**Spike2 Script Library**

Dirk Bucher, April 2013

***Introduction***

This is a collection of Spike2 scripts written over the last 10 years, mostly by Dirk Bucher. This means that they were written in Spike2 versions 3-7. Most of the older scripts have been tested to work in newer versions, and usually CED makes sure there are no problems. However, feel free to contact Dirk Bucher if there are problems.

The quality of the scripts ranges from “fast hack” to well designed and user-friendly. In addition, some are designed for broad use, while others are fairly specific for tasks that came up in the Marder and Bucher (and other) labs over the years. In general, apart from things like view manipulations that could be useful for anyone, there is a heavy bias toward analysis of rhythmic patterns and spike timing. **General use scripts are listed in bold below.**

Scripts written by Dirk Bucher are in most cases designed to be run from the script bar and close automatically. If you prefer running them from the file view and keeping them open, “out code” the FrontView/FileClose lines at the end.

Most scripts accessing time view files automatically operate in the time range between Cursor (1) and Cursor (2). If those are missing or in the wrong order, you’ll be asked if you want to analyze the entire time range instead.

With most scripts that output numerical values, results are written into the log window and can then be saved as text files.

Annotations are spotty. All scripts have a header with instructions/descriptions. However, the code itself is only annotated in some cases.

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| **Name** | **Category** | **Description** | **Example use** | **Author** | **Date** | **Class** |
| **1111** | **Burst analysis** |  |  |  |  | **General use** |
| **1spkMkburst** | **Burst analysis** | **Creates burst markers at single events.** | **allows using burst and phase analysis scripts when one of the neurons only spikes once per cycle.** | **Dirk Bucher** | **2007** | **General use** |
| **batchbfast** | **Burst analysis** | **Does fast burst analysis for one channel in a sequence of files. Only returns means and SDs for burst duration and cycle periods.** | **Fast analysis of long-term recordings** | **Dirk Bucher** | **2002** | **General use** |
| **batchburst** | **Burst analysis** | **Does full burst analysis for one channel in a sequence of files.** | **Analysis of long-term recordings** | **Dirk Bucher** | **2002** | **General use** |
| **burststat** | **Burst analysis** | **Single channel analysis of discrete bursts** | **Self explanatory** | **Dirk Bucher** | **2003** | **General use** |
| gastropyloric | Burst analysis | Burst analysis of a fast rhythmic signal with respect to a slow rhythmic signal.  . | Analyze when each pyloric burst happens in the gastric phase | Dirk Bucher | 2005 | Specialized |
| gpPhase | Burst analysis | '"gastric/pyloric phase" (written for Blitz lab). Burst and phase analysis of a pyloric reference neuron and an additional pyloric (follower) neuron with respect to the phase of a gastric reference neuron. | Analyze gastro-pyloric interactions in the STG | Dirk Bucher | 2013 | specialized |
| missburst | Burst analysis | checks the regularity of alternation of two bursting neurons. Returns normal burststatistics for a reference channel and number of bursts of a second channel in each reference cycle. | Quick way to check how much cycle skipping occurs. | Dirk Bucher | 2012 | Fast hack |
| **mkbursts** | **Burst analysis** | **Creates a marker channel that holds burst starts and ends.** | **Do burst detection from spike events** | **Dirk Bucher** | **2002** | **General use** |
| **nSpks** | **Burst analysis** | **Plots the number of spikes per burst into a RealMark channel.** | **Fast check for burst variability** | **Dirk Bucher** | **2012** | **General use** |
| **phaseburst** | **Burst analysis** | **Analyses rhythmic bursting in 2-3 neurons fairly completely (in phase and time, and with optional spike analysis).** | **Phase and burst analysis of pyloric or gastric patterns** | **Dirk Bucher** | **2002** | **General use** |
| PRC | Burst analysis | Does phase response curve analysis. | Self explanatory. | Dirk Bucher | 2003 | Fast hack |
| pyloricBmk | Burst analysis | Detects PD, LP and PY spikes and bursts if good enough for simple thresholding. | Faster than doing it one by one. | Dirk Bucher | 2005 | Specialized |
| pyloricPhase | Burst analysis | Customized version of "phaseburst" for analysis of pyloric rhythms from extracellular recordings | Faster than doing it with the general scripts | Dirk Bucher | 2003 | Specialized |
| pylPhConsec | Burst analysis | Pyloric phase analysis from consecutive files. | Analyze long-term recordings | Dirk Bucher | 2005 | Specialized |
| The\_Crab\_Analyzer | Burst analysis | Does Spike detection , burst detection, and phase analysis. | Analyze pyloric and gastric rhythms all in one go. | Wolfgang Stein | 2009 | Specialized |
| **trigBurst** | **Burst analysis** | **Script to analyze repetitive episodes of bursting** | **Self-explanatory** | **Dirk Bucher** | **2005** | **General use** |
| **1111** | **Channel editing** |  |  |  |  | **General use** |
| **AddChan** | **Channel editing** | **Generates an event channel that holds events of two input event channels.** | **Put spike detection results from two different time windows into a single channel** | **Dirk Bucher** | **2002** | **General use** |
| **artiCut** | **Channel editing** | **Cuts out stimulus artifacts from a waveform channel and replaces them with a linear interpolation.** | **Remove short artifacts where data loss in that time window is not important, or where artifacts are inconsistent** | **Dirk Bucher** | **2012** | **General use** |
| **artiSubtr** | **Channel editing** | **Removes stimulus artifacts from recording traces by subtracting a template average artifact waveform.** | **Remove artifacts with minimal data loss in traces with consistent artifact waveforms.** | **Dirk Bucher** | **2012** | **General use** |
| chunkreplace | Channel editing | copies a chunk of waveform from one channel and place it into another channel | Self-explanatory | Dirk Bucher | 2012 | Fast hack |
| **ClearProc** | **Channel editing** | **Clears all Channel Processes (like "smooth" or "rectify") from all channels.** | **Too lazy to do it one by one.** | **Dirk Bucher** | **2012** | **General use** |
| **EditEvt** | **Channel editing** | **Edits event or marker channels.** | **Delete or add events or markers by hand.** | **Dirk Bucher** | **2007** | **General use** |
| **setBursts** | **Channel editing** | **generates an event channel with "artificial bursts".** | **Generate test data sets** | **Dirk Bucher** | **2002** | **General use** |
| **subtrSpikes** | **Channel editing** | **Subtracts events of one channel from another.** | **Separating signals of different amplitude in extracellular recordings.** | **Dirk Bucher** | **2002** | **General use** |
| **WinSubtr** | **Channel editing** | **Deletes events in an event channel in time windows defined by markers in a marker channel.** | **Analyze interacting temporal patterns** | **Dirk Bucher** | **2004** | **General use** |
| **1111** | **File manipulation** |  |  |  |  | **General use** |
| **batchImp** | **File manipulation** | **Converts a batch of files in foreign format (e.g., Axon) into spike2 files.** | **Convert all files from and expt recorded in foreign format for spike2 analysis** | **Dirk Bucher** | **2002** | **General use** |
| **ConcatFiles** | **File Manipulation** | **Concatenates consecutive time view files (waveform channels only).** | **analyze larger time stretches** | **Dirk Bucher** | **2007** | **General use** |
| **RepFileMerge** | **File Manipulation** | **Creates a new file that holds event and waveform channels from two source files that were recorded with matching stimulus patterns.** | **Channels aligned at reference stimulus patterns can be used for virtual channel calculations.** | **Dirk Bucher** | **2013** | **General use** |
| **1111** | **Plot** |  |  |  |  | **General use** |
| EMFseq | Plot | Outputs a sequence of metafiles from time views | Make movies or make images of longer time stretches at decent resolution. CAN NOW EASILY BE EXTENDED TO ALLOW TIFF OR JPG, JUST HAVEN’T DONE THAT YET. | Dirk Bucher | 2005 | Fast hack |
| floatingBar | Plot | Creates an XY view floating bar chart with error bars. Values are entered manually. | Fast way to create phase plots for CPG patterns | Wolfgang Stein, Dirk Bucher | 2009 | Fast hack |
| **multiSweep** | **Plot** | **Plots multiple sweeps of waveform data with fixed delay and duration from a trigger (XY plot)** | **Identify signals with consistent delay. Generate sweep plots from VC/CC protocols** | **Dirk Bucher** | **2002** | **General use** |
| **PoissCreate** | **Plot** | **Makes a file with an event channel in Poisson distribution** | **Create a Poisson stimulus** | **Wolfgang Stein** | **2009** | **General use** |
| **respMk** | **Plot** | **Creates artificial unitary passive responses from spike train event channel input using a te-at function.** | **Create artificial EPSP or contraction responses to a spike pattern** | **Ralph DiCaprio, Dirk Bucher** | **2002** | **General use** |
| SquareWave | Plot | Creates a waveform channel with square signals, at time points taken from an event channel. | Create TTL triggers | Dirk Bucher | 2013 | Fast hack |
| **SweepDiff** | **Plot** | **Plots the difference between two multisweep plots, as generated with "MultiSweeps"** | **Leak subtraction and difference currents from VC protocols** | **Dirk Bucher** | **2004** | **General use** |
| TrigEMF | Plot | Outputs a sequence of metafiles from time views triggered by events | Make movies or make images of longer time stretches at decent resolution. CAN NOW EASILY BE EXTENDED TO ALLOW TIFF OR JPG, JUST HAVEN’T DONE THAT YET. | Dirk Bucher | 2005 | Fast hack |
| **WolfieSweep** | **Plot** | **Version of “multisweep “ for more than 2 channels** | **Identify signals with consistent delay. Generate sweep plots from VC/CC protocols** | **Wolfgang Stein** | **2005** | **General use** |
| **1111** | **Spike analysis** |  |  |  |  |  |
| burstDelay | Spike analysis | Analyzes delays and spike waveforms from burst stimulations of axons. | Track delay and waveform changes from nerve stimulations with realistic burst structures. | Dirk Bucher | 2012 | Specialized |
| **delFilter** | **Spike analysis** | **Sorts spikes according to 2 different delay times between 2 recording sites** | **Self explanatory** | **Dirk Bucher** | **2002** | **General use** |
| delPlot | Spike analysis | Plots delays between stimuli and spike responses into a RealMark channel | Fast delay analysis | Dirk Bucher | 2012 | Fast hack |
| delTest | Spike analysis | Plots delays between stimuli and spike responses into a RealMark channel, even if number of events are not matching | Fast delay analysis, identify spike failure times | Dirk Bucher | 2012 | Fast hack |
| FailEctZoom | Spike analysis | Checks for spike failures or ectopic spikes in burst stimulations, and zooms in on the next occurence of a mismatch  between stim and response event channels. | Specifically written for editing event channels from PD axon recordings (specific channel names). | Dirk Bucher | 2011 | Specialized |
| IF\_ISI | Spike analysis | Returns intervals and instantaneous frequencies for an event channel | Fast spike analysis | Dirk Bucher and Ralph DiCaprio | 2002 | Fast hack |
| PoissDel | Spike analysis | Analyzes delays and spike waveforms from poisson stimulations of axons. | Track delay and waveform changes from nerve stimulations with randomized intervals. | Dirk Bucher | 2012 | Specialized |
| pPulse | Spike analysis | Analyzes spike delays and waveform parameter changes from paired pulse recovery cycle protocols. | Analyze axon excitability changes | Dirk Bucher | 2010 | Specialized |
| rate\_meanfreq | Spike analysis | Returns spike numbers and mean frequency in defined bins from an event channel. | Fast spike analysis | Dirk Bucher | 2002 | Fast hack |
| tPulse | Spike analysis | Analyzes spike delays and waveform parameter changes from recovery cycle protocols with conditioning trains. | Analyze axon excitability changes | Dirk Bucher | 2010 | Specialized |
| **1111** | **View manipulation** |  |  |  |  |  |
| **ChanWeight** | **View Manipulation** | **Sets the relative vertical space taken up by a channel** | **Make intracellular recordings bigger than extracellular ones** | **Dirk Bucher** | **2007** | **General use** |
| **CurLabelSwitch** | **View Manipulation** | **Switches cursor label mode between "no label", "position only", "number only", and "position (number)".** | **Self explanatory. Too lazy to do it by hand for each cursor** | **Dirk Bucher** | **2012** | **General use** |
| **DelCur** | **View Manipulation** | **Deletes all cursors (vertical and horizontal).** | **Too lazy to do it through menu** | **Dirk Bucher** | **2002** | **General use** |
| **displSwitch** | **View Manipulation** | **Switches between default font and font sizes and larger fonts.** | **Make Figures** | **Dirk Bucher** | **2003** | **General use** |
| **Optimise** | **View Manipulation** | **optimizes y-range for all channels** | **Too lazy to do it through menu** | **Dirk Bucher** | **2002** | **General use** |
| **TimeMax** | **View Manipulation** | **Maximizes x-axis** | **Too lazy to do it through menu** | **Dirk Bucher** | **2002** | **General use** |
| ***You can also use shortcut keys for all kinds of view manipulations, including “optimise” and “TimeMax”. Look up “short cut keys” in the spike 2 help menu.*** | | | | | | |
| **1111** | **Waveform analysis** |  |  |  |  |  |
| **aab** | **Waveform analysis** | **Measures area above baseline (voltage integral) for single or compound EPSPs or EJPs** | **Self-explanatory** | **Dirk Bucher** | **2002** | **General use** |
| **ClearFit** | **Waveform analysis** | **Removes all fits from all channels in result view or waveform channels or XY plots** | **Clean up previously analyzed file** | **Dirk Bucher** | **2009** | **General use** |
| decayfit | Waveform analysis | Returns time constants from dual exponential fits for PSPs or spikes as marked with event channel | Self explanatory | Dirk Bucher | 2010 | Fast hack |
| Ih\_fit | Waveform analysis | Measures IV values, time constants and tail currents from multisweeps of non-leak subtracted Ih Vclamp data. | Self-explanatory | Dirk Bucher | 2008 | Specialized |
| 'IMI\_XYcursors | Waveform analysis | Drops cursors into an XY view IV plot of IMI for fast measurements, returns values to log window. | Measure peak, baseline, and Vpeak from IMI IV plots. | Dirk Bucher | 2013 | Fast hack |
| IMIcont | Waveform analysis | Creates IV plots of the modulator activated inward current from continuous (repeated) voltage clamp ramps during peptide application. | Roughly analyze how responses to peptide application change over time and pick maximal responses for later analysis with “RampIV”. | Dirk Bucher | 2012 | Specialized |
| instCorr | Waveform analysis | Creates fast scatterplots of EPSP or EJP amplitudes from 2 waveform channels to see if they are correlated. | Self-explanatory | Dirk Bucher | 2005 | Fast hack |
| IVcurve | Waveform analysis | Returns IV values from time views of step protocols | Fast IV curve from input resistance measurements | Dirk Bucher | 2004 | Fast hack |
| P5protocol | Waveform analysis | Creates a multisweep xy view of the summed step sequence from P/5 protocol data. | For leak subtraction using the "SweepDiff" script. | Dirk Bucher | 2009 | Specialized |
| PSPparamAv | Waveform analysis | Returns PSP parameters from a waveform average. | Fast but crude analysis of PSPs | Dirk Bucher | 2002 | Fast hack |
| RampIV | Waveform analysis | Creates difference current and IV plot from result files averaged from voltage ramps run to measure IMI in STG neurons | Measure peak current and voltage at peak of IMI | Dirk Bucher | 2012 | Specialized |
| SynVC | Waveform analysis | Modification of "XI\_IVcurve", specifically for synaptic currents from VC expts. | Analysis of slow graded synaptic currents in STG neurons | Ayanna Bryan and Dirk Bucher | 2010 | Specialized |
| **TrainPSPamp** | **Waveform analysis** | **Measures the amplitudes of PSPs in trains or bursts.** | **Analyze even summating responses by index.** | **Dirk Bucher** | **2002** | **General use** |
| **TrigPSP** | **Waveform analysis** | **Returns PSP parameters for separate events.** | **Measuring postsynaptic responses from triggered or low frequency spontaneous events.** | **Dirk Bucher** | **2002** | **General use** |
| **WaveToEv** | **Waveform analysis** | **Does event detection from waveform channel (peak, trough, threshold) and writes results into real event channel.** | **Faster than doing it through the menu.** | **Dirk Bucher** | **2002** | **General use** |
| **WinDiscr** | **Waveform analysis** | **Window Discriminator for event detection based on horizontal cursors.** | **Separating signals of different amplitude in extracellular recordings.** | **Dirk Bucher** | **2002** | **General use** |
| **XY\_IV** | **Waveform analysis** | **IV measurements from VC or CC step protocol data in XY views created with “multiSweeps”.** | **Self-explanatory** | **Dirk Bucher** | **2013** | **General use** |
| XY\_TabOut | Waveform analysis | Outputs xy view data as a text file with tab separated columns. | Output multisweep VC clamp data in the appropriate format for “Neurofit” | Dirk Bucher | 2009 | Specialized |