Abstract View

SPATIOTEMPORAL DYNAMICS OF A COHERENT PATTERN OF ACTIVITY IN A NETWORK OF DIPOLAR SOURCES IN HUMAN ELECTROPHYSIOLOGICAL EXPERIMENTS FOLLOWING INCORRECT SPEEDED MOTOR RESPONSES.

N.M.Rosseinsky\textsuperscript{1,2*}; J.C.Roddey\textsuperscript{1,2}; P.Luu\textsuperscript{3}; D.M.Tucker\textsuperscript{3}; T.J.Sejnowski\textsuperscript{4}; S.Makeig\textsuperscript{1,2}

1. Swartz Ctr. for Computational Neurosci., 2. Inst. for Neural Computation, UCSD, La Jolla, CA, USA
3. Dept. of Psychology, Univ. of Oregon, Eugene, OR, USA
4. The Salk Inst. for Biological Studies, La Jolla, CA, USA

The error related negativity (ERN or Ne) is a brief negative-going potential observed in event-related potential averages of EEG data trials at human frontal midline scalp sites following self-recognized speeded motor response errors. Here we report a complex dynamic of brain activity arising in association with such errors but not well captured in the ERP average. Seven subjects performing a speeded forced-choice visual response experiment were penalized monetarily for responding to the central letter (H or S) of five-letter stimuli either with the wrong hand (incorrect) or later than an unmarked deadline (late). We decomposed the concatenated 800, 2-second, 128-channel, response-locked EEG data trials from each subject, after removing atypically noisy trials and channels, using independent component analysis (ICA) (sccn.ucsd.edu/eeglab). A subset of the identified maximally independent sources were well fit by cortical dipoles. Using time/frequency analysis and event-related coherence measures we analyzed the dynamics of activity in networks of 8-18 near-dipolar sources. A striking result was the emergence of transient theta band power and coherence peaking about 100 ms after incorrect responses. The transient coherence remained significant even after removing common phase-locked (ERP) activity. The coherent activity was widely distributed, whereas the theta power increases were maximal in dorsal frontal midline sources. Transient theta coherence may be a signature of the brain's top-down response to significant external or internal events.

Support Contributed By: NSF (NR), Swartz Foundation (SM), NIH (SM, PL &DT)

Citation: N.M. Rosseinsky, J.C. Roddey, P. Luu, D.M. Tucker, T.J. Sejnowski, S. Makeig.


2004 Copyright by the Society for Neuroscience all rights reserved. Permission to republish any abstract or part of any abstract in any form must be obtained in writing from the SfN office prior to publication.