

COGNITIVE STYLE IN CHILDREN PERCEIVED BY THEIR TEACHERS AS HYPERACTIVE

Małgorzata Lipowska¹, Leszek Buliński²

¹ Institute of Psychology, University of Gdańsk, Gdańsk, Poland

² Gdańsk South Private Health Clinic, Gdańsk, Poland

SUMMARY

Attention Deficit Hyperactivity Disorder (ADHD) is a disorder that occurs in both children and adults, and manifests itself in cognitive and behavioral difficulties severe enough to disrupt important aspects of their lives. The dysfunctions can be grouped into three characteristic syndromes: impulsiveness, hyperactivity, and inattention. Neither a high level of psychomotor activity nor difficulties with attention are thus sufficient grounds for a diagnosis of hyperactivity. Nevertheless, among teachers the term is often overused, so that the majority of pupils who misbehave in the classroom are classified as "hyperactive." These children often receive reprimands and penalties of varying severity for their deviant behavior. The educational style correlates with the preferred cognitive style. The limits placed on the freedom to develop one's own individuality contribute to the formation of a "field-dependent" cognitive style. Our research was intended to determine whether pupils perceived by their teachers as "hyperactive" differ from their peers in terms of the preferred cognitive style. For this purpose we used Witkin's Masked Figures Test and a questionnaire based on DSM-IV diagnostic criteria. The research group consisted of 180 persons: 90 younger school-age pupils identified by their teachers as "hyperactive" and a control group matched for age and gender distribution.

INTRODUCTION

"Hyperactivity" is a popular term for a specific disorder identified by the ICD-10 (WHO 1992) as "Hyperkinetic Disorder" (HK). Although the ICD-10 is formally acknowledged as authoritative throughout Europe, the widely-used appellation from the DSM-IV-TR (APA 2000) is more often used: Attention Deficit/Hyperactivity Disorder (ADHD). This syndrome, regardless of what it is called, is one of the most common developmental disorders among school-

age children. It is also a disorder that is diagnosed relatively early, usually in the early school years, i.e. from age 6 to 9 years.

The earliest reports on hyperactivity attributed the disturbances to "abnormal control of moral behavior" (Still 1902, cited by Barkley 2006), but more recent research on the etiology of ADHD has tended to focus on neurology and genetics. As early as the first decade of the 20th century researchers had already noticed the familial occurrence of hyperactivity, implying a genetic background. The available data suggest that the risk of ADHD if one of the parents is hyperactive may be as high as 50%. The most complete research has been done on monozygote and polyzygote twins, where the results point to a rate of coincidence reaching 80% in monozygote twins, but dropping to 29% in polyzygote twins (Faraone et al. 2005). In addition to population studies, DNA research has also been conducted, using the linkage method, in order to identify the gene responsible for the phenotype of ADHD. There can be no doubt that the transmittal of hyperactivity is a polygenetic mechanism, and that it is a matter of susceptibility rather than determination, i.e. the occurrence of a particular genetic configuration need not necessarily lead to the development of the disorder. In the case of a complex disorder, the underlying pathogenesis is not associated with an "ADHD gene" that directly evokes the syndrome, but rather with a system of many genes, each of which to some small degree modifies the development of the brain, and thus its functioning. A locus associated with susceptibility to the occurrence of a continuous trait is called a "quantitative trait locus" (QTL). Currently genetic research has pointed to several potential *loci* associated with susceptibility to ADHD, primarily genes coding the dopaminergic system; for example, a defective gene for the DR4 dopamine receptor (gene DRD4 on chromosome 11, a 7-fold repeat allele) has been found in 30% of the healthy population, but in 50%-60% of persons with ADHD (Biederman et al. 2002). The genes for the D5 dopamine receptor (DRD5), the transporter dopamine beta hydroxylase (DBH), and protein 25kD (Snap 25) have also been implicated (Barr 2001). Research in behavioral genetics has indicated that ADHD may be as much as 70% hereditary (Plomin et al. 2001). Only in the case of autism has a higher genetic factor been discovered in the etiology of a childhood behavioral disorder.

Apart from genetic research, the application of new neuro-imaging techniques to cerebral structure and function has revealed numerous neuroanatomical anomalies. In children with ADHD there is a 3-4% reduction in the volume of the entire brain and the cerebellum; the differences involve primarily frontal cortex, the basal ganglia, the cerebellum, and the corpus callosum (Castellanos 2002). Since these anatomical changes are associated with specific patterns of information processing, ADHD can safely be considered a neurodevelopmental disorder. Moreover, research points to abnormalities in the connectivity between cortical and subcortical structures, which is also associated with abnormal regulation of dopamine and noradrenaline (Faraone et al. 2005).

Despite the frequency of occurrence of this syndrome and the amount of scientific and clinical research that has been done, there are considerable divergences in reports regarding the epidemiology of ADHD in various countries. In the US, a frequency rate of 7% has been reported (Barkley 2006), in England less than 1%, in China from 2% to 13% (Mann et al. 1992), and in Poland 6.6% (Kołakowski et al. 2007). This situation reflects not only cultural differences regarding what is expected of "normal" behavior, but also the lack of unified diagnostic criteria. A strict comparison of precise data regarding the frequency of occurrence of ADHD in different countries is not entirely feasible, since different diagnostic criteria and evaluation techniques are in use. This in turn results at least partly from the fact that the ICD-10 and DSM-IV-TR systems are not fully in agreement concerning the definition of hyperactivity.

According to the ICD-10 (WHO 1992), the diagnostic criteria for "hyperkinetic syndrome" include inattention, excessive mobility, and impulsiveness to such a degree that the child's functioning is impaired or inadequate to the calendar age. The classification found in the DSM-IV-TR (APA 2000), on the other hand, conditions the diagnosis of ADHD on patterns of inattention and/or overactive, impulsive behavior, occurring more often and more seriously than in other individuals at the same stage of psychomotor development. The difference may appear to be trivial, but in practice it significantly alters the diagnostic process. In those countries where the ICD-10 system is used to diagnose mental disorders, those children who present significant attention deficits or are overly mobile, but do not meet both criteria at once, may be excluded from the diagnosis of hyperactivity. Test results pointing to hyperkinetic disorder (HKD) are perhaps comparable to the mixed type of ADHD, but not to the sub-type with predominant inattention or excessive activity and impulsiveness (Barkley 2006).

Early diagnosis is without a doubt essential, and increases the opportunity to implement therapeutic measures, or in extreme cases pharmacological treatment, yet all too often the label "hyperactive" is applied too quickly and too easily. The problems with diagnostic accuracy in ADHD are caused by the multiplicity of symptoms and the inability to state precisely the point at which the intensity of a given type of behavior becomes an indicator of pathology. If one carefully observes the behavior of pre-school children who show no symptoms of disturbance, there appear many behaviors listed among the diagnostic criteria for ADHD (Arnold 1996). Such behaviors as inattention, impulsiveness, motor restlessness, or misbehavior occur in all children to some extent; the diagnosis of hyperactivity is made, not simply because such behaviors occur, but because the intensity and duration of such behavior is inappropriate. This unavoidable area of reasonable judgment may contribute to the formation of certain prejudices on the part of the observer. Very often, the individual who makes the early diagnosis and pins the label "hyperactive" on the child (all too frequently misleading) is a teacher.

"Hyperactivity" is very commonly ascribed to children by their teachers. The teacher's perception of hyperactivity may be associated, however, more with the pupil's assumption of a particular attitude towards the world and herself, than with a particular cognitive disorder of cerebral origin. Over the longer term, the persistence of a false perception of the child causes negative consequences for the formation of personality. The child gradually learns to anticipate the teacher's expectations and react to them accordingly, which coincides with the feeling of being externally controlled among children labeled "hyperactive" by their teachers (Lipowska 2004). School is a highly structuralized institution; all the classes are very similar to each other, and the time frame of each day is established by adults. The dominant relational system in the class is non-personal. The pupils are obliged to do what the teachers tell them to do, though neither party actually knows the other very well. All the children are bound by the same principles at the same time, regardless of the child's individual preferences at a given moment. An essential element of maturity in school age is the skill of doing what the teacher says, including sitting at one's desk for the entire duration of the lesson, which may be up to 45 minutes. For most pupils this is a very difficult behavior, standing in direct opposition to the natural need for movement. Many children, especially boys, are simply not able to conform to these rules, and this evokes disapproval from the teachers. The term "hyperactivity" is well known to teachers, which unfortunately does not always mean that the diagnosis is accurate. Many teachers lack the patience or the means to help pupils acclimate to the completely new conditions created by the school environment; it is much easier to label the boy who cannot sit still at his desk "hyperactive," than it is to think up ways of conducting lessons in such a way that the children can manifest various forms of activity. The label "hyperactive" relieves the teacher of responsibility for the behavior of the pupil, because she can be said to have a "disturbance," which by definition lies outside the teacher's professional competence.

The tendency to hasty labeling of children as hyperactive also results from the way the diagnosis is established, since there are no objective tests that would establish once and for all whether or not the child has ADHD. In order to make the diagnosis, the specialist must take a history, observe the child's behavior, and perform a number of psychological and neuropsychological tests to describe how the child functions. It is not at all rare for a child who is simply a "live wire" to be assessed by her parents or teachers as hyperactive, despite the absence of diagnostic signs of ADHD (Lipowska 2003). Another trait that may steer the adult observers' attention in the direction of hyperactivity is the child's preferred method of cognitive functioning. Large-scale research on the cognitive functioning of children with ADHD around the world (Willcutt et al. 2005) and in Poland (Borkowska 2006) has identified a specific way of functioning in this children. In the neuropsychological diagnosis of ADHD a great deal of weight is attached to executive functions,

memory, and of course attention. However, it is essential to emphasize the qualitative and quantitative aspects of the differences in cognitive functioning in this group of children; the specificity of their cognitive functioning cannot be limited to the formal aspects of cognition (Barkley 2006). However, in the case of children who are merely perceived by their teachers as hyperactive, the hasty labeling is done on the basis of the formal aspect of their behavior. It is the manner, and not the substance of the child's cognitive functioning that may cause the pupil to be classed "hyperactive."

A relatively stable, generalized, and preferred manner of behaving and functioning on the cognitive level is referred to as a "cognitive style" (Matczak 1982). What is essential to cognitive style is individual differentiation in the ways in which information originating from both the outer and inner environment is organized and processed. Cognitive style is a manifestation of how cognition occurs, and is independent of the contents of thought or the level of cognitive ability (Messick 1996). Of course the manner of cognitive functioning is marked by the differing cognitive capabilities possessed by different persons, e.g. the level of intelligence differentiates the types of behavior available to the individual and likely to be chosen in a particular situation. The situation itself, however, can also modify the type of action (Matczak 2000); we quite often change behavior and ways of functioning, in order to adapt to concrete situational demands. Sometimes, for adaptational reasons, it is even possible to choose to act on a level lower than one's cognitive capabilities allow, when that is most adequate to the circumstances.

Apart from the possibilities of the individual and the specific features of the concrete situation, cognitive functioning also depends on cognitive preferences. As Matczak states (1982:10, translation mine), "among the available methods of functioning available to a given person at a given time, there are some which she is inclined to use more often than others." Naturally this should not be taken to mean that a given person is not able to alter the manner of action when the circumstances demand it, but rather that, absent situational constraints, she will choose the method that most corresponds to her preferences.

The fullest definition of cognitive style has been proposed by Nosal (1990: 147):

Cognitive style involves a relatively stable method of organizing cognitive tasks, by means of which the individual reaches an equilibrium between her individuality, conditioned by temperament and personal experience, and the objective demands of the environment, the situation or task. In terms of behavior, qualitative differences occurring in the course of cognitive processes correspond to cognitive styles. In terms of the basic mechanisms specific variants in the organization of information processing programs correspond to specific styles.

This means that by applying particular cognitive styles the individual can compensate for her limitations in the cognitive sphere and make use of her strong points, by choosing the manner of functioning that is most convenient for her. Much research has been done on the link between cognitive styles and both intelligence and personality; the results suggest that styles are a manifestation of personality, understood as a system of overarching mechanisms that regulate the entirety of the individual's functioning, and thus her cognitive processes as well (Matczak 2000).

The most popular conceptions of cognitive styles, based on a broad spectrum of research, have been developed by Kagan (1966) and Witkin (Witkin et al. 1977).

According to Kagan's concept (1966), cognitive style is an individually differentiated method of organizing perceptions and categorizing concepts. The criterion differentiating styles is the tendency to analyze in a particular way the adequacy of possible answers to a given cognitive problem. His analysis of subjects' behavior during problem solving in a situation of uncertainty allowed Kagan to differentiate methods of cognitive functioning in terms of the number of errors committed and the reaction speed (Strelau 2002). Kagan introduced the construct of impulsiveness-reflectivity, which is currently regarded as one of the most important dimensions of cognitive styles.

Witkin, in turn, along with his collaborators (1977), on the basis of their research in the 1960s and 70s, defined cognitive style as:

a global, bipolar dimension of the psyche, corresponding to the form of cognitive activity, i.e. individual differences in respect to how we perceive, think and learn in comparison to other people (cited by Nosal 1990:141).

The measure of cognitive style in Witkin's approach is what he called "field-dependence" and "field-independence." At one end of the scale are persons with a tendency to holistic perception, in which "parts are experienced as blended into the whole"; at the other are persons with a tendency to break through the settled organization of the perceptual field, to distinguish particular parts and perceive them as objects independent of the field (Witkin et al. 1977). The field-dependent style was termed by Witkin "global," while the field-independent was called "analytical." Referring to this terminology, Nosal (1990) argued that the independent style can be classified as an active-analytical orientation (articulated), while the field-dependent style is a passive-global orientation (global).

Individual differences in respect to field-dependence or independence appear as early as the preschool years. With age this dimension can prove to be variable: from school age to maturity there appears an intensification of field-independence, especially at ages 10-17. In later adult life, especially after age 60, there is a dramatic drop in field-independence (Witkin et al. 1977). Research on field dependence and independence has also pointed to gender differentiations in this respect. Women are generally more field-de-

pendent; this difference becomes manifest after age 8 and persists for many years, until it disappears in late old age. Multicultural studies have indicated that the source of inter-gender differences in this case may well be the economic and social status ascribed to women in a given society. On the basis of their data they reached the conclusion that a differentiated field-dependent or field-independent cognitive style takes shape in the context of the socialization process (Strelau 2002).

Essential data regarding the linkage between the preferred cognitive style and actual functioning have been provided by studies of the relations between styles and educational achievements. Radziłłowicz (2004) indicates that a field-independent style is associated with a more mature pattern of strategic behavior while learning school texts and general self-regulation while learning at school. Czerniawska (2000) in turn argues that pupils with a field-independent style are less susceptible to environmental distracters in a situation requiring concentration of attention. When this information is related to a group of children perceived by their teachers as hyperactive, one would expect to find in them the dominance of a field-dependent style. On the other hand, however, the dependent style is associated with conforming to the rules of social functioning, while the inaccurate identification of a child as hyperactive often results from the evaluation of her behavior as "naughty." Thus it would be possible to suggest an alternative hypothesis that these pupils display a field-independent cognitive style.

MATERIAL AND METHODS

Our research was intended to address the question of whether or not pupils perceived by their teachers as hyperactive differ from their peers in terms of cognitive style. For this purpose we used the Embedded Figures Test (EFT, Witkin et al. 1971) and the Eysenck Personality Inventory in an authorized Polish adaptation for children in early school age (Stawowska 1989). In order to measure the intensity of the features characteristic for hyperactivity, we also constructed a survey questionnaire based on the DSM-IV symptoms of psycho-motor hyperactivity. The cooperation of homeroom teachers was thus essential in conducting the research, since they were the ones who had the task of choosing from among their pupils those they considered to be hyperactive.

The children who were selected completed the EFT, where the subject is asked to find a simple figure embedded in a complex pattern. Two radically different kinds of task performance characterize persons with a field-dependent or field-independent cognitive style. Quick and easy recognition of the simple figure in a complex structure, the ability to abstract from the displayed perceptual field, and the application of internal criteria are signs of the independent style. Protracted times for task solution, frequent failure (associated with a tendency to fixate on the exposed perceptual stimulus), and a reliance

on external control are characteristic for the field-dependent style (Witkin et al. 1971).

Our research involved 180 subjects: a group of 90 third-grade pupils from a primary school identified by their teachers as hyperactive and a control group matched to the experimental group for age and gender.

RESULTS AND DISCUSSION

At the outset of our study we were struck by the disturbingly high number of children identified by their teachers as hyperactive. The homeroom teachers often stated that 10 or even 15 of the 30 children in their class were hyperactive, while statistics indicate an actual occurrence of around 6% nationwide (Kolakowski et al. 2007). This overestimate seems to result, first of all, from the ambiguity of the diagnostic criteria, and secondly from the inadequate knowledge base of teachers on that subject. Additional difficulties are caused by the way in which attention and inattention are defined. From the point of view of neuropsychology attention is listed among the basic cognitive functions, whose role is to filter information from the environment (Pachalska 2007). The pupil in the first years of primary school does not classify information as essential or non-essential in the same way as the teacher. Concentration on a friend's behavior is not perceived by the child as misplaced attention, but may be perceived by the teacher as a symptom of hyperactivity.

Our first research hypothesis dealt with differences of preferred cognitive style in children perceived by their homeroom teachers as hyperactive (the experimental group) and children from the control group. According to the present authors' working assumptions, a field-dependent cognitive style is associated with extended performance time and a greater number of errors and quits (Witkin et al. 1971). The results we obtained are presented in Fig. 1.

As expected, the children perceived as hyperactive had a significantly lower number of correct answers as a group ($t = -3.23$; $p = 0.001$) and a greater number of errors ($t = 3.23$; $p = 0.001$), which are both markers of

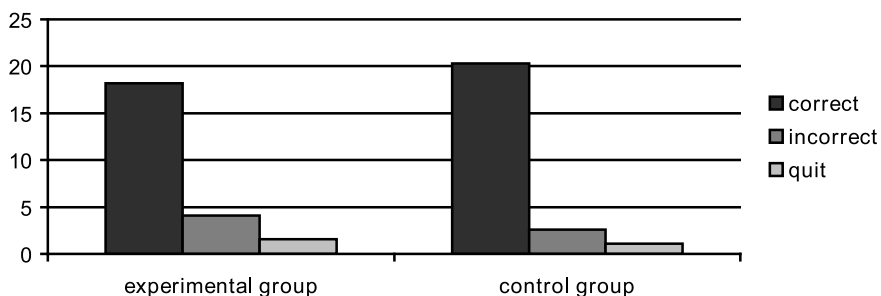


Figure 1. Mean number of correct responses, incorrect responses and quits in the Embedded Figures Test

a field-dependent cognitive style. This confirms the preliminary assumption that the hasty classification of children as hyperactive may result from a purely formal characteristic of their cognitive functioning. Accordingly, we compared the percentage distribution of children with particular types of cognitive style in the experimental and control groups (Fig. 2).

An analysis of the data indicates clearly that the groups differed significantly ($t = 3.23$; $p = 0.001$); in the group of children perceived as hyperactive the field-dependent cognitive style is dominant. Field-dependent children have a tendency to appeal to external guidelines, which makes them more susceptible to distraction and hinders their ability to concentrate (Billargeon et al. 1998). This is not, however, a sufficient reason to diagnose a pathological condition, such as ADHD. Such children may, however, behave in such a way as to attract the teacher's attention - and the label "hyperactive."

As indicated by research (Matczak 2000), field dependency results from an autocratic style of upbringing. Children who are raised in conditions of limited independence and strict discipline show a marked tendency to base their judgments on indicators provided by the environment: when amassing self-knowledge, external standards, such as information provided by other people, serve as the basic source of information, and when analytical problems are being solved it is difficult for them to abstract from the context of the task. Pupils who are frequently scolded by the teacher, often publicly, will try to meet her expectations, which further intensifies the tendency to be guided by the external environment. And this is precisely what characterizes the field-dependent style.

It should be borne in mind, however, that cognitive style is a manifestation of personality. (Matczak 2000). Consequently, we also performed an analysis of the dependency of cognitive style on personality features (Fig. 3).

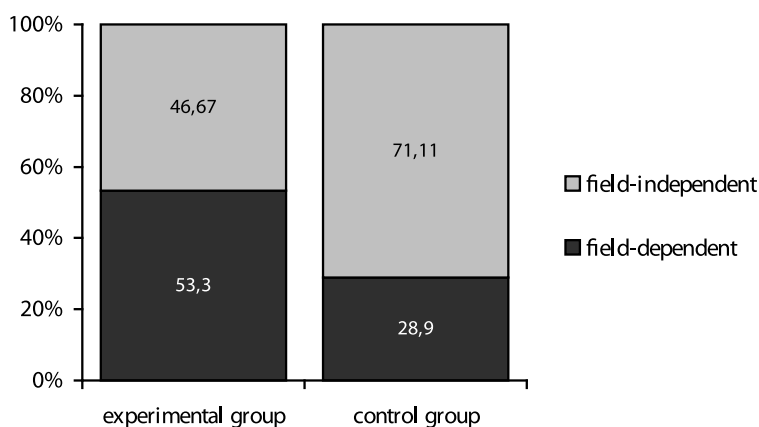


Figure 2. Types of cognitive style

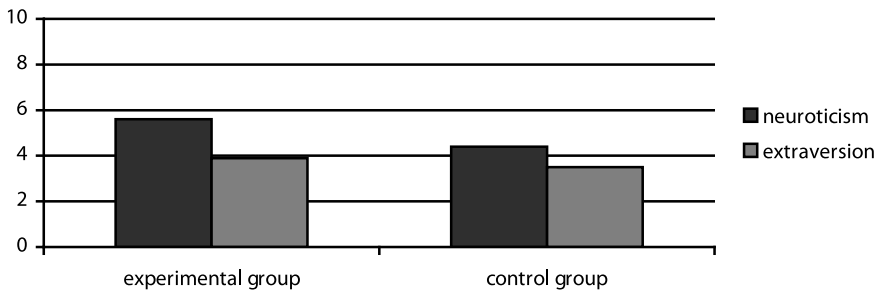


Figure 3. Dependency between cognitive style and the personality characteristics of neuroticism and extraversion

The two study groups differed significantly in terms of the intensity of neuroticism ($t = 3.49$; $p = 0.001$), but no differences were seen in the level of extraversion. The children perceived as hyperactive were characterized by a high level of neuroticism, which reflects the extent of the individual's emotional adjustment, including her susceptibility to experiencing negative emotions, such as fear or guilt. In addition, high intensity of this characteristic is associated with low resistance to psychological stress (Strelau 2002). Research on a world scale indicates that persons with a high level of nervous tension are described as restless, easily aroused, often convinced in advance that they will experience disaster in their undertakings. In a word, their reactions to psychologically and environmentally stressful situations is inordinately nervous. More neurotic pupils may appear to the teacher to be children who have difficulties in concentration, easily distracted by external stimuli.

Extraversion, however, remained in conjunction with the preferred cognitive style. Our results indicate that the higher the level of extraversion, the greater the field independence ($r = 0.45$; $p = 0.000$). These data are in contradiction to the reports by Singh and Gujonsson (1992), who found that children with a field-dependent cognitive style are characterized by an interpersonal orientation.

CONCLUSIONS

Cognitive style is a manifestation of the manner of cognition regardless of the level of cognitive abilities, and thus it pertains only to the form of cognition. The research presented here indicates that the manner of functioning of these children, their tendency to rely on prompts from the environment, or their relative independence essentially differentiate how the children are perceived by their teachers. Among a group of 90 pupils from three classes identified by their homeroom teachers as hyperactive there were significantly more children with a field-dependent cognitive style. The children perceived by their teachers as hyperactive often meet with reprimands and more or less severe penalties for their behavior, which is taken to be deviant. Their activi-

ty is strictly supervised by adults, both in school and at home. It would seem to be a reasonable assumption that children perceived as hyperactive more often (in comparison with their "non-hyperactive" classmates) are raised in an autocratic spirit. The lack of freedom and possibilities for the development of one's own individuality contribute to the formation of a cognitive style that can be identified as field-dependent.

Moreover, these children were characterized by a significantly higher level of neuroticity. Much research has emphasized the link between neuroticity and attention processes (Pachalska 2007), and in particular with difficulties in maintaining concentration. This cannot be the basis, however, for diagnosing a child with ADHD. Unfortunately, "hyperactive child" is one of the labels most commonly used by teachers in regard to their pupils. Epidemiological data from around the world suggest that this disorder occurs in considerably less than 20% of children, and perhaps much less. If we were to trust the assessment of their teachers, however, nearly half of all primary school children, including almost three-fourths of the boys, would be hyperactive. Inadequate knowledge on the part of teachers and the lack of sharp diagnostic criteria are often the reason for overestimating the importance of behavior as an indicator of pathology. The most important element in counteracting the harmful effects of the mistaken classification of a pupil and treating her as a "typical example of pathology" is proper diagnostics and early, appropriate intervention, e.g. by individualization of the way children are treated. This is a task that requires engagement from the teacher, which is often impossible in a 30-pupil class. Raising the level of awareness of the problems of hyperactivity and differentiating it from behavior that results from the intensity of certain traits of temperament (Lipowska 2003), or the typical patterns associated with a particular phase of development or a method of cognitive functioning, would allow many pupils to avoid the pathological label and the negative consequences it entails.

REFERENCES

- Arnold, L.E. (1996). Sex differences in ADHD: Conference Summary. *Journal of Abnormal Child Psychology*, 24, 555-569.
- American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision). Washington, DC: Author.
- Barkley, R.A. (2006). *Attention-deficit/ hyperactivity disorder - A handbook for diagnosis and treatment*. New York: The Guilford Press.
- Barr, C.L., Feng, Y., Wigg, K., Schachar, R., Tannock, R., Roberts, W., Malone, M., Kennedy, J.L. (2001). The 5' untranslated region of the dopamine D4 receptor gene and attention deficit hyperactivity disorder. *Biological Psychiatry*, 105(1), 84-90.
- Biederman, J., Spencer, T., Wilens, T. E., Faraone, S. V. (2002). Overview and neurobiology of Attention-Deficit/ Hyperactivity Disorder. *Journal of Clinical Psychiatry*, 63, 3-9.
- Billargeon, R., Pascal-Leone, J., Roncadin, C. (1998). Mental-attentional capacity: does cognitive style make a difference? *Journal of Experimental Child Psychology*, 70, 143-166.
- Borkowska, A. (2005). Impulsywność poznawcza w zespole ADHD. *Psychologia Rozwojowa*, 10 (3), 145-156.

- Castellanos, F.X., Lee, P.P., Sharp, W., Jeffries, N.O., Greenstein, D.K., Clasen, L.S., Blumenthal, J.D., James, R.S., Ebens, C.L., Walter, J.M., Zijdenbos, A., Evans, A.C., Giedd, J.N., Rapoport, J.L. (2002). Developmental trajectories of brain volume abnormalities in children and adolescents with Attention-Deficit/Hyperactivity Disorder. *Journal of the American Medical Association*, 288, 1740-1748.
- Czerniawska, E. (2000). Zależność-niezależność od pola a osiągnięcia szkolne. *Nowiny Psychologiczne*, 3, 45-54.
- Faraone, S.V., Perlis, R.F., Doyle, A.E., Smaller, J.W., Goralnick, J.J. (2005). Molecular genetics of Attention-Deficit/Hyperactivity Disorder. *Biological Psychiatry*, 57, 1313-1323.
- Kagan, J. (1966). Reflection-Impulsivity: The generality and dynamics of conceptual tempo. *Journal of Abnormal Psychology*, 71(1), 17-24.
- Kołąkowski, A., Wolańczyk T., Pisula, A. Skotnicka, M., Bryńska, A. (2007). ADHD – zespół nadpobudliwości psychoruchowej. Przewodnik dla rodziców i wychowawców. Gdańsk: GWP.
- Lipowska, M. (2003) Nadpobudliwość w oczach nauczycieli - temperament czy zaburzenie. In: B. Wojciszke & M. Plopa (ed.). *Osobowość a procesy psychiczne i zachowanie* (pp. 405-422). Kraków: Impuls.
- Lipowska, M. (2004). Poczucie umiejscowienia kontroli u dzieci spostrzeganych przez nauczycieli jako nadpobudliwe psychoruchowo. *Psychologia Rozwojowa*, 4, 135-144.
- Mann, E.M., Kieda, Y., Mueller, C.W., Takahashi, A., Tai Tao, K., Humris, E., Ling Li, B., Chin, D. (1992). Cross-cultural differences in rating hyperactive-disruptive behaviors in children. *The American Journal of Psychiatry*, 149, 1539-1542.
- Matczak, A. (1982). *Style poznawcze. Rola indywidualnych preferencji*. Warszawa: PWN.
- Matczak, A. (2000). *Style poznawcze*. In: Strelau, J. (ed.). *Psychologia. Podręcznik akademicki*. Gdańsk: GWP.
- Messick, S. (1996). Bridging cognition and personality in education: the role of style in performance and development. *European Journal of Personality*, 10(5), 353-376.
- Nosal, Cz. (1990). *Psychologiczne modele umysłu*. Warszawa: PWN.
- Plomin, R., DeFries, J.C., McClearn, G.E., McGuffin, P. (2001). *Genetyka zachowania*. Warszawa: PWN.
- Pachalska, M. (2007). *Neuropsychologia kliniczna: Urazy mózgu. t. 1*. Warszawa: PWN.
- Radziwiłłowicz, W. (2004). *Rozwój poznawczy dzieci w młodszym wieku szkolnym*. Kraków: Impuls.
- Stawowska, L. (1989). *Psychologiczna diagnoza w sporcie wyczynowym*. Katowice: Wydawnictwo AWF.
- Strelau, J. (2002). *Psychologia różnic indywidualnych*. Warszawa: Scholar.
- Willcutt, E.G., Pennington, B.F., Olson, R.K., Chhabildas, N., Hulslander, J. (2005). Neuropsychological analyses of comorbidity between reading disability and attention deficit hyperactivity disorder: in search of the common deficit. *Developmental Neuropsychology*, 27(1), 35-78.
- Witkin, H.A., Oltman, P.K., Raskin, E., Karp, S.A. (1971). *Manual Embedded Figures Test*. Palo Alto: Consulting Psychologist Press.
- Witkin, H.A., Moore, C.A., Oltman, P.K., Goodenough, D.R., Friedman, F. (1977). Role of field-dependent and field-independent cognitive styles in academic evolution: a longitudinal study. *Journal of Educational Psychology*, 69(3), 197-211.
- World Health Organization (1992). *The ICD-10 classification of mental and behavioral disorders: Diagnostic criteria for research*. Geneva: Authors.

Address for Correspondence:

Dr. Małgorzata Lipowska, Institute of Psychology, ul. Pomorska 68,
80-925 Gdańsk-Oliwa, Poland. e-mail: psym1@univ.gda.pl

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