

Spike2 Script Library

Dirk Bucher, May 2016, **version 1605**

Introduction

This is a collection of Spike2 scripts written in the years since 2002, mostly by Dirk Bucher. This means that they were written in Spike2 versions 3-8. Most of the older scripts have been tested to work in newer versions, and usually CED makes sure there are no problems. However, scripts are not necessarily backward compatible. 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.

Name	Category	Description	Example use	Author	Date	Class
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
gastbin	Burst analysis	Burst analysis of a fast rhythmic signal with respect to a normalized slow rhythmic signal.	analyze burst parameters of a pyloric neuron over the normalized gastric mill cycle (in gastric cycle bins)	Dirk Bucher	2015	Specialized
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
periodcount	Burst analysis	Counts the number of pyloric cycles (with fraction) within each gastric cycle.	Analysis of gastropyloric interactions	Dirk Bucher	2005	Specialized
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

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

batchImp	File manipulation	Converts a batch of files in foreign format (e.g., Axon) into spike2 files. Doesn't work when trying to convert foreign format 32bit files into 64bit spike 8 files! You need to install the 32bit spike8 version to do this.	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

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
mSweepAve	Plot	Plots multiple sweeps of AVERAGED waveform data with fixed delay and duration from a trigger	Average noisy traces from step protocols	Dirk Bucher	2014	General use
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
PhSweepAve	Plot	Creates both a multiple sweeps window and an average of waveform data in phase, i.e. normalized to the sweep duration.	Average of waveform trajectory in rhythmic activity with variable periods.	Dirk Bucher	2016	General use
PoissCreate	Plot	Makes a file with an event channel in Poisson distribution	Create a Poisson stimulus	Dirk Bucher	2016	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
SweepAve	Plot	Make average from multiple sweeps in XY file. Only uses visible channels	Exclude some sweeps from average	Dirk Bucher	2016	General use
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
XYlhleak	Plot	Subtract leak from lh measurements by scaling the response to the smallest command and subtracting it from all step responses	Alternative to subtracting leak from backward fits (script"lh_fit") under waveform analysis.	Dirk Bucher	2016	Fast hack

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
delFix	Spike analysis	Plots delays between stimuli and spike responses, lets you edit for spike failures and ectopic spikes.	Edit stimulus and response event channels to measure conduction delays over time.	Dirk Bucher	2016	Specialized
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 occurrence 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

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.

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
PPsubtr	Waveform analysis	Subtracts conditioning pulse waveform from paired pulse responses	Accurate paired pulse analysis	Dirk Bucher	2014	General use
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
SpkShapeSingle	Waveform analysis	Returns spike shape or EPSP shape parameters like peak voltage, time to peak and 2 time constants of exponential decay.	Return single spike shape parameters from PD axon recordings (no undershoot)	Dirk Bucher	2014	Fast hack
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 summing 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