Motor timing and high level of mental ability

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Temporal information processing seems to be more related to the general intelligence level than classical measures of mental speed. A large body of experimental evidence has suggested that the rate of brain 'clock' systems determines temporal aspects of information processing (e.g. perception, speech or working memory, or motor activity). Timing control of voluntary movements has been a neglected topic in the existing studies on neuropsychological basis of intelligence.

As Arthur R. Jensen (2006) claim the term - *gifted* – commonly used in psychology of individual differences, refers to "a high level of general mental ability or psychometric g, witch is typically associated with accelerated progress in scholastic achievements". Accordingly, the present study investigated differences between temporal control of repetitive finger movements in gifted (GI) and nongifted individuals (NI).

GI and NI groups were tested using two conditions of finger-tapping tasks: performed in a maximum or in personally chosen tempo. Both these tasks were performed separately with the right and left hand. Two parameters of movement were analyzed: motor *preparation* and motor *execution*.

Analysis of linear statistics and nonlinear elements for reconstruction of dynamical properties of motor timing, revealed significantly faster and more stable performance on the maximum than on personal tempo in both groups. A clear dissociation between groups was found for the

movement preparation in the maximum tempo. The NI group tapped faster with the right hand than with the left one. Such difference disappeared in the GI group, who performed with the right and left hand on the similar level. In personal tempo GI group tapped faster and significantly more stable than NI.

These findings suggest: (1) more efficient temporal information processing in GI individuals in comparison with NI subjects; (2) the involvement of the right cerebral hemisphere in timing motor control in GI. Additionally, results support the notion that motor control may be dependent on more than one timing mechanism.

Supported by grant nr 1H01F09430. The project of this study was accepted by the Ethics Committees of the Warsaw School of Social Psychology in Poland (7/I/06-07/E).