

Release Notes

Changes from 1.0b1

%age of variance accounted for by each Promax rotated factor returned. Fixed error in Promax algorithm. Changed output variable names to more readable names. Parametric PCA technique now supported by EGISToPCA routine.

Changes from 1.0b2

Kaiser correction now works when it is turned on.
Factor scores now correctly computed when relationship matrix is covariance or SSCP matrix. Factor scores are no longer zero-centered when using SSCP matrix.
Added spatiotemporal PCA procedure.
PCAtoEGIS now returns peak latencies of factors.
Various modifications to improve performance or ease of use.

Changes from 1.0b3

Changed factor score calculation to avoid need for generalized inversion of relationship matrix, which could cause singularity problems.
Dropped output of scoring coefficient matrix for the same reason.
Fixed Promax factor score computation.
Changed default factor waveform output to pattern matrix for PCAtoEGIS routine.

Changes from 1.0b4

Changed factor scores to unstandardized form to correctly handle variables with non-zero means, especially non-average reference data and ST-PCAs.
Added peakChan and peakSamp output to PCAtoEGIS routine.

Changes from 1.0fc1

Fixed readEGISave bugs for outputting spatial formatted data.

Changes from 1.0fc2

Fixed readEGISave bugs when parameters not specified. Fixed PmxUnPat parameter name in PCAtoEGISscript.

Changes from 1.0fc3

Abandoned effort to enable non mean-corrected factor scores as unworkable. Added option to superimpose grand average on factor output to facilitate interpretation.
Dropped UnPat outputs since not needed. Made PCAtoEGIS scripts easier to use.
Percentage accounted for fixed.

Changes from 1.0

Added error-checking code to PCAtoEGISscript and stPCAtoEGISscript to make sure the subject, channel, timepoint, and cell parameters match up with the size of the matrices.

Changes from 1.01

Moved eyeblink correction routines to a separate ICABlink_toolbox. Modified

EGISStoPCA routine to optionally output factor waveforms as a matlab cell array.

Changes from 1.02

Fixed bug in parametric PCA output. Fixed EGISStoPCA subject specs to include subject ID number so NetStation will label observations properly and NAvG so BESA will have N= info.

Changes from 1.03

Fixed bug in PCAtoEGISscript output of reconstructed factor waveforms for spatiotemporal PCA only. Implemented non-mean corrected factor scores.

Changes from 1.04

Generalized output format of doPCA so that rotations can be Varimax instead of Promax. To use with existing PCAtoEGIS scripts, replace the portion under the dividing line with the new code. Added variance correction after Varimax rotation to ensure that factor scores remain unitized, resulting in some improvement in solution output.

Changes from 1.05

Option for unrotated output added. Error introduced in 1.04 fixed regarding computation of non-mean centered factor scores fixed. Added centroid measure to ANOVA output options. Fix to latency ANOVA output. Changed missing values number for parametric PCA from zero to "999." Modified to work under Matlab 6.5.

Changes from 1.06

Added readNSmat. Added InfoMax (ICA) rotation option. Fixed bug in parametric PCA for cells past the first one. Automatically change bins to 500 for EGIS format output to avoid losing too much resolution if bins are a small number, such as from NS. Added saving of scores matrix when doing parametric PCA in order to facilitate parametric analysis. Added option for separate subject output files by PCAtoEGIS to facilitate individual subject source analyses. Modified cellist feature in readEGISave so that the cells retain their original cell numbers.

Changes from 1.07

Added option for covariance loadings. Updated my contact information to University of Kansas.

Changes from 1.08

Modified code to treat covariance loading as an alternate weighting scheme to Kaiser normalization since that's what it is. Modified covariance loadings so that, like Kaiser normalization, it only affects the weights at the Varimax stage, not at the Promax stage.

Changes from 1.090

Bugs fixed in PCAtoEGIS file. Legal language in this readme file modified. Grand average option added to doPCA. ICA option set to reinitialize random number generator with each use and to use non-verbose output.

Changes from 1.092

Bugs fixed in PCAtoANOVA file. EGI Toolkit included courtesy of EGI. Added error check to PCAtoEGIS.

Changes from 1.093 (9/3/06)

In parametric PCA procedure, drop cells corresponding to missing data parameters when generating the mean voltage map.

Changes from 1.094 (11/4/06)

Fixed unique variance vector (FacVarQ) for Varimax. Fixed scree and screeST for Infomax.

Changes from 1.095 (12/3/06)

Fixed ReadEGISave. When start and end samples were set to zero, the first sample would remain at zero, resulting in the first sample being random and the remaining samples shifted backwards by one sample and the last one being lost.

Changes in 1.1 (1/27/08)

Bugfix for ICA scree. Eliminated indexdata. For PCAtoEGIScripts, changed input cell names and parameter names arrays to cell arrays. Changed cellcoll to cell array, thus eliminating need to pad it out with zeroes. Deleted old filetype function (only worked on OS 9 Macs). Switched to the use of the Field Trip I/O routines for reading in files. Changed data matrix to 3D array. Shifted to GNU license. Made EGIS files always big-endian so that NetStation will correctly read files made on Intel Macs.

Changes in 1.2 (2/21/08)

Changed direct rotation of factor scores back to direct computation of scores since it turned out to be more accurate. Fixed bug in setting up data for spatial analyses introduced in version 1.1. Copyright notice appears only once per session. Incorporated GPF rotations and variable Oblimin. Output is now packaged in a structured variable. Added RotOpt rotation parameter. Generalized variance accounted for calculation to all rotations. Added the readPCAdat function. Added fixEGIS function. Added readEGISheader. Sorts factors in order of size and flips the loadings to be mostly positive for rotations other than Varimax. Factor loading weighting now applies to all rotations. Looks for binary compiled version of runica.

Changes in 1.21 (2/21/08)

Subjects mode of PCAtoEGIS fixed.

Changes in 1.22 (3/22/08)

doPCA tests for bad loadings and communalities. Added total variance accounted for to the output variable. Rotations are now run 10 times with random starting locations to avoid local minima.

Changes in 1.23 (8/20/08)

1) Added EGIS file utilities. 2) Fixed sign of parametric output from PCAtoEGIS. For

example, positive correlation should result in positive voltage for positive channels but negative for negative channels. Instead it was producing positive voltages at both types of channels. Sign is now determined solely by correlation. 3) Fixed unique variance accounted for. 4) Changed readPCAdata to readData. 5) Improved support for other file formats by readData.

Changes in 1.3 (11/27/08)

1) Removed FieldTrip. It will now need to be downloaded separately. This was done to avoid collisions between multiple installs of FieldTrip. Be sure to download the latest version of FieldTrip since some fixes have been made to the EGIS file import routines. 2) On the Mac, file type and file creator now set automatically. QuickType is no longer needed. 3) Changed names of combineEGISave and mergeEGISave to more descriptive names. 4) On the Mac, montage type now set automatically. ResFool is no longer needed. 5) Output of readData is now a structured variable that contains descriptive information. Also, the data itself is now a 4D matrix to reduce the possibility of confusion between subjects and cells. Also, the inputs for readData are now handled using keywords. For EGIS files no input information is needed at all now, simplifying usage. 6) Added robust statistics routines. 7) Added blink correction routines.

Changes in 1.35 (4/14/09)

1) Fixed spatial PCA crashing doPCA. 2) blinkCorrection can now accept data files with multiple events per trial as long as there is one and only one at stimulus onset. 3) Fixed reversal of cell and subject fields when using readData for non-EGIS file formats. 4) Increased scaling of blinkCorrection plots so that blinks are more visible. 5) Added artifact detection and correction routines to blinkCorrection function, including bad channel interpolation. 6) Added automatic generation of cell combinations for the PCAtoEGISscript stage. 7) Added automatic statistical evaluation of factor results, using robust statistics. 8) More information added to the data and PCA output structured variables. 9) Eliminated need for separate PCAtoEGISscripts for one and two-stage PCAs. 10) Robust statistics prints to file with html format, allowing for formatting. 11) Updated EGIS session file utilities to have endian support. 12) Missing data number for parametric PCA changed to -999. 13) Increased range of files that can be read by readData and the number of options for it. 14) Added mergeEPfiles function so that data from Neuroscan can be analyzed. 15) Added writeData function so full range of supported output files is supported across the Toolkit functions. 16) Added editCells function for editing cells and making difference cells. 17) Batch selection of files in blinkCorrection file requester added.

Changes in 2.0

1) editCells function renamed editData and full display and editing of data file header information implemented. Other file utilities for performing these functions eliminated. 2) Flat channels are identified as being globally bad channels by the artifact detection routine unless they are the reference channel. 3) Flat channels are identified as being a bad trial channel unless they are a globally flat reference channel. 4) electrode coordinates and channel types added to the files. 5) Fixed problems in html output of robust statistics. 6) Green significance is now one-tailed threshold (twice that of

uncorrected alpha). 7) Eliminated latency field of events. 8) Added factor dimension to the datasets, allowing for factor data for individual subjects to be handled within the data structure. WriteData can now output separate factor files for each subject or separate trial files for each factor when factoring single-trial data. 9) Added "ep_" prefix to all functions to avoid conflicts with other Matlab toolkits. 10) Added full graphical user interface. Too many other changes to list. See tutorial for full listing of current features.

Changes in 2.01

1) Checks the cache in EPwork to see if it is from a previous incompatible version or otherwise corrupted and regenerates it if so rather than crashing.

Changes in 2.02

1) Fixes crash when using single trial mode with Read data function. 2) Fixes crash for non-continuous data files that do not contain analysis fields when there is more than one chunk. 3) **Fixes bug in preprocessing where when there are multiple chunks, the last two may be miscalculated such that they are data from earlier chunks (thanks to Siri Kamp).**

Changes in 2.03

1) Binica file removed from external folder. Edit window shortened to fit on smaller monitors. 2) Crash during PCA when file was not averaged in EP Toolkit. 3) Crash when saving simple binary format files and the data file was not originally an EGIS format file. 4) Crash when saving single trial simple binary format file and there are more than one events per trial. 5) Single trial simple binary files being saved as ".bin.bin". 6) Fixes to formatting of ANOVA outputs.

Changes in 2.04 (11/9/09)

1) Crash when importing continuous simple binary files with events. 2) Crash when exporting data from QC and PCA subpanes when using a Matlab version predating 2008.

Changes in 2.05 (11/12/09)

1) For preprocessing, when there are multiple chunks, fixed crash when there is an odd number of trials. 2) For preprocessing, when detecting bad channels via perfect correlation, .9999 is now sufficient.

Changes in 2.06 (11/12/09)

1) Fixed bug where Toolkit was saving all variables into EPwork cache, not just EPdataset, resulting in erratic problems when old values for variables were loaded back into the workspace.

Changes in 2.07 (12/4/09)

1) When reading simple binary files, if the cell names cannot be deduced, put all of the segments into the same single cell rather than just aborting. 2) When importing a text file, ignore tabs at the end of the line. 3) Drops CELL and TRSP events for all simple binary files since NetStation loses the associated information when exporting simple binary files. 4) Replaced "union" statements with "unique" statements because, under certain

conditions, they would cause Matlab 2007 to crash when doing preprocessing. 5) Added workaround for sporadic Matlab menu bug that was causing menu to disappear or crash when menu item that is selected is same as before. 6) Fixed crash when loading in blink template for a file or pathname with a space in it. 7) In preprocessing, avoid performing trialwise bad channel detection entirely unless both minmax and maxneighbor parameters are inactive. 8) Fix for bug in trialwise bad channel detection where channel 1 would be marked as bad in too many trials if there was only one globally bad channel. 9) Additional check in preprocessing and PCA functions for ICA failure (denoted by imaginary numbers for weights). 10) In preprocessing, detects non-reference channels that are perfectly correlated and identifies them as bad channels as they must be shorted together. 11) In preprocessing, fixed bug where test of correlation with reference only detecting +1 correlation, not -1 correlation. 12) In preprocessing, fixed bug where if there is an explicit reference channel and it is flat, then all reference channels marked bad and real bad channels are no longer marked bad. 13) In preprocessing, don't apply correlated neighbors test to explicit reference channels as distant reference channels will always be labeled bad. 14) In preprocessing, fixed crash when more than one bad channel. 15) Now only asks for montage once when doing a preprocessing batch.

Changes in 2.08 (12/8/09)

1) **Fixed faulty bad channel interpolation (x and y coordinates were swapped) for both preprocessing data and when manually constructing a blink template.** 2) Fixed crash in Mark option of preprocessing (thanks to Alex Lamey).

Changes in 2.09 (1/17/10)

1) Fixed crash when viewing Window pane for a dataset with less than four cells under Matlab versions prior to 2008. 2) Workaround for Matlab bug that appears to prevent buttons from being colored when pressed in the Channel Group window on Macs using version 2009b under at least some conditions. 3) Fixed crash in ANOVA pane when entering between group name that is not three letters long. 4) Fixed error when changing ced field in overview subpane of edit pane. 5) When reading in an EGIS format file, if none of the EGI montages are chosen, then it will allow for a .ced file to be chosen. 6) Fixed failure due to Matlab bug to redraw View pane when changing the dataset for one of the colors. 7) Fixed crash when examining a file in the View pane with less than four cells. 8) Rounds off ms labels in the scale graph of the Wave Window. 9) Added support to the ANOVA module for non-ERP data with the addition of the "behavioral" keyword. See the tutorial file.

Changes in 2.10 (1/31/10)

1) Can now leave out subject and cell fields when reading files in single file mode (will use default values instead and will assume all the subjects/cells are the same). 2) Fixed crash when reading files using single file mode and operation is aborted due to problem with files. 3) In order to accommodate file formats like Neuroscan AVG where bad channels may be dropped from the data file, when reading in file formats that label the channels, they will be reordered to match the order of the ced file. Then, if any channels are missing from the data file then they will be added as bad channels. Conversely, if any channels are in the data but not in the ced file, they will now be properly handled as

locationless channels. 4) The type field in the .ced files is now used since the EEGlab bug was apparently fixed and it is now functional. The type field must now be present in the .ced file and assumptions will no longer be made about which ones are REF or FID types. 5) Sped up the View function's waveform displays, requiring some additions to the dataset cache. 6) Fixed contents of analysis fields (which keep track of bad channels etc.) being not arranged correctly when merging files, as in the single file mode. 7) Fixed crash when examining QC data on bad channels and trials via the Edit function. 8) Added support for Neuroscan .eeg and .cnt files. 9) Added ability to plot data from continuous data files in the View function by showing only one second at a time. 10) Epoch ms times now displayed as from beginning of first sample to end of last sample. 11) Fixed bug introduced in 2.07 where checkboxes and subject and cell fields on Read and Preprocess panes impossible to deselect. 12) Fixed bug not updating baseline field when using Postprocess function to baseline correct data. 13) Fixed incorrect subject ID being extracted from EGIS session headers. 14) Refreshes Edit pane when Done button is pressed so when Data Name is changed, the name in the list of datasets is updated. 15) Fixed crash when adding a cell in the edit pane whose type is 'SGL'. 16) Fixed an error message when all the SGL cells have been deleted, leaving only the CMB cells, and one clicks on the Factors subpane of the Edit pane. 17) Fixed crash when reading a file due to events with empty value fields (now uses type field instead if value field is empty). 18) Fixed crash while reading files due to empty type fields in eloc information by assuming they are EEG channels. 19) Fixed not saving event data to single_trial EGI simple binary files. 20) Fixed putting events at the very first sample for EGI simple binary files.

Changes in 2.11 (2/28/10)

1) Fixed crash due to changes in 2.10 when loading factor file with CED information with Read function. 2) Fixed loss of some factor information (factor types and combined factor waveforms) when loading EP format factor file using Read function. 3) Fixed bug in code for follow-up ANOVAs that could cause crashes or the wrong factors to be used (but still correctly labeled). 4) Changed bad channel field to negative numbers for uncorrected bad channels to distinguish them from corrected bad channels. 5) Added "repChan" to QC information in the Edit Pane so that one can examine the proportion of replaced bad channels separately from the proportion of uncorrected bad channels. 6) Modified averaging function to accommodate uncorrected bad channels. 7) Counts of total blink trials and movement trials for averaged waveforms now computed by averaging function include only good trials. 8) Averaging function now handles possibility of no good trials for an average. 9) When importing data using the Read function, epochs that are entirely flat across all channels are marked as bad. 10) AvgNum and SubNum fields now calculated when computing grand averages. 11) Fixed crash in Read function when there are two REF channels (as in M1-M2 mean mastoid channels). 12) Can now handle displaying waves from multiple datasets where some of the channels are implicit in one but not the other dataset (as in Neuroscan missing channels). 13) BadChans numbers of QC subpane will now use number of subjects to calculate proportion for grand averages. 14) Fixed bug where during preprocessing, neighboring channels for determining whether a channel is not correlating with its neighbors was sometimes not chosen correctly, which could lead to too many channels

being dubbed globally bad. 15) No longer treating shorted channels as being bad channels as this was proving too conservative a criterion. Instead it now just provides a warning message. 16) Preprocessing can now be applied to subject average files with multiple subjects. 17) Analysis fields no longer optional parts of EP file format. 18) In preprocessing, turning off bad channel preferences affects only the relevant bad channel criteria rather than turning off all bad channel detection. 19) Now has option to use file's default reference channels (as indicated by the CED file) in the preprocess pane. 20) Fixed crash when loading in an EP file with ced information. 21) Fixed crash when loading in a .set file that does not have ced information included in its header. 22) Fixed crash when subject adds are being stripped from data with no subject specs (as in Neuroscan files). 23) Fixed crash when adding subject spec via Edit Pane. 24) When importing EP file format data, correctly checks for data type even for "factors" and "grand_average". 25) When running ANOVAs with between subject factors, fixed the addition of grand averages corresponding to the levels of the factors to the dataset. 26) Eliminated chantype field. 27) If there are two reference channels (as in mean mastoids), then no longer require that they have a -1 correlation as one may just be bad. 28) If there are two reference channels (as in mean mastoids), then they are still marked as bad channels if they are flat. 29) When writing out EGIS files, cell names and experiment names are terminated so that they are not padded out with spaces when read by some programs. 30) Fixed error message when reading factor data with combined (CMB) factor in EGIS format. 31) Now reads the nsweeps field of Neuroscan AVG files to fill in the avgNum and subNum fields. 32) Export file dialogs in Edit function now correctly indicate that the file will be of type .txt. 33) Made autoPCA option of Window function more memory efficient so it wouldn't run out of memory. 34) Fixed crash in ANOVA function when level names of between group factors were of different lengths. 35) Now zero-padding factor names (e.g., "003") to maximum number of digits so that they sort properly. 36) Close files after running batch of ANOVAs to avoid "too many files open" error. 37) When running ANOVAs with between subject factors using the output of the autoPCA option, fixed the addition of grand averages corresponding to the levels of the factors to the dataset. 38) Corrected the peak channel and peak time point identification of factors made by the autoPCA option of the window function. 39) Fixed bug that prevented one from fully deleting the contents of edit fields, such as "baseline" on the preprocessing pane. 40) Fixed bug that prevented one from changing the contents of the edit fields on the postprocessing pane. 41) Workaround for Matlab bug that appears to prevent buttons from being colored when pressed on Macs using version 2009b applied to windowing function's PCA guided channel group option too. 42) Fixed crash when viewing data with regional channels. 43) Eliminated updating of baseline field when baseline correction during postprocessing. The part of the segment used for baseline correction may not necessarily correspond to the prestimulus period. 44) Fixed crash when using Edit function's Factor subpane to examine factors that include a combined factor add. 45) Fixed inability to set minimum variance setting for autoPCA preference to anything other than zero. 46) Implicit reference channels will no longer be marked as bad when reading them in. 47) Added option to turn off adding montage information to EGIS file format files due to incompatibility issues with some versions of NetStation. 48) Fixed crash when saving EGIS file format file with a "sex" subject spec field.

Changes in 2.12 (3/9/10)

1) One dimensional cell array fields in the EP internal data file format are now standardized to be column vectors. Some file formats were causing crashes in the Edit function because some of these fields were coming out as row vectors. 2) Fixed crash in doPCA when using grand average option (only useable from command line). 3) When running ANOVAs with between subject factors, fixed having only the first between group waveform being added to the datafile. 4) Fixed bad trials field misnamed and hence horizontal eyeblink detection not having any effect. 5) Fixed lack of splitting of analysis fields (bad channels etc.) when preprocessing resulting in incorrect analysis fields or crash when rejoining the chunks.

Changes in 2.13 (3/28/10)

1) When generating a PCA dataset, ensure that the summary factor, subject, and cell names are not already taken. If so, add a unique suffix to the name. 2) When reading in data, if .type field is missing from eloc information (due to use of defective .ced file), then add it rather than crashing (assume channels are "EEG"). 3) Support for EDF file format was broken due to dropping of Biosig from FieldTrip (which is used to provide file format support). An attempt has been made to reinstate it but the one sample .edf file that I have yielded defective output. In order to fix this, I would need someone with access to .edf files to work with me to help track down the problem. 4) Fixed crash when viewing waveforms of data with no implicit channels. 5) Fixed crash when reading in .txt file format data. 6) Fixed crash when reading in data where event information is empty. 7) Fixed crash when viewing data with no electrode coordinate information. 8) Fixed text files treating all channels as being implicit when used with ced files with channel names different than the default channel names. 9) When reading data, for file formats with fixed channel orders (such as EGI files and text files), use channel names from ced file if available. 10) Added ability to save data using .set file format (thanks to Grega Repovs for his help). 11) Reduced memory required to display waveforms.

Changes in 2.14 (4/26/10)

1) When displaying waveforms, fixed zero voltage bar not appearing in expanded waveform figures. 2) When displaying waveforms, fixed stimulus onset bar not appearing in waveform figures. 3) When displaying waveforms, fixed baseline bar and stimulus onset bar not appearing in expanded waveform figures when click lands on a waveform. 4) When displaying waveforms, fixed real reason waveform figures using much more memory than needed. 5) Fixed wrong peak chans and time points for AutoPCA when not two-step PCA. 6) Scale of waveforms no longer constrained to be at least +/- 1 microvolt when plotting waveforms. 7) Fixed CMB factors not dropped from data when present in .data rather than .facData (which was resulting in error messages about missing factors when, for example, an EGIS factor file was read in and then one switched to the Window pane). 8) Added Topo button to View pane for displaying scalp topographies and screening factors efficiently. 9) Fixed wrong number of channel names when reading fixed order file formats (like EGIS) and the reference channel is implicit.

Changes in 2.15 (5/17/10)

1) Fixed crash when reading data using single file mode with .set files which contain the

.eloc information. 2) Fixed crash when reading single_trial data using single file mode. 3) Fixed crash when reading data file that was originally in .set format and then was saved in EP file format. 4) Fixed crash when generating grand average from files with more than one cell by using either mean or median methods. 5) Fixed crash when in Window Data pane using noTable mode (older versions of Matlab) and there are less than five subject specs. 6) Fixed table of cells and table of specs not changing when dataset is changed, when in Window Data pane using noTable mode (older versions of Matlab). 7) Fixed crash when using Topo button of View EEG pane and not all four colors are being used. 8) For Topos of View Pane, fixed can only change channel and latency settings for number of rows equal to number of pages of factors. 9) Fixed Topos of View Pane sometimes crashes when first color is set to none. 10) In Topos of View Pane, added white marker to topos for electrode corresponding to the waveform figures. 11) When reading data, for files with ced set to "eeglab", change to either name in chaninfo.filename field if present, else "none". 12) Added ced to cache contents. 13) In Topos of View Pane, small black dots indicate electrode locations in topographical plots. 14) In Topos of View Pane, may click on electrode dots to move the waveform plot channel. 15) In Topos of View Pane, may right-click on topographical plot to obtain expanded 2D plot. 16) In Topos of View Pane, may right-click on topographical plot to obtain expanded 3D plot. 17) Made blink correction routine more memory efficient by reducing resolution of the blink plots to no more than 10000 points regardless of size of data. 18) For eyeblink correction, fixed when data is mean mastoid, not setting second reference channel to be inverse of the first reference channel. 19) For eyeblink correction, fixed crashes when explicit reference channel is present and identified as being a reference channel. 20) Changed the way the electrodes are highlighted on the Channel Grouping page to get around a bug in older versions of Matlab. May cause compatibility issues though, as I don't have a copy of every Matlab version so I'm not sure which versions of Matlab are affected. Let me know if you run into problems with this. 21) Added summary page to the PCA subpane of the Edit function, including the total variance accounted for information. 22) In Topos of View Pane, may right-click on topographical plot to obtain basic dipole analysis. 23) In Topos of View Pane, electrode names no longer provided alphabetical order in popup menus. 24) Added option to use unrotated solution for PCAs.

Changes in 2.16 (5/25/10)

1) Fixed location of the variance accounted for table for old versions of Matlab for two-step PCAs in the Summary subpane of the PCA pane of the Edit function. 2) Fixed crash when reordering cells using the Edit function. 3) Fixed crash when a two-step PCA fails due to an error. 4) In PCA pane, number of factors and title of PCA no longer being changed to blank when changing other PCA settings. 5) Fixed crash when importing .set file or EP file with unavailable or invalid ced file named in ced field. 6) In readData function, fixed channel selection not operating on channel coordinates eloc field (not accessible from GUI). 7) Fixed assumption in Edit function that appended files will be in EGIS format. 8) Fixed crash when merging average files. 9) Added support for reading and writing EEGLab .study files. 10) When saving EEGLab file formats, cells are now saved as separate .set files. 11) When using single file mode to combine data files, fixed subtle bug where a cell or subject names that are supersets of a shorter one (as in "sub010" and "sub01") could be treated as being the same. 12) **Fixed cell names being**

associated with wrong cells after averaging data (thanks to Kate Bailey).

Changes in 2.17 (6/19/10)

1) Fixed crash when rereferencing and there are no implicit channels. 2) Fixed crash when postprocessing (bug introduced in 2.16). 3) Fixed not keeping FID channels in implicit channel info for fixed channel order file formats (e.g., EGIS, text). 4) Fixed electrode information not matching the data for second file onwards when reading files in single cell file mode. 5) For single cell file mode, no longer need to access ced file for every file. 6) Fixed not successfully merging average files together when reading in data using single cell file mode. 7) Fixed cell labels and sub labels not being applied when reading EP file formats, as when using single cell file mode. 8) Fixed baseline control on Samples subpane failing to change baseline value. 9) When importing data via single cell file mode, only adds trial names for single trial data files. 10) View function no longer crashes when average file erroneously has non-empty trial names field. 11) Fixed crash when reading file formats with fixed-order channels when ced file has wrong number of channels. 12) Fixed files sometimes not being recognized as being selected when names are in uppercase. 13) Fixed not ignoring extra tab at end of line of text files, resulting in "not-a-number" errors. 14) Fixed crash in Topos function when trying to display 3D plot or dipole source using .ced file generated from a .elp file. 15) Fixed average files not being generated with .dataName field, which could result in crashes down the line. 16) Added dipole analysis of jack-knifed PCA results to the Topos function of the View Pane. 17) Added name of first session file to the name of the artifact correction log file if just one file or the number of files if more. 18) In listings of files, puts a star in front of files that have unsaved changes. 19) PCA output no longer adds grand average to subjects dimension if the data type is continuous to avoid resulting crashes. 20) Fixed crash when retaining only one factor for an Infomax rotation. 21) Changed the suffix of EP files to ".ept". 22) Fixed crash when loading EP or .set file with name of original ced file in addition to eloc information. 23) Fixed losing the electrode coordinate information (eloc and and ced) when loading in a .study file. 24) Fixed crash when windowing adds regional channel and there is no electrode coordinate information (eloc). 25) Fixed crash when conducting robust ANOVA and there are no spec columns in the ANOVA data file.

Changes in 2.18 (7/27/10)

1) Fixed when no within factors for ANOVAs, pane indicated needed one within cell rather than zero within cells. 2) Fixed freeze after requestor for information (like name of spec being added to a file using the Edit function or the name of a new merged file when using the Single File Mode of the Read function) due to Matlab bug on Windows computers. 3) Now requires use of 20100720 version of FieldTrip so that it makes use of fixed EGI simple binary code. This fix prevents the Toolkit from getting confused by the inclusion of DIN events, resulting in inability to assign trials to the appropriate cells. These newer versions of FieldTrip also no longer have the R13 and R14 files in the compat folder that were destabilizing Matlab. 4) Fixed view pane listing all the trial names of the dataset rather than just those for a specific cell, resulting in crashes when they were selected. 5) Fixed crash in PCA when there are variables which are flat (zero standard deviation). 6) Fixed crash in View Topos when doing dipole or 3D function and ced is either empty or "none". 7) **For View Topos, fixed 3D, dipole, and jackknife**

results incorrect for topos not on the first page (when there are multiple pages of topos). 8) Fixed crash when viewing Waves and data are all zero. 9) **Fixed grand averages, which are added when computing ANOVAs with between factors, as they were being computed incorrectly when the between factor column was not sorted alphabetically (only affected waveforms, not the ANOVA results).** 10) Fixed min and max of factors sometimes not being calculated correctly, resulting in View Waves plots sometimes not having the voltage range set correctly.

Changes in 2.19 (8/25/10)

1) Fixed crash when reading a file if using "trial" events to determine name of cells and the .value field is empty. 2) Fixed crash on start-up when EP Toolkit folder name has been changed. 3) Fixed Single File mode aborting when reading files in conjunction with a .ced file due to "has different channels" error. 4) Fixed errors when importing .study files where the group or the session fields were left blank. 5) Now supports writing out unsegmented simple binary files. 6) Fixed append cells and append subjects functions not working due to fallacious error messages.

Changes in 2.20 (10/10/10)

1) Fixed unable to output result of averaging function in EGIS format. 2) In Edit function, fixed append cells and append subjects and append chans crashing when averaged data (typically ept files) contain noise or std information from having run the averaging with the Toolkit and the new file is not a factor file. 3) In Edit function, fixed append cells and append subjects and append chans not adding std and noise information from the new file. 4) In Edit function, fixed append cells failing if the files contained trial specs, as in EGIS files. 5) Fixed not allowing subject rows to be changeable even when exceeding limits of subject subpane when using a Matlab version predating 2008. 6) Fixed bug when reading data files such that events in the final sample of a segment were being assigned to the succeeding segment and causing a crash if the segment was already the last one. 7) Fixed crash when the montage keyword was followed by a blank, as when preprocessing a batch of non-EGIS files containing more than one data file. 8) Eliminated warning message associated with the Fileparts function starting with Matlab 2010b. 9) Now assumes that all the session files going into an average is using the same montage so doesn't keep asking for it. 10) Standardized error messages. 11) Fixed Edit function not able to append subjects or cells to data with same names by generating new name. 12) Fixed crash in Edit function when appending cells to non-single trial data. 13) Fixed crash in Edit function when appending subjects to a file with more than one subject or appendings cells to a file with more than one cell. 14) Fixed centroid measures in Window function too large due to addition of the left side of the window (e.g., +200 ms for a window of 200-300 ms).

Changes in 2.21 (1/26/11)

1) In artifact correction routine, fixed badChans and badTrials fields of data files not being recorded for all but last chunk when data are being processed as multiple chunks. 2) For continuous files, data now divided into one second epochs and can be artifact rejected in an epochwise fashion in same fashion as segmented data. 3) Added support for saccade correction to be done in the same fashion as blink correction as opposed to

simple rejection of the trial. 4) Now accepts upper case file suffixes (e.g., .EGIS). 5) Now handles mismatch in artifact correction where file template or data has implicit reference and the other one has explicit reference. 6) When reading in EGIS session files with implicit reference channel, adds it in explicitly, thus avoiding crash in eyeblink correction routine. 7) Fixed crash in Window function after switching to a dataset with fewer cells. 8) Fixed crash in ANOVA function when performing ANOVA with no between group factors under Matlab 2008b. 9) No longer aborts blink correction when number of electrode coordinates in blink file and in data match (including implicits). 10) Fixed bottom of Topos window being cut off on laptop screens. 11) Fixed crash in ANOVA function when used prior to data being loaded into the work set yet (due to badly initialized variable). 12) Now putting preferences file and work directory at default user directory if old one cannot be found in order to work better on Windows computers. 13) Type grayed out of Preprocess, Average, Postprocess, and Read functions when set to .ept files since the type is specified by the file. 14) "Done" buttons renamed to "Main" to reduce confusion (thanks to Tim Curran). 15) Fixed channels not being unstandardized correctly in jack-knife function of Topos, resulting in some inaccuracy in dipole results and potentially a crash. 16) Fixed crash when trying to display Topos where some channels are missing electrode coordinates. 17) Wave window title now more descriptive (thanks to Arild Hestvik). 18) View function now defaults to selecting the newest dataset rather than the first dataset (thanks to Arild Hestvik). 19) When adding combinations of cells or subjects, the name of the new addition describes what went into it. 20) Bumped default size for preprocessing chunks up to 200000. 21) Added support for selecting timepoints in preprocessing (previous implementation was non-functional). 22) Fixed View ANOVA function not matching up ANOVA levels with data columns correctly when a subset of the columns are selected. 23) In Contrast function of the ANOVA pane, fixed levels of ANOVA factors being listed in the wrong order when there are more than one ANOVA factor. 24) In Contrast function of the ANOVA pane, fixed crash when no between factor specified. 25) Fixed error message incorrectly rejecting between or within contrast specified as being "1", which should mean no contrast of that type. 26) Added option to manually specify EOG channels for preprocessing for cases where automatic EOG channel selection does not work. 27) Fixed channel controls for Window Pane not working on Matlab versions prior to 7.8. 28) Fixed some channel controls for Window Pane going off screen on a laptop screen.

Changes in 2.22 (2/3/11)

1) Fixed crash in preprocessing when autoTemplate or bothTemplate options selected. 2) Fixed only final factor being expanded for spatial PCAs for purposes such as viewing topographies of factors. 3) Fixed crash when starting program on a computer with spaces in the default user path, as in "Documents and Settings"

Changes in 2.23 (4/11/11)

1) Hopefully fixed crashes from buggy reset of preferences. 2) Fixed crash when performing eyeblink correction due to change in preferences file. 3) Fixed not using saccade preference settings. 4) Added commands to change or create EPwork directory from the EP menu. 5) EPprefs files now stored only in EPwork directories. 6) Fixed

contents of topos window getting shifted upwards off window when OS X Dock is at bottom of screen. 6) Fixed crash when displaying data with only one or two timepoints using Topos view. 7) Fixed crash when saving continuous simple binary or EP file with events and with no bad trials. 8) Added support for reading CSV text data files in addition to tab-delimited text files. 9) Added support for importing NetStation Matlab data files. 10) Fixed crash when performing contrasts with dataset having no between group factors.

Also, note I've entered in updates to the FieldTrip I/O code to optimize loading of simple binary files, fix to problems reading EGIS files on linux systems, and fix for segmented simple binary files that don't have any events. Be sure to update your copy of FieldTrip (to March 26, 2011 or later) if you are using any of these file formats.