

Drowsiness detection by alpha-related events in the EEG

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Diminished vigilance, increased drowsiness and finally sleepiness are well documented effects of long duration tasks. Usually, these processes are described by changes in spectral parameters which are calculated by Fouriertransformation. A major problem is that in the very first stages of decreasing vigilance effects are not powerful enough to raise power significantly. Moreover, a sufficiently high resolution in the frequency domain unfortunately results in poor time resolution. In contrast, the progress of fatigue is assumed as not monotonous and occurs as short periods of lapses in wakefulness as a consequence of reactive performance increase.

Therefore, a new rationale is introduced which extracts so called „alpha events“. The beginning and end of these events can be determined with an accuracy given by the time resolution of the measurement itself. Resulting parameters are the duration of these events and the duration of the pauses between them.

The diagnosticity of the approach has been demonstrated in a driving simulation task. 12 young subjects were instructed to drive on a quite monotonous highway at different times of the day. The results reveal that vigilance is characterised by smaller pauses between events whereas severe sleepiness is characterised by an increased event duration.

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