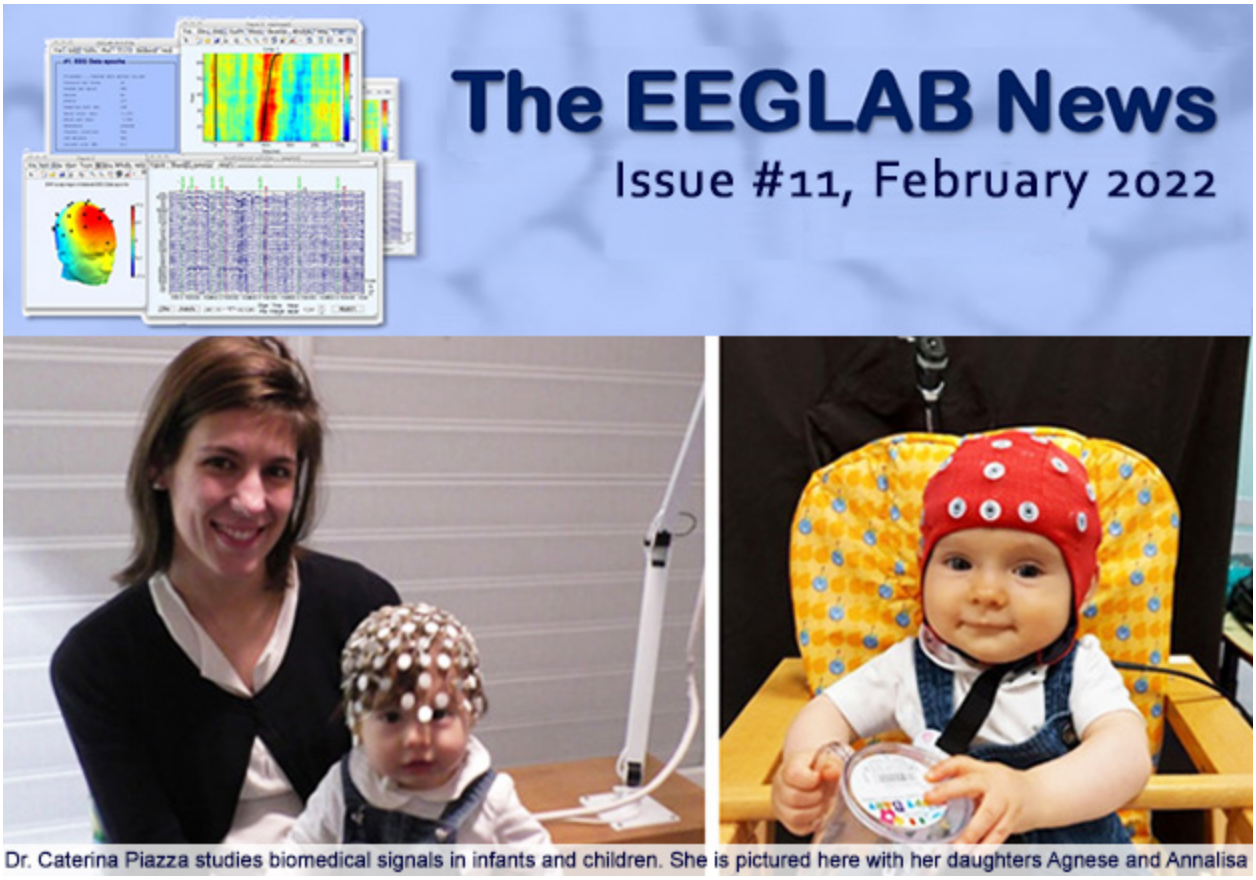

Dr. Caterina Piazza studies biomedical signals in infants and children. She is pictured here with her daughters Agnese and Annalisa

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# What's New

**New version EEGLAB 2022.0** has been released. This revision features some bug fixes (bug reports always appreciated); increased interoperability with Fieldtrip and LIMO; the possibility of processing a subset of channels when rejecting artifacts using ASR; better support for EDF data import and export; and better support for processing multiple datasets from both the command line and the EEGLAB graphic interface (menu). The github list of changes is available here. Key plug-ins have also undergone important changes in the past few months. For the bids-matlab-tools, these include the capability of exporting data files for multiple tasks in a session to a BIDS-formatted dataset (study), and the addition of new example BIDS export scripts.

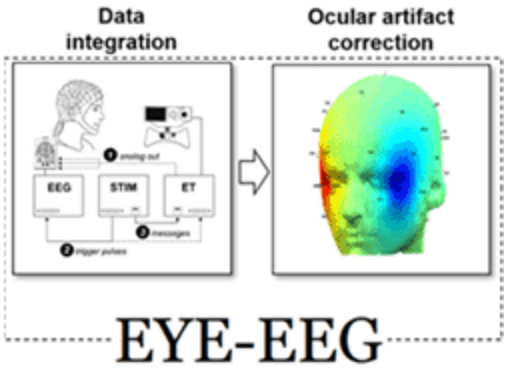
**Virtual EEGLAB Workshop Pacific/Asia - Nov 29-Dec 3rd 2021.** From November 29 to December 3rd, the 31st EEGLAB workshop was held online inside Gather.Town, an online conference platform. The first day was free for all and featured lectures and social events. Timings were arranged to accommodate Pacific and Asian time zones. 19 EEGLAB expert speakers presented. About 700 participants registered for the first day and 190 for the following days. As for the first edition in June 2021, this format proved to be a success. The next workshop will be held in person in Poland (see below).

# 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.*

**Zapline-plus.** Zapline-plus (Klug & Kloosterman, 2021) is a wrapper for Zapline (de Cheveigné, 2020) that automatically removes narrow spectral peaks (typically, line noise) from data with minimal negative impact, preserving both the data power spectrum and rank. It searches for noise frequencies, separating the data into noise-stationary chunks, and adapts cleaning strength automatically. Parameters can be adjusted, and a detailed plot is created to display cleaning method and results. Zapline-plus is available through the EEGLAB plug-in manager.


**EYE-EEG plug-in.** EYE-EEG is a plug-in for the open-source MATLAB toolbox EEGLAB developed with the goal to facilitate integrated analyses of electrophysiological and oculomotor data. The plug-in parses, imports, and synchronizes simultaneously recorded eye tracking data and adds it as extra channels to the EEG. It is not a new plug-in, but it has become a popular one. We recommend you give it a try by downloading it on the EEGLAB plug-in manager and following the tutorials at https://www.eyetracking-eeg.org/.




**FitTwoDipoles plug-in.** Developed by Caterina Piazza with Makoto Miyakoshi, the plug-in identifies independent components (ICs) of EEG data with bilaterally near-symmetric scalp projections and fits bilateral dipoles wherever appropriate. (Piazza et al., 2016).

## Open Science

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

Effort continues to add EEG and other human electrophysiological datasets to the *OpenNeuro.org* open data archive, to make them available for search and analysis via the *NEMAR.org* portal to 'neuroelectromagnetic' (EEG, MEG, iEEG) data in OpenNeuro. A unique feature of NEMAR is its link to The Neuroscience Gateway (NSG) that allows users of neuroscience software (including EEGLAB) to run their compute-intensive scripts and pipelines on the XSEDE high-performance computing network without charge. NSG users can compute directly on the EEG and related (MEG, iEEG) data shared in the NEMAR/OpenNeuro data archive without needing to download and then re-upload the data NSG, thus functioning an early example of what we refer to as a 'DATCOR' (an integrated 'Data, Tools, and COmpute Resource').

**HED news**: An EEG (plus anatomic MRI head image) dataset extracted from the Henson & Wakeman MEEG face presentation experiment data, including third-generation HED tagging of events, conditions, and tasks, has been shared on OpenNeuro.org (ds003645) and is also available on NEMAR.org with some data visualization (see dataset README for details). Its HED annotation is the subject of a new

paper in NeuroImage.

# Profiles

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

**Caterina Piazza, Ph.D.**
Post-doctoral researcher in the Bioengineering Lab at the Applied Technologies Research Area of IRCCS Medea, Italy

Dr. Caterina Piazza, post-doctoral researcher at IRCCS E. Medea in northern Italy, focuses on the development and application of biomedical signals in infants and children. She is drawn to this age group because of the possibility "to study the brain in a phase in which most of the human competences are being acquired and developed."

Studying infant brains, and analyzing infants' data, comes with challenges. Dr. Piazza explains: "Algorithms developed and tested with adult data often don't work well when applied to infants. Infants' data are noisier and have different characteristics from adult ones. Moreover, to perform source localization, there is the necessity to use ad hoc head models that take into account the characteristic of the infant head." After visiting the Swartz Center for Computational Neuroscience (SCCN) and learning more about EEGLAB, she successfully analyzed a dataset recorded in six-month-old typically developing infants investigating source-resolved auditory event related potentials (ERPs) and identifying ERP cortical generators. Since then, she has used the same methods to successfully complete additional EEG studies with infants. "What I really hope for the future," she shares, "is to see the results of my research become useful in clinical practice." Read more »

# Upcoming Events

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

- **The 4th International Mobile Brain-Body Imaging Conference** will be held at UC San Diego, the birthplace of MoBI, **June 8-10, 2022**. New this year will be a 3-day hands-on MoBI workshop prior to the conference (June 5-7). Abstract submission is open. More information at https://mobi.ucsd.edu.

- **The 33rd EEGLAB Workshop in Lublin, Poland,** will be held from the **12th to the 16th of September 2022**. For more information, contact Dariusz Zapała (d.zapala@gmail.com). More information »

# From the eeglablist

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

**Q: Epoch length inquiry – using long vs. short trials.** Our kids go/nogo task(500 ms stimuli, 900 ms response window [or until the motor response], 200 ms inter-trial interval) has shorter trials than the recommended (-1, 2) seconds epoch length. As, particularly, we are interested in midline theta activity – if I use -1 to 2 sec epochs in EEGLAB analyses, won't these epochs overlap? Making our inter-trial intervals longer would seem to solve this issue, but now that the data has been collected... **any advice on optimal epoching?** - Brian

**A: Scott Makeig:** There is no problem with extracting overlapping epochs if you keep in mind which parts overlap. If you are interested in measures in the time/frequency domain (ERSP, ITC, coherence and cross-coherence, etc.), then it is necessary to use a long enough trial epoch to include, e.g., at least one time window wholly within the trial 'baseline' period before the first latency of analysis interest (to enable within-trial before/during/after comparisons), and at least one window centered at the last latency of analysis interest. To measure down to 3 Hz - using a 3-cycle window to improve spectral resolution - a (-1, 2) sec window is sufficient.

**Makoto Miyakoshi:** I agree with Scott. The Wavelet transform or STFT use a sliding window. If your default 3 cycles at 3Hz (1,116 ms) window is applied to produce an ERSP or ITC data point every 4 ms (i.e., 250 samples/sec), each sliding window is 1112 ms overlapped with the adjacent one! So the outcome is already very redundant in that way, so no worry about another redundancy. You don't lose anything except computational time (in return, the output measures are smoother), and you are not biasing the data in any particular direction. So, there is no problem – if redundancy is not some other sin in the given situation!

# In Print

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

A. Delorme et al. (2021). Tools for Importing and Evaluating BIDS-EEG Formatted Data, *2021 10th International IEEE/EMBS Conference on Neural Engineering (NER)*, 2021, pp. 210-213, doi: 10.1109/NER49283.2021.9441399.

Piazza C, Cantiani C, Miyakoshi M, Riva V, Molteni M, Reni G, and Makeig S (2020). EEG Effective Source Projections Are More Bilaterally Symmetric in Infants Than in Adults. *Front. Hum. Neurosci*., 12 March 2020 | https://doi.org/10.3389/fnhum.2020.00082

Piazza C, Visintin E, Reni G, Montirosso R. The Effect of Baseline on Toddler Event-Related Mu-Rhythm Modulation. *Brain Sciences*. 2021; 11(9):1159. https://doi.org/10.3390/brainsci11091159

Robbins, Kay; Truong, Dung; Appelhoff, Stefan; Delorme, Arnaud; Makeig, Scott. Capturing the nature of events and event context using Hierarchical Event Descriptors(HED). *NeuroImage* 245 (2021): 118766.

Truong D, Milham M, Makeig S, Delorme A. Deep Convolutional Neural Network Applied to Electroencephalography: Raw Data vs Spectral Features. Annu Int Conf IEEE Eng Med Biol Soc. 2021 Nov;2021:1039-1042. doi: 10.1109/EMBC46164.2021.9630708. PMID: 34891466.

De Sanctis P, Solis-Escalante T, Seeber M, Wagner J, Ferris DP, Gramann K. Time to move: Brain dynamics underlying natural action and cognition. Eur J Neurosci. 2021 Dec;54(12):8075-8080. doi: 10.1111/ejn.15562. PMID: 34904290.

# Online

**Live coding using the BIDS EEGLAB plugin**

Arnaud Delorme, Ph.D. (December 24, 2021)