

ZDZISŁAW MAREK KURKOWSKI

Maria Curie-Skłodowska University, Lublin  
Department of Logopedics and Applied Linguistics

## Hearing Difficulties and Central Auditory Processing Disorders from the Logopedic Perspective

### SUMMARY

In the audiological practice and in the diagnosis and therapy of people with speech and reading disorders, the boundary between difficulties in auditory perception and central auditory processing disorders (CAPD) is usually not specified. The lack of Polish developmental norms in the field of auditory skills, often cursory diagnostics and questionable competence of people evaluating auditory processing may be the reason for an unjustified diagnosis of CAPD in a child, especially in educational institutions and private offices proposing various methods of auditory therapy. The discussion on this subject is the goal of this work.

**Key words:** auditory processing, hearing difficulties, central auditory processing disorders, diagnosis of CAPD, speech disorders

Logopedics, both in diagnosis and in treatment, has to take auditory phenomena into consideration. The audiogenic conditioning of speech disorders as well as of reading and writing difficulties is significant in some cases. The problem worth discussing is whether hearing difficulties occurring in speech disorders or in reading and writing difficulties should be diagnosed as auditory processing disorders (CAPD).

Auditory perception and its disorders are a very broad problem. Sound perception can be investigated at the biological, mental, and social levels. The biological level of auditory perception is the domain of medical sciences, in which anatomical and physiological foundations of the hearing process are primarily analyzed. The mental level is the subject of interest of psychologists, psychoacousticians, audiophonologists, as well as logopedists/speech therapists. The influence of hearing on social behaviors is also studied by educators, teachers, physiotherapists, etc.

The first problem that needs to be focused on is the ambiguous and imprecise term used to describe the phenomenon of “auditory processing”. The most frequently adopted definition of auditory processing is the one presented by ASHA (American Speech-Language-Hearing Association), which points to the co-occurrence of nervous mechanisms and processes with auditory skills and abilities: it thus combines biological and mental processes responsible for the perception of sounds (ASHA 2006). There are, however, proponents of confining the term “auditory processing” to nervous processes taking place in the central auditory system, and those who define auditory processing as hearing skills. It is often not clear whether “auditory processes” are defined as neurobiological processes or as mental processes (auditory functions) (cf. Dajos-Krawczyńska et al. 2013).

In Poland, auditory processing is usually seen in terms of auditory skills (functions) and the neurobiological aspect of this phenomenon is generally not taken into account perhaps because the problem of auditory processing disorders is studied first of all by psychologists, logopedists and educators/teachers.

At the same time, there is no unambiguous definition of “central auditory processing disorders” – CAPD. What is usually emphasized is disorders that manifest themselves in the limitation of auditory abilities. The team of expert operating within the ASHA pointed out the limitations of such auditory functions as:

- location and lateralization of sounds,
- auditory discrimination,
- recognition of characteristics of auditory patterns,
- perception of temporal aspects of sounds (temporal resolution, masking, integration, temporal ordering),
- ability to recognize competing acoustic signals,
- ability to receive distorted signals (particularly speech).

All those concerned agree that in the case of auditory processing disorders there is no damage to the peripheral hearing organ should be found.

Another problem is the lack of explicit views in assessing the relationship between auditory processing disorders and other co-occurring disorders, particularly linguistic and cognitive disorders. Most scholars believe that the occurrence of linguistic and cognitive disorders rules out a diagnosis of CAPD. In children with SLI (Specific Linguistic Impairment [delayed linguistic development]) or with limited intellectual development, it is impossible to conclusively define the cause of developmental difficulties. That is why the diagnosis of CAPD in children is questionable because difficulties in auditory perception may stem, for example, from language dysfunctions. Moreover, the measuring of auditory skills in most tests requires the knowledge of the language. A survey of research on the interrelationship between language disorders and auditory processing can be found in the study by L.B. Leonard (2006). From this standpoint, one can introduce a division

into specific and non-specific auditory disorders (difficulties) just as in the case of reading and writing difficulties.

There is some ambiguity here about:

- whether we diagnose the **norm** in auditory perception,
- whether we diagnose **difficulties** in auditory perception,
- whether we diagnose **disorders** in auditory processing.

The resolution of this problem appears to be the most important.

When diagnosing specific skills we have to determine the indices of individual auditory functions and standardize ways of measuring them. In the case of children, it is particularly necessary to set norms for individual skills, and consequently, for the defined indices.

The ways of measuring individual abilities are diverse, first of all due to the adoption of appropriate indices. For example, the function of distinguishing sound frequencies or identifying sound frequency patterns can be measured by recognition of tones of different pitch. Is the choice of specific frequencies correctly determined? The determination of developmental norms for individual indices requires appropriate research procedures. Reliable indices for Polish children have not yet been determined. The ones used so far may be questioned (see: Lewandowska, Pluta 2015).

If we do not know norms for individual auditory functions in children we cannot diagnose the occurrence of hearing difficulties, and much less auditory disorders. It is assumed as a rule that we are dealing with the disorder of a skill when the test result is below at least two standard deviations. In diagnosing auditory processing disorders, the American Speech-Language-Hearing Association adopted a rule that the diagnosis of CAPD is confirmed when a deviation was below two standard deviations in at least two tests or below three deviations in one test. A diagnosis should comprise the assessment of at least three basic auditory skills (the so-called gold standard). It is necessary to consider whether an auditory processing disorder can be diagnosed in a four- or five-year-old (this practice has been recently observed in Poland). Does anyone know the norm for two- or three-year olds to point out that we have obtained a result lowered by two standard deviations?

We all remember how often reading and writing difficulties were diagnosed as dyslexia in children in the first school years, without distinguishing difficulties from disorders. Regrettably, this mistake is very common today in the hasty diagnosing of CAPD. In most of the diagnoses of CAPD we are dealing with the occurrence of hearing difficulties rather than central auditory processing disorders.

The occurrence of hearing difficulties in children with learning problems, particularly with reading, writing, and speaking difficulties, is nothing new. Thirty years ago H. Spionek (1981) found that as many as 72.1% of students with school failures had a seriously delayed development of auditory perception (excluding

hearing-impaired children from the tests). She pointed out that the development of auditory functions appropriate for the age is a necessary condition for the correct development of the child's speech, the most noticeable manifestation of delayed auditory perception in early-grade students being specific difficulties in reading and writing by ear. She also demonstrated the influence of hearing difficulties on foreign language learning. In his study on SLI, Leonard (2006) also cites the research results that point to such relationships.

When, a dozen or more years later, I assessed auditory skills in children with language communication disorders, I obtained very similar results (Kurkowski 2013).

From the logopedic standpoint, attention should be drawn to the function of sound discrimination, in particular to distinguishing between sound pitches because frequency is an essential distinctive feature of speech. Although in speech-therapy diagnosis the measurement of distinguishing speech sounds (testing of phonematic hearing) is used, this form of measurement is imprecise. In a test, words are usually spoken slowly, more clearly and more loudly. In everyday conditions, words are spoken faster (being more compressed), less clearly, more quietly and in the environment of other sounds. The immature hearing system cannot cope in such situations. That is why the audiological measuring by the sounds of distorted speech, in noise and given dichotically, will enable demonstration of difficulties in this area. Furthermore, the assessment of the ability to distinguish nonverbal sounds (prephonological level) may provide significant information on the level of development of auditory skills in a child.

A separate problem is the necessity of improving auditory skills in order to achieve a higher level of musical, linguistic, and communicative competence, etc. so as to enhance the quality of life above average. Improving of the level of auditory skills for some specific purpose is also crucially important.

What ideas come to mind after the foregoing problems have been explicated? What positive aspects and threats – from the perspective of clinical work – can I see in accurately diagnosing CAPD and starting appropriate therapeutic procedures in the case of diagnosed hearing difficulties or central auditory processing disorders?

1. The CAPD diagnosis is first of all an audiological diagnosis and has to be made according to a set algorithm, and the person authorized to make one is an audiologist. A psychologist, teacher/educator, logopedist (speech therapist) as well as a therapist, having been trained on courses to use different methods of auditory rehabilitation (e.g. Tomatis, Johansen, or other methods), can diagnose selected auditory skills by using their own testing techniques but this does not authorize them to make a CAPD diagnosis;

2. The CAPD diagnosis requires differentiation from other developmental disorders (above all linguistic, cognitive, ADHD, and ADD). A distinction be-

tween specific and non-specific auditory processing disorders can be introduced. Specific disorders are CAPD in the full sense of the word: we diagnose disorders of auditory functions while there are no peripheral auditory disorders, language development disorders or cognitive disorders (disorders concern auditory modality only). Usually, however, combined difficulties occur – they concern several modalities. A division into idiopathic and non-idiopathic disorders can also be applied. From this point of view, diagnosing should be interdisciplinary with the leading role of an audiologist.

3. One should distinguish between hearing difficulties and central disorders of auditory skills. What is decisive in this case is the determination of developmental indices and adoption of the rule that a disorder means at least two standard deviations. A CAPD diagnosis means finding the disorder of at least two auditory skills or a profound disorder in one of the fundamental auditory functions.

4. In Poland, it is absolutely necessary to develop reliable norms for individual hearing tests and to establish which tests are the basis for diagnosis.

5. The development of auditory functions in children should be stimulated. It is possible to enhance children's involvement in singing and making music because it is an excellent way to stimulate the development of auditory functions.

6. One must not, however, conduct the so-called disease mongering, particularly by making a false and unjustified diagnosis as well as by promising impossible treatment results. These measures are increasingly often observed as being carried out by persons offering the commercial application of auditory therapy methods.

7. Auditory skills concerning physical sounds (prephonological level) and speech sounds (language level) should be assessed from the logopedic point of view.

8. If central auditory processing disorders have been diagnosed, it is necessary to provide access to effective stimulating methods that aid the child's development, particularly the development of speech as well as reading and writing skills. In order to achieve this, the quality of services provided by the National Health Fund's pedagogical-psychological clinics, school doctor's offices, and speech therapy clinics should be enhanced. It is also necessary to improve the quality of diagnosis in audiological care, and to continue auditory processing screening tests, which began in schools (it should be remembered that screening tests are not tantamount to diagnosis).

It appears that actions conducted by commercial entities are a type of disease mongering: attempts to persuade basically healthy people that they are ill, and those slightly ill – that they are seriously ill (this strategy, observable particularly in pharmacological activity, is also called “the corporate construction of disease” and is meant to earn money by convincing people that they are sick).

The diagnosis of some deficit in children with learning difficulties is often also an attempt to justify these difficulties and to evade responsibility for failure to take appropriate pedagogical measures (at home and at school). It is no longer in vogue to diagnose in children “dyslexia”, or “psychomotor hyperactivity”, “autistic features”, etc. It is now in vogue to diagnose “central auditory processing disorders”.

Statistical studies report the 2–3% CAPD occurrence in school-age children. Why then has CAPD been recently diagnosed in Poland in such a large group of school- or even preschool-age children? Is it diagnosed by competent specialists and in accordance with appropriate procedures?

#### BIBLIOGRAPHY

- ASHA, 2006, *Central Auditory Processing: Current status of research and applications for clinical practice*, “American Journal of Audiology”, 5, 41–53.
- Dajos-Krawczyńska, K., Piłka, A., Jędrzejczak, W.W., Skarżyński, H., 2013, *Diagnoza zaburzeń przetwarzania słuchowego – przegląd literatury*, „Nowa Audiofonologia”, 2(5), 9–14.
- Keith R.W., 2005, *Zaburzenia procesów przetwarzania słuchowego*, [in:] *Audiofonologia kliniczna*, red. M. Śliwińska-Kowalska, Łódź.
- Kurkowski, Z.M., 2013, *Audiogenne uwarunkowania zaburzeń komunikacji językowej*, Lublin.
- Leonard L.B., 2006, *SLI – Specyficzne zaburzenia rozwoju językowego*, Gdańsk.
- Lewandowska, M., Pluta, A., 2015, *Zasady i metody normalizacji testów przetwarzania słuchowego*, „Nowa Audiofonologia”, 4(3), 45–50.
- Spionek, H., 1991, *Zaburzenia rozwoju uczniów a niepowodzenia szkolne*, Warszawa.