *zglębienia* instead of *zglębić*, *wyciąganie* instead of *wyciągnąć*. They thereby resulted (in a specific context) in the essential change of meaning (*powierzchniowego* instead of *powierzchnowego*). The change (replacement) of words is caused by the boy's attempt to read words globally, as wholes, with the simultaneous absence of self-correction. A change in the text *written by ear* does not usually change the meaning, but one in the read-out text often results in a change of meaning.

Analysis should also cover peculiarities on the graphic or – in the case of the read-out text – suprasegmental levels. Errors evidencing serious phonological problems include the absence of marks indicating the beginning and end of sentences (full stop and capital letter) in the text *written by ear* – a significant

indication of a severe lack of ability to segment texts. This lack is manifested in the boy also on the level of morpheme, word, sentence and longer text. It is also confirmed by the test of dividing a word into syllables. This lack is observable not only with word boundaries or when dividing words into syllables. The strongly disordered speech rhythm and wrong intonation when reading out reflect the low level of use of prosodic features, and result from disorders punctuation marks perception. The failure to notice graphic details may be additionally caused by focusing all attention on the form and content of words.

In Wiktor, a high predominance of errors is observable at the level of identification, discrimination and remembering the acoustic features of speech sounds, as a result of which many of the errors committed in reading out correlate with the errors made in writing down (reduced ability to remember the visual equivalent of a speech sound – grapheme). This is confirmed by the results obtained in two successive tests: division of the word *przeanalizowałem* into syllables and rhyme identification.

przeanalizowałem

	prze	ana	liz	wa	łem	
		PRZ	ana	liz	wa	łem
łem			PRZ	ana	liz	wa
wa	łem			prze	ana	liz
liz	wa	łem			prze	ana
ana	liz	wa	łem		prze	

The rhyme identification test turned out to be very difficult for Wiktor and confirmed the low level of understanding by ear and failure to use the prosodic features of speech:

W leśniczówce

Tu, gdzie się gwiazdy zbiegły
 w taką kapełkę dużą,
 domek z czerwonej cegły
 rumieni się na wzgórzu:
 to leśniczówka Pranie,
 nasze jesienne mieszkanie.

Chmiel na rogach jelenich
 usechł już i się sypie;
 w szybach tyle jesieni,
 w jesieni tyle skrzypiec,
 a w skrzypcach, byle tknięte,
 lament gada z lamentem.

Za oknem las i pole,
 las – rozmowa sosnowa;
 minął dzień i na stole
 stoi lampa naftowa,

To identify rhymes the boy used only one color of markers, perhaps because he did not focus attention on the instruction repeated several times, or perhaps he was not sure about the correct execution of the task. Basing on the markings it can be concluded that he identified no more than two pairs of rhyme in the presented excerpt of K. I. Gałczyński's poem: *jelenich-jesieni* and *tknięte-lamentem*. Despite having enough time for performing the task, the boy could not indicate the other pairs of rhymes.

The next ability tested was to produce a text based on analysis of a picture. A dynamic picture (releasing the interpreter's emotions), which contains two levels.



Source: R. Caputo, 2002, *Szkola fotografowania National Geographic. Ludzie i portrety*, Wydawnictwo G+J RBA, Warszawa 2002, p. 142.

The objective of the task is to assess the ability to interpret the mood of the picture, the ability to express feelings aroused by its presented content, or to inspire the subject to present his own experiences thematically related to it. The task is performed in two stages: in the spoken and written forms. During the test the therapist asks supporting questions, motivating the subject to expand utterances (supporting questions in square brackets)

Wiktor's utterance:

Ja sobie wyobrażam, że ta pani płacze, a ta leży albo może też umarła, nie jestem pewien, i tam jakiś pan, czy pani, bo tutaj nie widać dokładnie, gra na jakimś instrumencie. [Co jeszcze o tym obrazku możesz powiedzieć? Nastrój – jaki tam panuje?] Że jest przykry tam jest nastrój, bo nie wiem, czy coś tam się stało, czy ona płacze, że ta pani umarła, czy że jest jakoś ciężko chora i tam panuje niefajny nastrój, jeżeli by ta pani umarła, to byłby niefajny nastrój. [A po czym poznajesz, że ten nastrój jest niefajny?] Dlatego, bo ta pani płacze tutaj. [Mhm... Po czym jeszcze? Można płakać ze szczęścia, nie?] Tak, no ale tak tu widać, bo jak ktoś ... właściwie to tak się płacze i tak się śmieje, a ta pani tu krzyczy bardziej, płacze.

Wiktor's utterance:

TU PANU JE smutny nastrój bo pani płacze i jest ktoś z rodziny umarł i pani gra na instrumencie. Ten obrazek mi się nie podobał
Wiktor, S

The instruction for the task was repeated twice: before the spoken utterance and before the written one. The spoken text consists mainly of specific items of information (account), only once Wiktor relates some experience to himself (*Ja sobie wyobrażam ...*). For Wiktor to utter more personal sentences a stimulus in the form of questions or suggestions was needed. As compared with the spoken text, Wiktor's written test has a far more limited content and is much shorter than the produced spoken text in the form of a guided conversation. The carried-out test made it possible to observe the divergence between reading out and talking. A far easier content to absorb is a picture than a continuous text. This is evidenced by the higher fluency and naturalness of the speech flow during a spoken utterance than when reading out. When observing the way the boy constructs utterances we can only speak of the lack of information continuity – confusion of the levels of utterance, repetition of the same information and omission of essential information about the content, and weak causal connections.

The information obtained from tests may help individualize forms of organization of working with the child. It clearly demonstrates that a friendly situation is a guided conversation (situational context). This type may turn out to be the right way to learn/teach constructing utterances and organizing the store of acquired knowledge. In logopedic management it might be useful to apply the rules of utterance building based on a pattern, e.g. a map of ideas, containing the names and examples of obligatory and/or optional elements of an utterance (primary and secondary information together with the recommendation to name the presented situation; taking a stance on a situation – attempts to interpret it, to relate a situation to one's own experiences, to name feelings and internal experiences inspired by a picture, to explain the role of secondary figures and elements and the information they carry with them; attempts to consider the impact of the picture on the receiver's sensations: form and composition. The use of meta-cognitive knowledge to construct utterances based on the picture is – in the case of auditory processing disorders – one of important therapy forms in improving auditory-visual integration.

Another test checked the level of understanding proverbs and metaphorical expressions in connection with difficulties in processing abstract contents: *To jest biały kruk; Kiedy wejdiesz między wrony, musisz krakać tak jak one; Lepszy wróbel w garści niż kanarek na dachu; W maju jak w gaju; mieć gumowe uszy; ruszać się jak słoń w składzie porcelany.*

Wiktor understood only two of seven sentences although they related to his earlier linguistic and cognitive experiences.

The last test was the “drawing a clock” test:



When marking the segments of the clock face, Wiktor did not help himself with the logical division of the circle into quarters; he performed the task in a linear way by starting with hour one. The clock he drew is characterized by a lack of symmetry.

SUMMING-UP

Martin L. Kutscher, Tony Attwood and Robert R. Wolff, when describing central auditory processing, emphasize that it involves “transforming the information received by the nervous system into something useful. The process consists in analyzing and interpreting information. It determines what our brain will do with that which reaches our ears” (Kutscher, Attwood, Wolff 2007: 215).

The occurrence of auditory processing disorders in the analyzed case manifests itself in difficulties with segmentation, analysis and identification of speech sounds, in low integration within one or many modalities, and in the weak connection between semantic information and prosodic elements. The boy’s deficits in auditory processing are accompanied by problems with focusing attention.

Wiktor reads and writes words globally, hence there are so many inflectional errors in his texts – the errors frequently change the meaning of the text, thereby resulting in failure to understand its content both by the reader and the listener.

The results of the foregoing observations serve to develop ways of individualizing therapeutic procedures for CAPD patients. An impetus for further action may also be the advisability to check the efficacy of the functioning of thinking patterns in learning/teaching to construct utterances.

It would be good if the starting point was polysensory, repeatedly analyzed information with the same or similar content. Practicing within the intermodal transfer of information is one of major forms of therapeutic management. Among others, the information provided visually – the picture carrying appropriate content – set in the interaction space, is associated with tutoring methods postulated by Keith Topping (Reid, Wearmouth 2008). Participation enables comparing and evaluating the advantages of two or a greater number of different utterances. It is through the interpretation of the picture, the map of thought patterns, and spoken utterance, (whether guided or independent) that one develops the ability to understand complex verbal messages that are the capability of the brain to analyze and modify information received through the auditory pathway. In this way persons with auditory processing difficulties learn to consolidate stimuli.

Multiple processing of the same information in many ways and gradually enriching them with new elements contributes to acquisition of auditory information and is associated with the multifaceted organization of reality expressed in language, in building the order of human thinking.

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