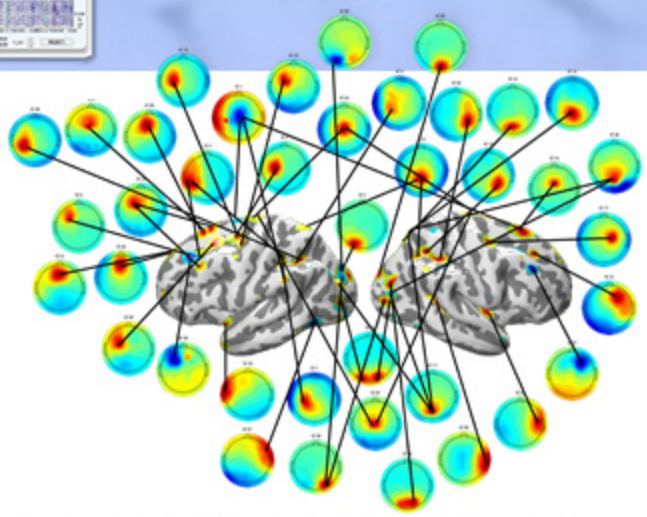


ICs from a multi-model decomposition of high-density EEG from a subject in a complex video game playing experiment, localized using SCALE and SCS (Zeynep Akalin Acar).

View this email in your browser

What's New

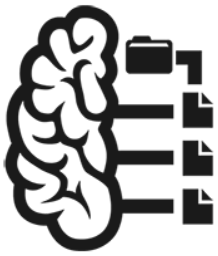
LiveMEEG - Good Scientific Practices in EEG and MEG research. At the recent LiveMEEG online conference on technical EEG and MEG processing (with 1200 registrants), Scott Makeig presented a panel talk on best practice in EEG analysis with developers of the Brainstorm, Fieldtrip, and MNE environments. We also presented two posters about EEGLAB, BIDS, and LIMO. The conference publicized efforts to properly annotate, archive and share EEG data, and data analysis scripts. Warnings were raised against 'p-hacking', meaning hacking your way into finding a significant effect by running multiple tests until one returns significant - and then not correcting the result for the multiple comparisons you ran. While pre-registration of a motivating hypothesis before data collection may shelter you from criticism in this regard (see more), Dr. Makeig spoke of the importance to science of exploration and urged viewers to explore their data in depth — as this is where groundbreaking observations and models appear and give rise to hypotheses worth testing! Sharing of data in the Brain Imaging Data Structure (BIDS) format is already occurring on websites such as OpenNeuro.org (for human neuroimaging data) and the forthcoming NEMAR.org (a customized OpenNeuro portal for MEEG data). EEGLAB and other leading MEEG analysis platforms now have tools for converting data to/from BIDS standard formats (see below).

– Scott Makeig & Arno Delorme

Plug-Ins

Here we highlight new EEGLAB plug-ins of possible wide interest to EEGLAB users. Please send descriptions of new plug-ins for consideration. These should have a brief lead introduction, and further

text and images to be published on a continuation page.



Brain Imaging Data Structure (BIDS). The BIDS-matlab-tools EEGLAB plugin contains a collection of functions to import and export BIDS-formated experiments (BIDS is Brain Imaging Data Structure). BIDS is a way to organize your existing raw data in pre-determined folder names, using text file description often formatted in rows and columns, and the binary files you collected. It is used to improve consistency of documentation and to facilitate re-use by yourself and others. If you want to know more about BIDS is, see the BIDS official website (https://bids.neuroimaging.io/) or watch our introductory video (https://youtu.be/du9waxN5Wcc). The BIDS-matlab-tools EEGLAB plugin allow you to import BIDS data into EEGLAB and/or export EEG raw data to BIDS, and it is available in the EEGLAB plugin manager. The code is tailored for use in EEGLAB but may also be used independently of EEGLAB. For more information about the plugin and documentation see https://github.com/sccn/bids-matlab-tools.

Profiles

This section contains personal profiles of EEGLAB developers and/or users, with a description of how they use EEGLAB in their research.

Sandra Loo, Ph.D.
Professor and Director of Pediatric Neuropsychology,
Department of Psychiatry and Biobehavioral Science, Semel Institute for Neuroscience and Human Behavior, David Geffen School of Medicine, University of California Los Angeles

Agatha Lenartowicz, Ph.D.
Assistant Professor of Psychiatry at the David Geffen School of Medicine, Semel Institute for Neuroscience and Human Behavior, University of California Los Angeles
Managing Director, Staglin One Mind Center for Cognitive Neuroscience, Semel Institute for Neuroscience and Human Behavior, University of California Los Angeles

Many researchers hope to drive science forward by designing a study that contributes a new perspective in their field of study. That's what Dr. Sandra Loo, Professor and Director of Pediatric Neuropsychology at UCLA, did after meeting Dr. Scott Makeig at a 2009 National Institutes of Health (NIH) meeting on electroencephalography (EEG).

"***We discussed applying Scott's tools (EEGLAB and ICA) within my research studies, which included children with Attention Deficit Hyperactivity Disorder (ADHD) and their families, as this is something that was not commonly done at that time***." Dr. Loo invited Dr. Lenartowicz to help with data analyses. What emerged was a novel and exciting project – to implement cortical source analyses to EEG data collected during a spatial working memory paradigm among children with and without ADHD. It had the potential to contribute a new perspective on working memory in ADHD. Read more »

Upcoming Events

This section contains announcements of future events of possible interest to EEGLAB users. Please submit brief descriptions.

ALL WORKSHOPS POSTPONED TO 2021 BECAUSE OF THE CURRENT COVID-19 OUTBREAK.

› **The next long-format 31st EEGLAB Workshop has been moved to June, 2021**, and will be at least partially held online. Registration will open early 2021. This workshop, to be presented at SCCN, will be the first to feature **a two-day Pre-Workshop Course** on the basics of EEG and using MATLAB, and on the basics of using EEGLAB to load and begin to process EEG data.Workshop attendees who might otherwise not be able to keep up with the main Workshop are encouraged to attend these sessions. **The main EEGLAB Workshop**, beginning with an Open House reception and poster show, will follow the format of previous EEGLAB workshops at UCSD, with new material incorporated as time and need permit. Following the Workshop, we plan to offer another new feature, **a two-and-a-half day Data Collaboratory** in which attendees with data to analyze will work with Workshop faculty to build analysis pipelines to process their data (limited to 20 participants).

› **The Second Hands-on LSL Workshop** has also been postponed to June, 2021, as has **the Fourth International MoBI Conference and a Group-EEG Recording Workshop** led by John Iversen (jiversen@ucsd.edu) on recording and analysis of group EEG and other data streams. These will also partially held online.

› **The 32nd EEGLAB Workshop in Lublin, Poland,** is likewise being postponed to 2021. The event has received funding so will certainly happen. The dates have not been set yet though. For more information, contact Dariusz Zapała (d.zapala@gmail.com).

From the eeglablist

(… the EEGLABLIST email list) *This section contains brief questions and answers from the eeglablist archives or elsewhere.*

Q: Chiara Terzo: *We are doing an ERP study on the Implicit Association Test (IAT), and specifically we look at N2 (cognitive conflict) and LPP (allocation of the attention towards motivationally relevant stimuli). Rereferencing does indeed affect ICA, but it does also affect the estimate of the evoked potentials (carried on the already cleaned data), especially affecting the late components. Indeed, when referencing to the right mastoid I get the LPP from 400 ms on. When referencing to the common average, the LPP disappears and I get instead a negative pattern from 300 ms on. The literature on ERPs and the IAT does not have a consistent reference, but on average they do not use the common average as a reference. Thus,* ***what I am wondering is whether using the right mastoid as a reference would bias too much my ICA.***

A: Arnaud Delorme: You do not need to re-reference the data before running ICA. There is no best reference for running ICA decomposition - I prefer to run it after converting the data to average reference but the benefit has never been clearly demonstrated to me. Changing the reference will of course change the independent component or raw data topographies you are observing, but not the location of the component process nor of its equivalent dipole. When interpreting results at the scale channel level, it is important to compare your results to published figures that use the same reference you have used in your analyses. This is one limitation of working with channel data. Re-referencing also affects the ICA component scalp topographies. Thus, when you re-reference your data in EEGLAB, the ICA scalp topographies (scalp maps) are also re-referenced by the EEGLAB reref() function. In the "envtopo" plot (EEGLAB menu item Plot > Component ERPs > With component maps), the ICA component map polarities also depend on the latencies at which they are plotted; the component scalp map polarity is inverted when the activity (activation) of the component is negative at the latency at which its contribution is indicated. See also comments on ICA and polarity from Joe Dien and Makoto Miyakoshi (with some expansions for instructional use by Scott). More »

In Print

Here we list recent papers highlighting EEGLAB function and plug-in capabilities. Please submit suggested papers, with a brief summary description.

Lenartowicz, A., Truong, H., Salgari, GC, Bilder, RM, McGough, J., McCracken, JT, Loo, SK. (2019). Alpha modulation during working memory encoding predicts neurocognitive impairment in ADHD. *Journal of Child Psychology and Psychiatry*. 60(8):917-926. 18 March 2019 https://doi.org/10.1111/jcpp.13042

Lenartowicz, A., Mazaheri, A., Jensen, O., Loo, SK (2018). Aberrant modulation of brain oscillatory activity and attentional impairment in ADHD. *Biological Psychiatry Cognitive Neuroscience and Neuroimaging*, 3(1), 19-29. NIHMS 911176

Lenartowicz, A, Delorme, A, Walshaw, PD, Cho, AL, Bilder, RM, McGough, JJ, McCracken, JT, Makeig, S, Loo, SK (2014). Electroencephalography correlates of spatial working memory deficits in attention-deficit/hyperactivity disorder: vigilance, encoding, and maintenance. *J Neurosci*, Jan 22;34(4):1171-82. doi: 10.1523/JNEUROSCI.1765-13.2014. PMID: 24453310

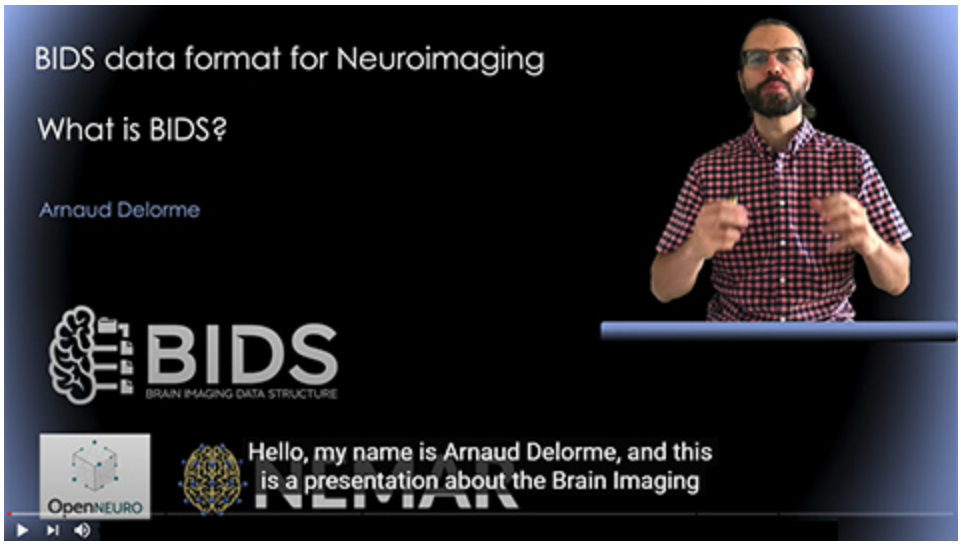
Loo, SK, Lenartowicz, A, Makeig, S. (2016). Research Review: Use of EEG biomarkers in child psychiatry research - current state and future directions. *J Child Psychol Psychiatry*. 2016 Jan;57(1):4-17. doi: 10.1111/jcpp.12435. Epub 2015 Jun 23.PMID: 26099166

Martínez-Cancino, R., Heng, J., Delorme, A., Kreutz-Delgado, K., Sotero, R.C. and Makeig, S., (2019). Measuring transient phase-amplitude coupling using local mutual information. NeuroImage, 185, pp.361-378.

Robbins K, Truong D, Jones A, Callanan I, Makeig S (2020). Building FAIR functionality: Annotating event-related imaging data using Hierarchical Event Descriptors (HED). Submitted to NeuroInformatics 07/31/20. Open Science Foundation https://osf.io/5fg73/

Online

BIDS Data Format for Neuroimaging
What is BIDS?
This is a presentation about the Brain Imaging Data Structure or BIDS,
which is a format to share neuroimaging data.
Arnaud Delorme - October 2020



Also,
Scott Makeig, The MoBI Horizon: Mobile Brain/body Imaging Past and Future.
Online talk (37 min) on YouTube from the 2020 MoBI Awards program.