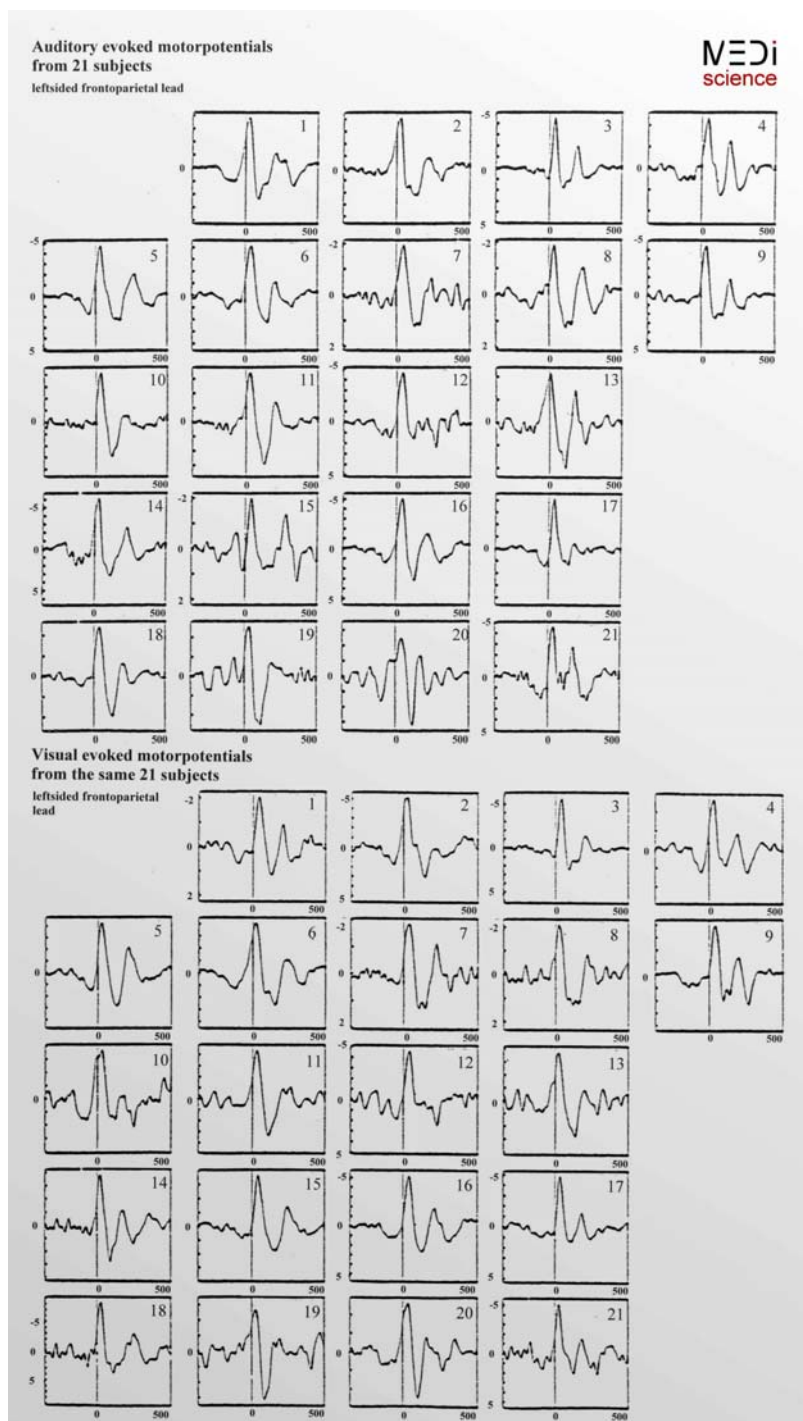


Inter- and intrasubject reliability of response related brain potentials extracted by the CDA-method by G.K. Schenk and I.M. Schenk



The figure above shows the intersubject as well as the intrasubject reliability of reaction correlated motor potentials of the brain extracted by means of CDA (Crossed Double Averaging). It is taken from the monograph on „The predictive brain. Prediction theory of conscious behavior“ (in preparation). The EEG signals for this figure were depicted by bipolar precentral-parietal (F3-P3) leads during an auditory as well a

visual P3-oddball Go/NoGo reaction time paradigm (Bernoulli order, random ISI 1.1 to 4.1 sec, single sweep time 912 ms, 612 scans per sweep). The subjects were instructed to respond to the frequent (Go-) stimulus as quick as possible, but not to the rare (NoGo-) stimulus. The auditory stimuli were the following tones: 1. 800 Hz, 65 dB, 40 ms, 85% 2. 1400 Hz, 65 dB, 40 ms, 15%. The visual stimuli were horizontal (85%) or vertical (15%) black

bars on a white 30x30 cm square (viewing distance 150 cm). The subjects were supposed to lift the right sided indexfinger und to return the finger immediately back to the initial „readiness“-position as the Go-reaction. The reaction movements gave rise to extension onset and flexion offset flags. The average number of reactions per subject was 252 +/- 15. The extraction of the reaction correlated motor potentials of the brain by means of CDA followed the guidelines outlined in Schenk & Zerbin (1986), in Schenk (1988) and in the internet publication of Schenk & Schenk (2002, www.MEDscience.de).

In the upper half of the figure are shown the response related brain potentials due to auditory Go-stimuli, whereas the lower half displays these potentials due to visual Go-stimuli. The same subject was always given the same number in the upper and lower half of the figure. Also the follow up sequence of the subjects (1 to 21) is the same in both halves of the figure.

An impressingly high intersubject reliability may easily be recognized in both halves of the figure. Such a high degree of intersubject reliability due to an identical

finger movement must be demonstrated to proof CDA a valid method for extracting brain potentials correlated with reaction movements.

Furthermore a superior intrasubject reliability is shown by this figure if one compares the results in the upper and lower half. One may immediately recognize that reaction correlated motor potentials of the brain can be extracted with a very high stability if repeated measurements based on identical reaction movements in the same subject are performed. And last, but not least, the figure is in proof of a strict independence of reaction correlated motor potentials from the sensory modality of the stimulus which is causing the reactive motor behavior. The independency of reaction correlated motor potentials from stimulus related sensory modality is a basic proof of the motor specific nature of the CDA-extracted reaction correlated brain potentials.

Keywords: P3 paradigm, selective stimulus response behavior, visual stimuli, auditory stimuli, reaction correlated CDA-potential, CDA-motor potential, intersubject reliability, intrasubject reliability, motor specificity of CDA-motor potential