

INDIVIDUAL DIFFERENCES IN MOVEMENT-RELATED POTENTIALS
DURING A SKILLED TASK

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During the execution of a motor perceptual task, movement-related potentials are recorded related to preparation (Bereitschaftspotential-BP), execution (Motor Cortex Potential) and evaluation of results (Skilled Performance Positivity-SPP). Different levels of performance have been observed related to age and practice in a group of 119 normal, right-handed subjects aged between 6 and 38 years.

The research consists in testing which of the movement-related potentials separates subjects with good performance from those with poor results. The subjects were requested to perform a self-paced left hand button-press which had as a result the initiation of the sweep of an oscilloscope. The sweep had to be stopped by a right hand press within 40-60 msec from its initiation. The distance from this time interval was considered as degree of performance accuracy and defined as performance shift. For 8 age groups the expected performance shift was calculated on which the subjects were divided in good and poor performers and the movement-related potentials of each subject were averaged accordingly. They were recorded unipolarly from FPz, Fz, Cz, Pz, RPC, LPC, P4, P3. EMG and EOG were also recorded. The EEG and EMG signals were sampled for 3.2 secs at 250 Hz. Student's t test and discriminant analysis were performed. In each age group the SPP discriminates the good from the poor performers. After the age of 10, the SPP of the poor performer is of significantly lower amplitude in the frontal, central and right precentral areas in comparison to the subjects with good performance. In the parietal areas the SPP does not differ between the two groups, suggesting that, the perceptual analysis processes, in these areas, take place in a similar fashion during good and poor performances. The SPP may be considered as a neurophysiological indexes of learning processes; it has not a univocal significance but depends from age and recording location.