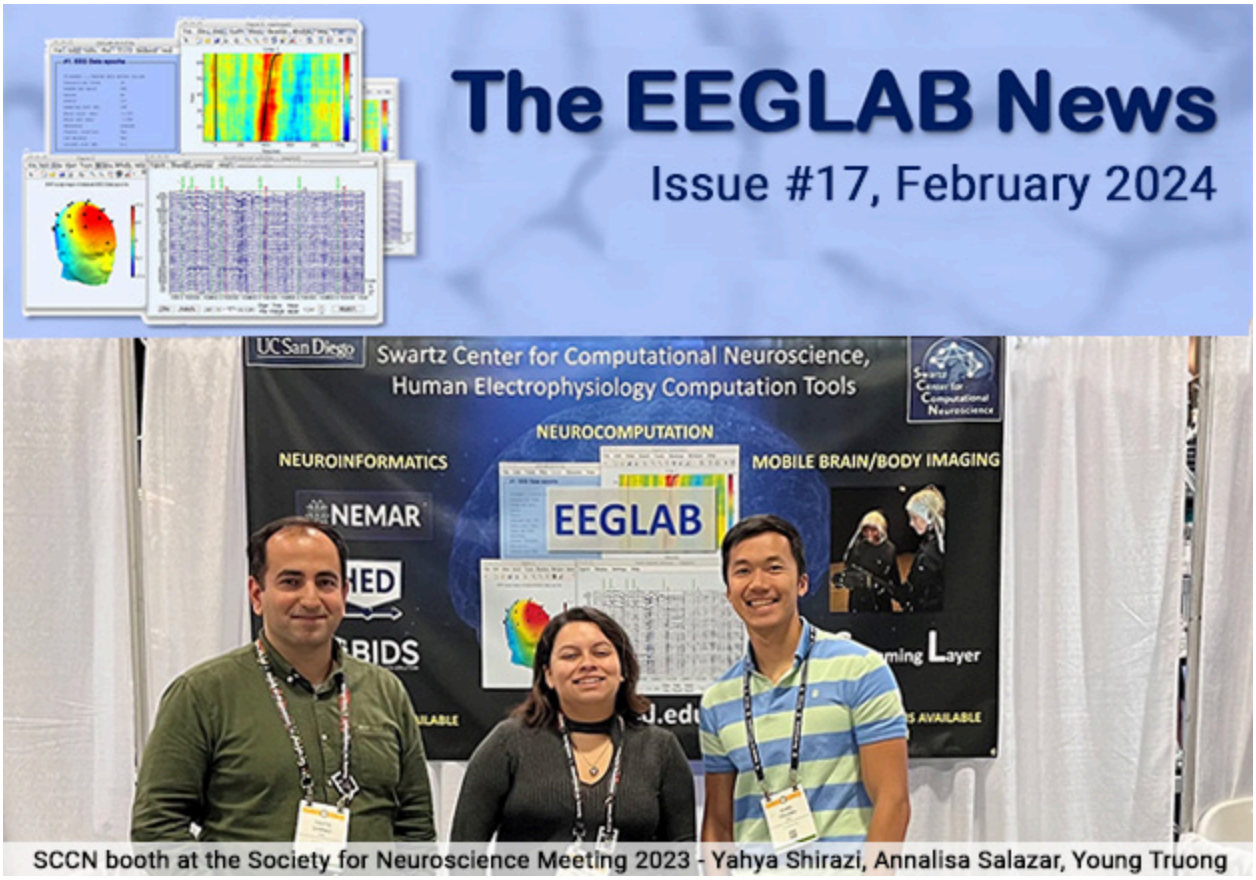


SCCN booth at the Society for Neuroscience Meeting 2023 - Yahya Shirazi, Annalisa Salazar, Young Truong

View this email in your browser

What's New

EEGLAB 2024.0 has just been released. Among the new features, users can now efficiently apply custom measures to data across an entire STUDY, export results in table format (e.g., for statistical processing outside of EEGLAB), employ a new channel interpolation method using spherical interpolation, import Neuralinx data, and BIDS coordsystem information for MEG data, perform more consistent/stable ICA decompositions by Extended Infomax using runica, and select events for processing from multiple datasets in a STUDY. Interoperability with Octave 8.4 has been improved, as has searching channel locations in STUDY datasets. The DIPFIT plug-in now supports STUDY-level lead field matrix computation, and the *bids-matlab-tools* plug-in release (v8.0) has various improvements including behavioral data handling. The *ROIconnect* plug-in is now available in the EEGLAB plug-in manager with improved compatibility.

EEGLAB and Large Language Models (LLMs)
We tried giving the following prompt to ChatGPT (4.0; commercial version), and to Bard:
"*Create a simple EEGLAB script to import the "test.edf" file in EEGLAB, resample the file to 250 Hz, high pass filter the file at 0.5, run the clean_rawdata to reject bad channels and bad portions of data, then run ICA decomposition and the IClabel plugin*." Read how ChatGPT and Bard performed »

EEGLAB is 20!
In its first 20 years (2004 through 2023), the EEGLAB reference paper (Delorme & Makeig, 2004) accumulated 21,632 references in Google Scholar (12,700 references in 1,125 ISI Journals, authored by 29,125 individuals). The annual growth rate of publications related to EEGLAB is 28.12%, with an international co-authorship rate of 37.27%. The most prominent sources citing EEGLAB were

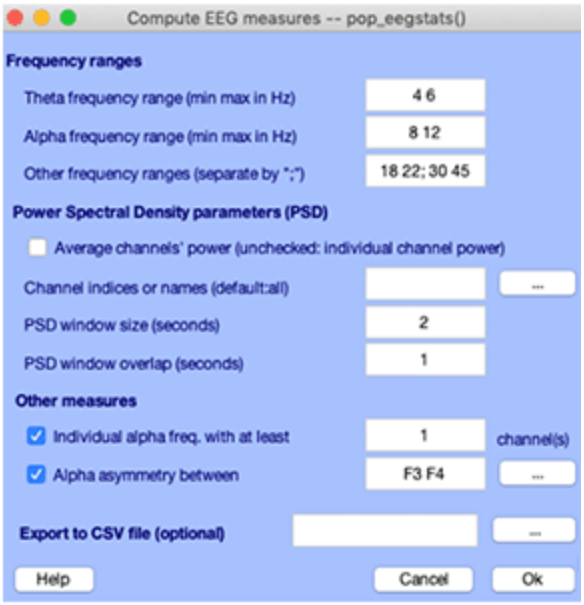
Neuroimage, Frontiers in Human Neurosciences, Scientific Reports, Psychophysiology, and PLOS One. Countries producing the highest number of citations were the USA, Germany, and the United Kingdom. EEGLAB plug-ins ERPLAB, ADJUST, and ICLabel were the most cited. More details are available in the article of Mohammad Fayaz in *Neuroscience Informatics*.

SCCN hosted a booth at the Society for Neuroscience meeting (Nov. 2023)
This year the EEGLAB team and collaborators presented an exhibition booth at the Society for Neuroscience meeting in Washington, D.C. (Nov. 11-15, 2023). Yahya Shirazi, Annalisa Salazar, Dung ('Young') Truong, and SCCN director Scott Makeig maintained the SCCN booth as an 'experiment' with a goal of meeting users, and informing potential users about Swartz Center open science projects in neuroinformatics (NEMAR, HED), neurocomputation (EEGLAB), and mobile brain/body imaging (LSL, MoBILAB). Those involved agreed that the SCCN booth was an experiment worth repeating. Look for us in Chicago this fall.

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.

eegstats is a simple plug-in that computes scalp channel power in selected frequency bands for continuous data, and estimates an individual alpha frequency, and an alpha asymmetry level. The plug-in also supports group analysis from the command line, allowing comparison of results across subjects and conditions using either EEGLAB statistics or other statistical tools. The plug-in leverages new EEGLAB (024.0) sets of STUDY commands in tailored for group analysis. A screen capture is shown below. Click here for more information. (For information about alpha distribution at the cortical source level, see this poster by Julie Onton and Scott Makeig).



Include your plug-in here. If you have a plug-in you would like to feature in the newsletter, please send us an email at eeglab@sccn.ucsd.edu. For a plug-in to be featured, you need at least some documentation and a test dataset that people can try it on.

Open Science

Here we highlight news of open EEG and related data, tools, and other resources.

Multiverse analysis. The "multiverse" approach in the context of Neuroscience analysis is a concept borrowed from statistical analysis and research methodologies, particularly in the fields of psychology and neuroscience. While specific to Neuroscience, the technique can be applied to the processing of fMRI, and EEG, MEG, and other physiological signals. In this article, we will focus on EEG as an example application. Read more...

NEMAR.org - NEMAR, an EEG, MEG, and iEEG open data portal and free integrated high-performance compute resource, is continuing to grow. Data quality metrics and results including power spectra and ICA source maps are shown for most datasets, as are citations associated with each dataset. Well-annotated, analysis-ready datasets will be featured through use of a badging system, and datasets

receiving many citations will be featured. If you would like to post your EEG data on NEMAR (a portal to data shared via OpenNeuro.org), we can assist you – just let us know by booking an office hour appointment with Annalisa Salazar (view calendar).

Profiles

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

Matthew Wisniewski, Ph.D.
Assistant Professor, Psychological Sciences, Kansas State University

How can two people hear the same sound but have very different psychological experiences of that sound? Dr. Matthew Wisniewski, Assistant Professor in Psychological Sciences at Kansas State University, is fascinated by how experience shapes the way we hear the world. Initially motivated by a love of music, he fortuitously signed up for a Biology of Memory class in college, where he learned about plasticity in the auditory system. This was an 'aha' moment. From that point on, he has devoted his efforts to learning all he can about the brain and how it processes sound. EEGLAB is a key tool in his research. Read more! »

Upcoming Events

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

- **MOBI 2024 -** The 5th International Mobile Brain/Body Imaging Conference will be held June 2-5, 2024 in Piran, Slovenia. The conference will be preceded by a workshop including sessions based on EEGLAB and on LSL. More info here.

- An **LSL workshop and Mobile Brain Imaging workshop (using EEGLAB)** will be held in association with MOBI 2024 (see above).

- **Ongoing weekly SCCN office Hours**: Sign up for (EEGLAB/data analysis) office hours chats with Yahya Shirazi (view calendar) and for (NEMAR/BIDS/HED) office hours with Annalisa Salazar (view calendar).

From the EEGLABLIST

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

Question: I am currently working on a preprocessing procedure for EEG data with the aim to analyze the movement-cortical potential. My main purpose for the preprocessing is to reduce the amount of artefact contamination (especially eye blinks) using ICA. Since we are interested in the MRCP, I am following the suggestion to split the data before the ICA to apply a high-pass filter (1 Hz) to the data I am running the ICA algorithm on [the data], and attach the solution to the second dataset I am using for the analysis.

Now my question is: **Because the ICA is trained with data that does not contain low frequency content (due to the high pass filter at 1 Hz), I am concerned that this low**

frequency content will be randomly distributed across the ICA components when applied to the second dataset (in my case with a band pass filter of 0.05 - 5 Hz). Hence, in the worst case, an ICA component that contains mostly eye blinks will also contain more valuable information than usual in the low frequency domain. Do you think that the low-frequency data within the ICA sources is problematic, or can it be ignored? What are your suggestions on how to best deal with such data?
- Jan

A: Scott: The number of ICs needed to capture /account for eye movements can be 2 (vert , horiz) - though in free-ranging visual (+movement) tasks it may be larger. Activity with these (2) maps will be channeled into activities of these 2 ICs when using the above-1Hz trained IC unmixing matrix to decompose the full-range data. But yes, other sources of <1-Hz activity (sweat-based?, movement-based?, ...) will spread their activities into the learned ICs, as you say. It is also possible to separately decompose the lowpass_data (= data - highpass_data), but it can't be guaranteed that ICA is as suitable for this, (particularly if the lowpass activity is dominated by moving-potentials (from scalp or from cortex); ICA assumes source spatial stationarity, and is much less efficient encapsulating spatially-moving sources (basically, separating it into a sum of a series of 'overlapping movie frames' - requiring multiple deg of freedom (DoF)). But this is easy to try - though perhaps not as easy to judge / interpret...
For additional responses from Makoto and Arno, **read here**.

In Print

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

Makeig S & Robbins K. Events in context–a framework for the study of brain, experience and behavior. Psyarxiv.com, 2023.

Subash P, Gray A, Boswell M, Cohen SL, Garner R, Salehi S, Fisher C, Hobel S, Ghosh S, Halchenko Y, Dichter B, Poldrack RA, Markiewicz C, Hermes D, Delorme A, Makeig S, Behan B, Sparks A, Arnott SR, Wang Z, Magnotti J, Beauchamp MS, Pouratian N, Toga AW, Duncan D. A Comparison of Neuroelectrophysiology Databases. ArXiv [Preprint]. 2023 Aug 30:arXiv:2306.15041v2. Update in: Sci Data. 2023 Oct 19;10(1):719. PMID: 37426452; PMCID: PMC10327244.

Wisniewski, M.G., & Zakrzewski, A.C. (2023). Effortful listening produces both enhancement and suppression of alpha in the EEG. Auditory Perception & Cognition, 6, 289-299. https://doi.org/10.1080/25742442.2023.2218239

Wisniewski MG, Joyner CN, Zakrzewski AC, Anguiano A. Learning to detect auditory signals in noise: Active top-down selection and stable change in signal representations. J Exp Psychol Hum Percept Perform. 2023 Mar;49(3):428-440. doi: 10.1037/xhp0001082. Epub 2023 Jan 16. PMID: 36649167; PMCID: PMC10107850.

Wisniewski MG, Zakrzewski AC, Bell DR, Wheeler M. EEG power spectral dynamics associated with listening in adverse conditions. Psychophysiology. 2021 Sep;58(9):e13877. doi: 10.1111/psyp.13877. Epub 2021 Jun 23. PMID: 34161612; PMCID: PMC8355203.

Wisniewski, M.G., Mercado, E., III, Church, B.A., Gramann, K., & Makeig, S. (2014). Brain dynamics that correlate with effects of learning on auditory distance perception. Frontiers in Neuroscience, 8, 396.

Frank G, Shirazi SY, Palmer J, Cauwenberghs G, Makeig S, Delorme A. An Exploration of Optimal Parameters for Efficient Blind Source Separation of EEG Recordings Using AMICA. https://doi.org/10.48550/arXiv.2309.15388

Online

The Best EEG Reference

Dr. Arnaud Delorme, April 2023