RELATIONS OF INFORMATION PROCESSING SPEED TO INTELLIGENCE AND PERSONALITY CHARACTERISTICS IN HIGH ABILITY SCHOOL STUDENTS

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INTRODUCTION

Speed of information processing (SIP) is the ability to perform simple, time-limited tasks effectively. The review of researches on the relationship between intelligence and SIP indicates the meaningful correlations between a variety of intelligence and mental speed measures (3). A person’s SIP is perceived as his intelligence manifestation in scientific studies and daily life. Both high intelligence and high SIP are associated to successful and fast learning, problem solving, making of decision. Many evidences suggest that SIP may be related to general and special (mathematics, musician, etc.) giftedness and higher academic achievement in gifted children and adults. The studies with the ZVT (Number Connection Test) to measure SIP support that SIP is integral component of general intelligence (1; 2). They show that SIP impacts higher intellectual abilities, which effect school performance, so SIP operates likely mediator. The Munich Longitudinal Study of Giftedness based on a multidimensional giftedness concept included investigation of the development and role of the SIP in the gifted secondary school students (1). The cognitive abilities were measured with the German Cognitive Abilities Tests (KFT) for gifted children and the ZVT-measure as a good indicator of general intelligence. To sum up the literature regarding the relationship between intelligence and SIP we conclude that it is inconsistent, especially about the comparison of high ability and ordinary school students. **The purpose of our study** was to examine the interrelations of SIP to intelligence and personal characteristics in school children with average and high intelligence.

1. Heller K. A. (2010). Munich studies of giftedness. Berlin: Verlag.
2. Oswald W. D. (2016) Zahlen-Verbindungs-Test. 3 Aufl. Göttingen: Hogrefe. 3. Sheppard L. D., Vernon P. A. (2008). Intelligence and speed of information processing: A review of 50 years of research. *Personality and Individual Differences*, 44(3), 535-551.

METHODS: We used the following methods: the Number Connection Test - ZVT by W.Oswald; the Cognitive Ability tests (verbal, quantitative, nonverbal, and general abilities); the Questionnaires on Anxiety and Self-Concept; School Achievements. **PARTICIPANTS:** A total 120 students (equally boys and girls) were investigated two times: in grades 9 (14-16 years) and 11 (16-18 years). They represented two groups. The control group included 60 ordinary (unselected) students, and the gifted group included 60 students preliminary selected according to the teachers' ratings and testing of abilities (the top 10 %). **RESULTS:** We applied an independent samples t-test to investigate the gender differences between the ZVT-variables in the high ability and control groups of grades 9 and 11. There were no significant gender differences in the SIP (Table 1). The same comparisons of the ZVT-variables between the gifted and control groups showed that the gifted both boys and girls carried out the tests significantly faster than their ordinary age-peers. On the whole, the SIP in the gifted group are significantly higher than that in the control group in both 9 and 11 grades.

Table 1. Means and SD of the ZVT-scores					
Grade	N	Gender	Gifted	Control	p
9	30	Boys	2.3(.47)	2.0(.44)	.023
	30	Girls	2.3(.32)	1.9(.33)	.000
	60	All	2.3(.40)	1.0(.39)	.000
11	30	Boys	2.6(.45)	2.3(.50)	.027
	30	Girls	2.5(.37)	2.3(.34)	.013
	60	All	2.6(.42)	2.3(.43)	.001

The correlation analysis demonstrated high stability of the ZVT-variables between the results of 9 and 11 grades ($r = .71$; $p < .001$). The significant positive correlations were observed between the ZVT-variables and the intellectual abilities. These correlations were higher for the quantitative, nonverbal and general intelligence, but lower for the verbal intelligence as well as academic self-concept and achievement (see Table 2). In contrast, the significant correlations between the ZVT-variables and the manifestations of anxiety were low and negative. In two years, the correlation patterns did not almost change. Besides, the correlations in grade 11 were close with the correlations between the variables in grades 9 and 11. The results of variance analyses (ANOVAs) showed the influence of the level of SIP (ZVT-score) in grade 9 on the intellectual abilities and general intelligence (KFT-HB) in grades 9 and 11 (See Figures). The influence of speed level on intelligence is statistically significant only for the control group (with different levels of intelligence) both in 9 and 11 grades, but not for the intellectually gifted group.

DISCUSSION: The results showed a significant growth of the SIP with age in the secondary school students. At that the intellectually gifted students significantly exceeded their ordinary age-peers on these variables in the grades 9 and 11. There were demonstrated high stability of the SIP and its significant positive interrelations to the quantitative, nonverbal, and general intelligence. No gender differences were revealed. The SIP level influenced intelligence only in the control group not in the high ability group. Overall, the findings support the usefulness of the SIP-measure as a component in identification of giftedness in the secondary school students.

Table 2. Pearson correlations of ZVT-scores (n = 120)			
Variable	ZVT 9		ZVT 11
	9 grade	11 grade	11 grade
Verbal abilities	.25**	.29**	.21*
Quant.abilities	.54***	.40***	.44***
Nonverb.abilities	.53***	.45***	.46***
Intelligence	.55***	.46***	.46***
Achievement	.18*	.20*	n.s.
Self-Concept	.24**	.20*	.20*
Fear of Failure	-.27**	-.25*	-.34***
Emotionality	-.22*	-.19*	-.21*
Instable Thinking	-.20*	-.21*	-.30**
Notes: * p < .05; ** p < 0.01; *** p < 0.001.