

5th International Conference on

Medical Informatics & Telemedicine

August 31- 01 September, 2017 | Prague, Czech Republic



Wilfried Dimpfel

Justus Liebig University Giessen, Germany

ENKEPHALOVISION, A NEW COMPUTER-OPERATED APPROACH IN BRAIN RESEARCH

Statement of the Problem: In order to understand brain function several approaches have been used like functional NMRI or quantitative Electroencephalography (qEEG). Functional NMRI suffers from the fact, that it only provides an indirect measurement but covers the whole brain. Quantitative EEG provides a direct measurement of neuronal activity but is limited to the cortical surface. The present approach aimed at achieving higher time resolution in qEEG analysis in order to combine it with eye tracking.

Methodology & Theoretical Orientation: Fast Fourier Transformed EEG signals were subdivided into specially defined frequency ranges now allowing to analyze epoch lengths of 364 ms. Electric power within the frequency ranges was transformed into spectral colors and mixed according to RGB resulting in brain images representing the true measurement not any so-called “false color coding”. Screen capture of the online real time EEG data resulted in the first video-clip. The eye tracker provided a second video as a so-called gaze overlay. By starting the presentation with a gong, offline synchronization using Adobe Premiere software was achieved by taking into account brain and computer dependent processing time.

Findings: Combination of this ultra-fast qEEG analysis with eye tracking allowed functional analysis of brain activity in response to audio-visual challenges with a time resolution of about 3 brain maps per second. Cognitive and emotional challenges revealed particular frequency changes in different brain regions related to individual eye gazes. The new methodology has been successfully applied in evaluation of TV commercials, web site viewing and efficacy characterization of plant-derived drugs, food supplements and food extracts.

Conclusion & Significance: The combination of ultra-fast qEEG and eye tracking called “EnkephaloVision” for the first time revealed extensive focal electric activity at different brain regions related to momentary focal attention shown by orientation of eye gazes.

Biography

Wilfried Dimpfel is Honorary Professor at Justus-Liebig-University Giessen, Germany, since 1983. He is pharmacologist and got his neurophysiological education during 1973-1974 as Max Kade stipend (New York) at the NIH Bethesda from Phil Nelson. Together with Hans-Carlos Hofmann, a physicist and mathematician, he developed quantitative EEG software for research and practice. Wilfried Dimpfel is consultant and CSO at NeuroCode AG, Wetzlar, Germany. He published more than 150 papers in peer-reviewed journals.

Wilfried.Dimpfel@pharma.med.uni-giessen.de

Notes: