Documentation

fpEventViewer

Contents

1. Select your data tank

fpEventViewer.exe file should be used to start the application. Then, the users will be presented with the main application window where they can load TDT data by clicking on “Select TDT Data” button. (Fig1) Make sure that each subject will have avi video file. Video files should end with the respective Cam event name. For example, video ending with _Cam1 will be related to the Cam1 event in the TDT data tank.

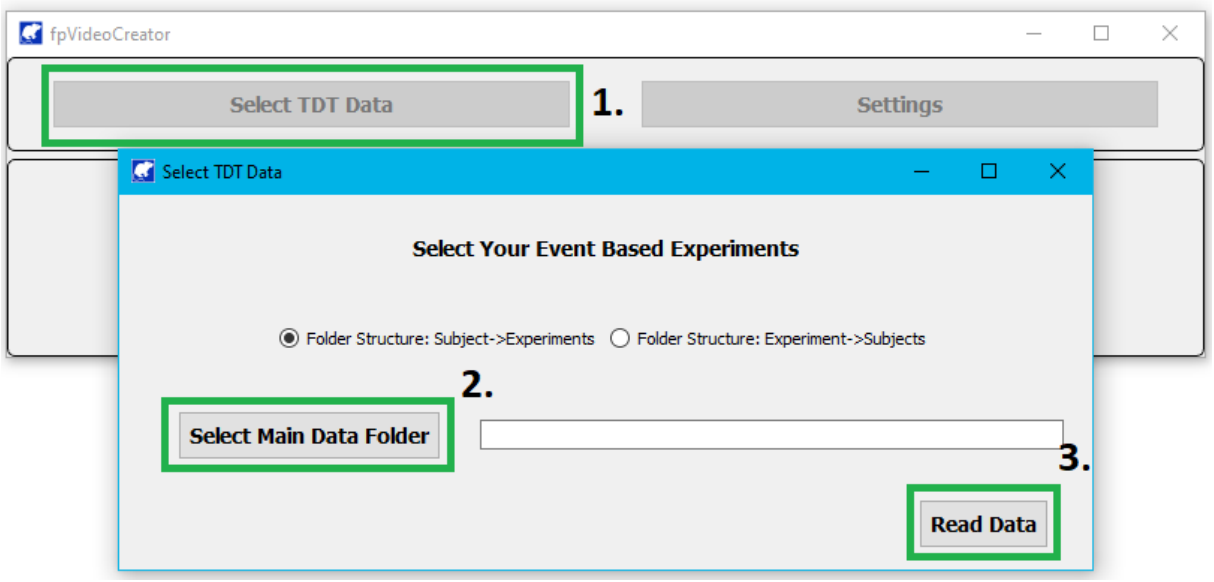

Fig1. Application main window with “Select Data” window where user defines what kind of data will be analyzed.

1.1. Folder Structure

The application is designed to analyze two kinds of data structures from TDT system. (https://www.tdt.com/docs/synapse/managing-data-for-your-lab/)

Subject -> Experiments

A folder that contains subfolders with subject names. Within subject subfolders, there should be subfolders with experiment names. Within experiment subfolders, there should be user’s TDT files (i.e., *.Tbk, *.Tdx, *.tev, *.tin, *.tnt, *.tsq).(Fig2)

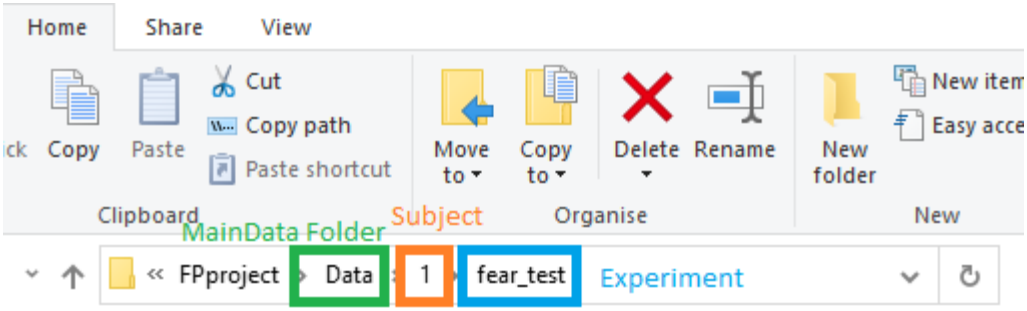

Fig2. Subject->Experiment folder structure example, where fear_test is an experiment name with TDT files (i.e., *.Tbk, *.Tdx, *.tev, *.tin, *.tnt, *.tsq)

Experiment -> Subjects

A folder that contains subfolders with experiment names. Within experiment subfolders, there should be subfolders with subject names. Within subject subfolders, there should be user's TDT files (i.e., *.Tbk, *.Tdx, *.tev, *.tin, *.tnt, *.tsq).(Fig3)

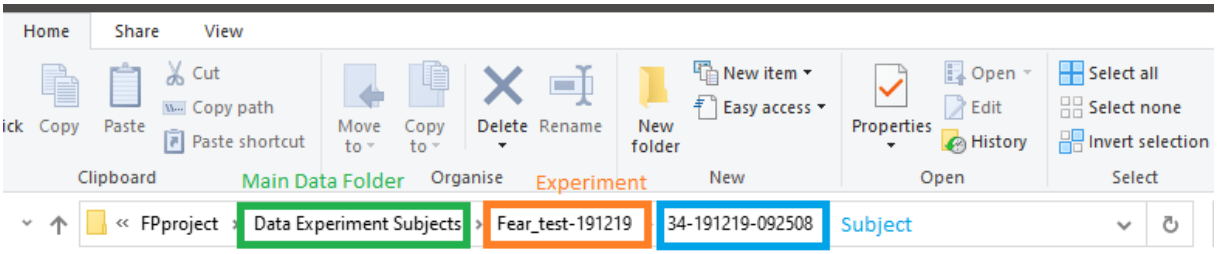

Fig3. Experiment->Subject folder structure example, where 34-191219-092508 is a subject name with TDT files (i.e., *.Tbk, *.Tdx, *.tev, *.tin, *.tnt, *.tsq)

1.2. Select Experiment Name

The user is prompted with the experiment names available from the first data set in the main folder. (Fig4)

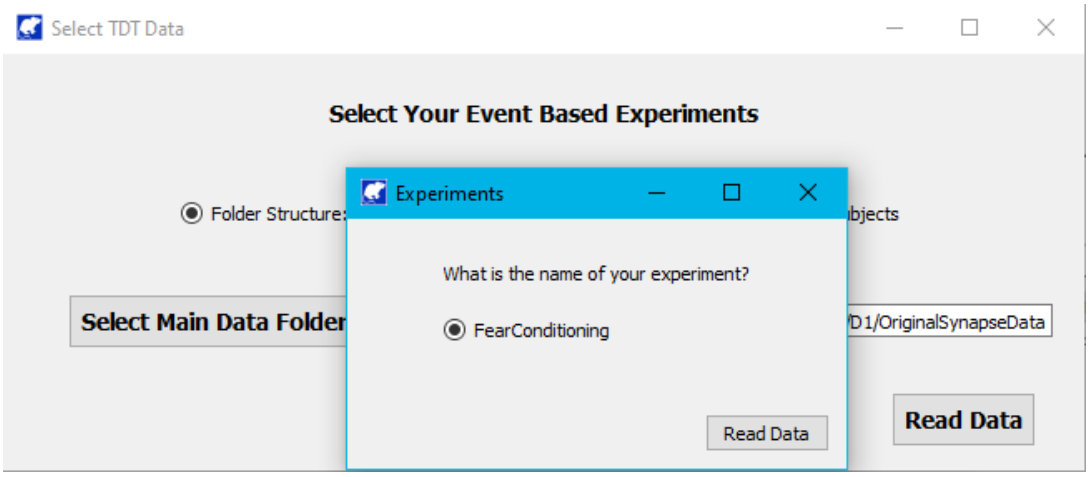

Fig4. Select experiment that will be analyzed.

1.3. Select Signal and Control Channels

The user is prompted with channel names available from the first data set in the main folder. The user should select signal channel and control channel (Fig5)

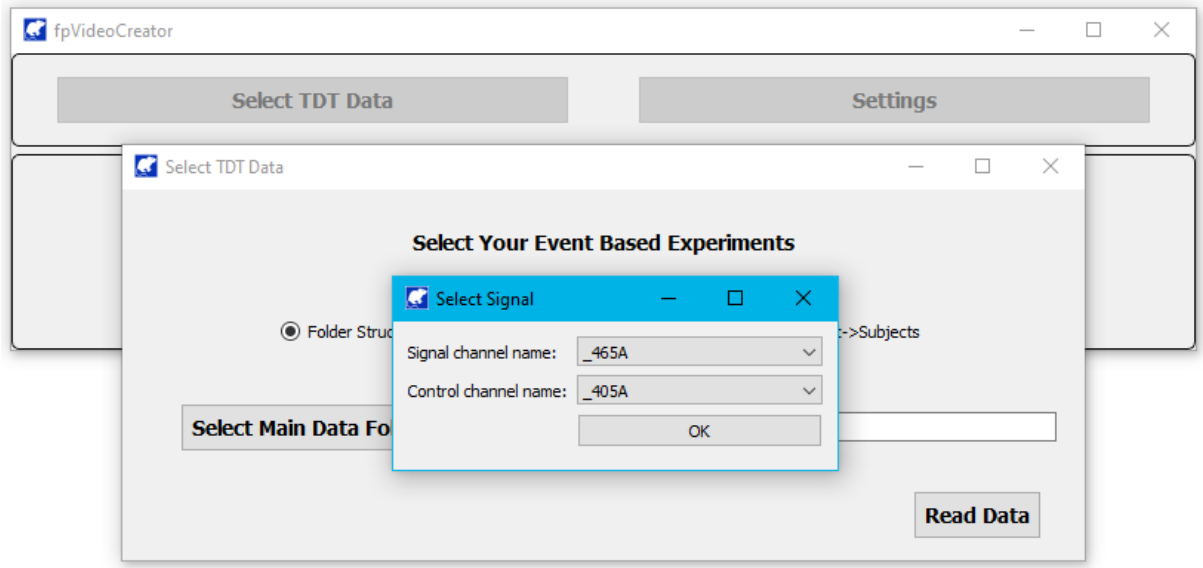

Fig5. Select signal channel name and control channel name.

2. Settings

2.1. Downsample

The user can modify the sampling rate or normalization method at any time by clicking on "Settings" button from the main menu at the top of main application window. (Fig6)

The recommended downsampling should be between 1 and 2% of the sampling frequency, so as not to lose too much information.

2.2. Normalize

The application allows to normalize using either Standard Polynomial Fitting (based on fitting applied in David Barker's pMAT application) or Modified Polynomial Fitting (Mulholland's version of polynomial fitting). These methods will be described later. (Standard Polynomial Fitting is the default). Then the user has the option to either show normalized data as df/F in % or as a Z-score.

2.3. Filter

The user can also choose to smooth data using filter with a window around each sample of the data between 0 and 10000 samples. (10 is the default).

We are using a digital filter forward and backward to the signal from Python's scipy.signal package called filtfilt:
https://docs.scipy.org/doc/scipy/reference/generated/scipy.signal.filtfilt.html

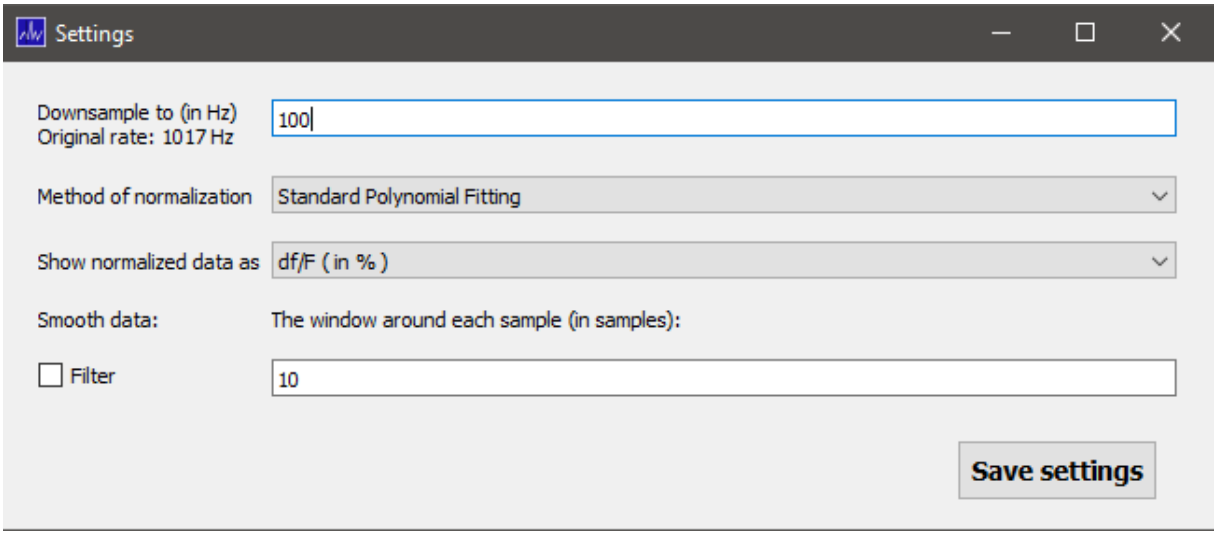

Fig6. Settings window where user can change normalization method and downsampling applied during the analysis.

3. Create Videos

Select and define your criteria for the videos. (Fig7)

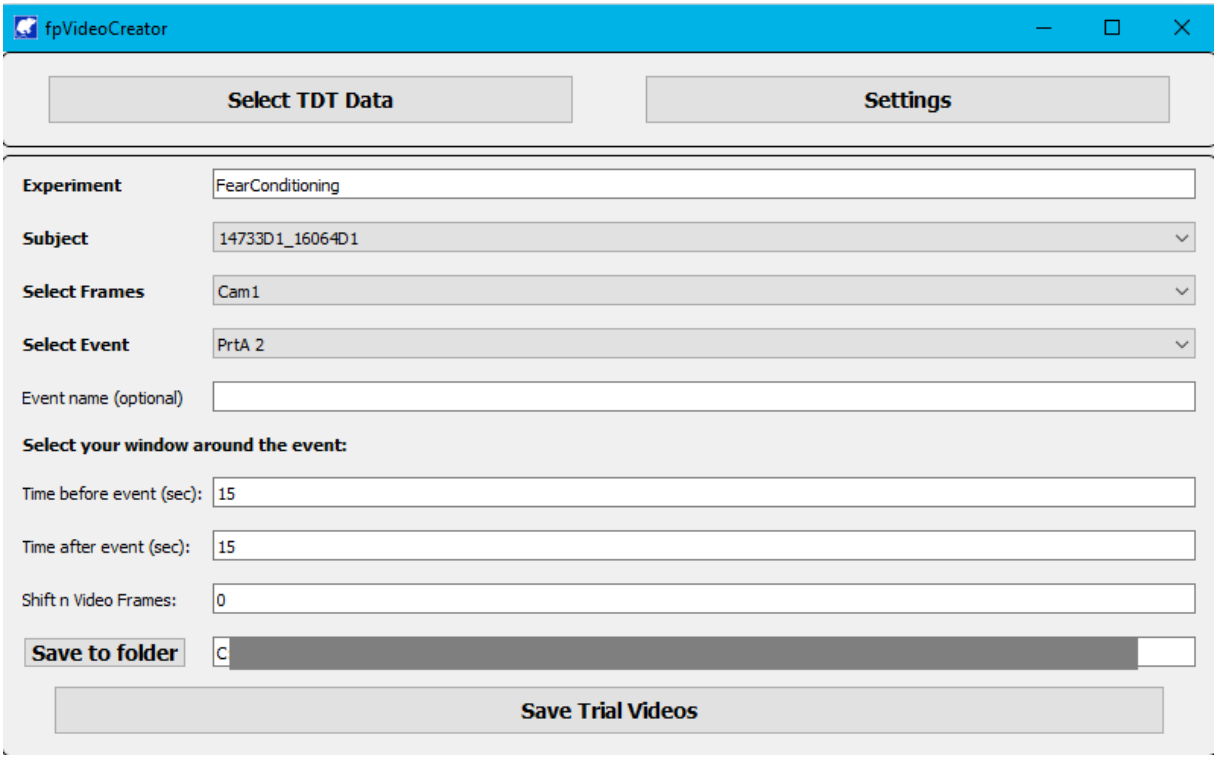

Fig7. Main interface to define video criteria.

Experiment

Shows which experiment was selected when reading TDT data tank.

Subject

Select subject from the drop down menu.

Select Frames

Shows available Cam events from the data tank. They contain time stamps of video frames. Currently, only Cam1 and Cam2 events are allowed.

Select Event

Shows recorded events.

Event name

One can enter the name of the above event i.e Tone. If the event name was entered, it will be added to the result video files names. If this was not added, the files will have the above (original) event name in the file name. For example, 14733D1_16064D1_Cam1_1_trial_evt_PrtA 2_combined.avi vs 14733D1_16064D1_Cam1_1_trial_evt_Tone_combined.avi

Time before event (sec)

How many seconds before the selected event should be included in the videos.

Time after event (sec)

How many seconds after the selected event should be included in the videos.

Shift n Video Frames

Unfortunately, most of the videos are not perfectly aligned with Cam events from the data tank. Usually, the observed shift is 4-5 frames. One can start with saving the videos with 0 frames shift and watch the result video frame by frame to see the offset. Then re-run the app with an observed frame shift. This is only possible when there is a visual que of the event onset on the video (i.e LED).

Save to Folder

Select where to save the results. By default, videos will be saved in _fpExplorerAnalysis subfolder for that subject and experiment. The safest path is the one that does not contain any special characters! Otherwise, saving frames might crash.

Save Trial Videos

Finally, select which trials to analyze and save as videos. (Fig8) When experimenting with the time window and finding the right shift, one may want to create only one trial video at a time. This will be faster.

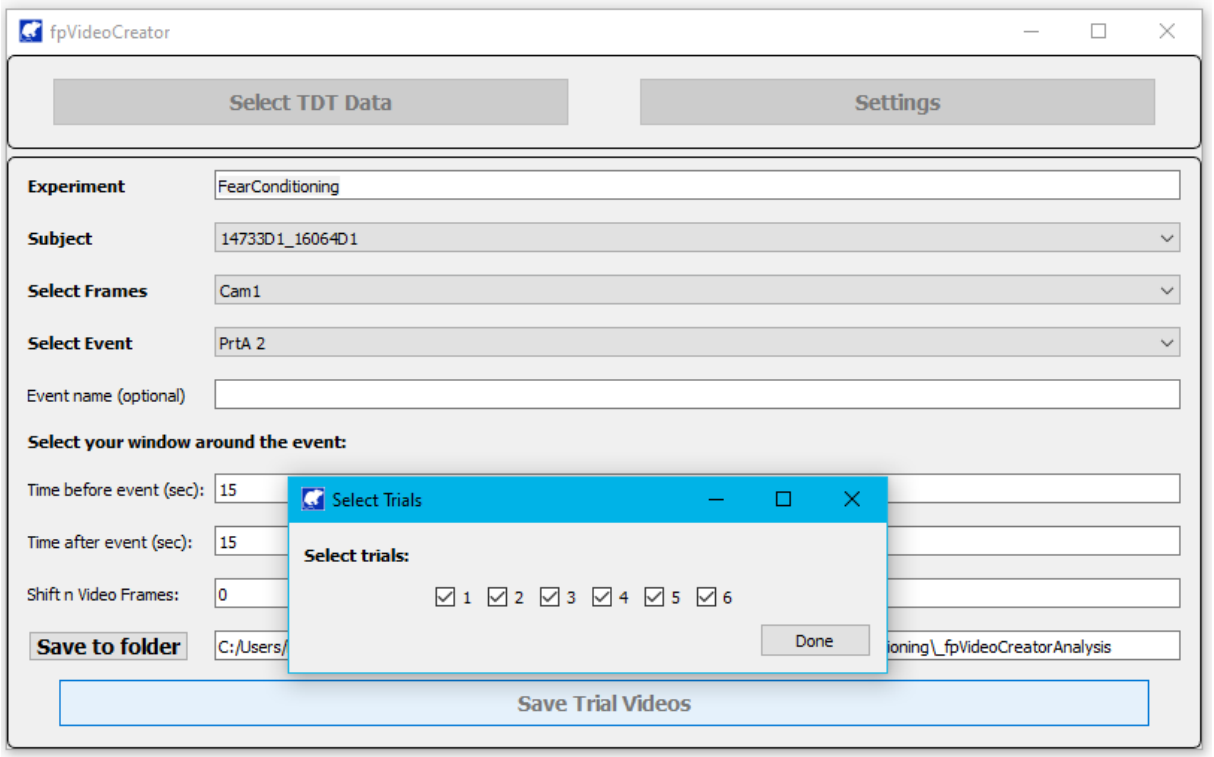

Fig8. Select which trials to analyze and create videos.

4. Results

Depending on the video length, selected time window and the number of selected trials, the analysis may take very long time. Look at the console to track the progress. (Fig9)

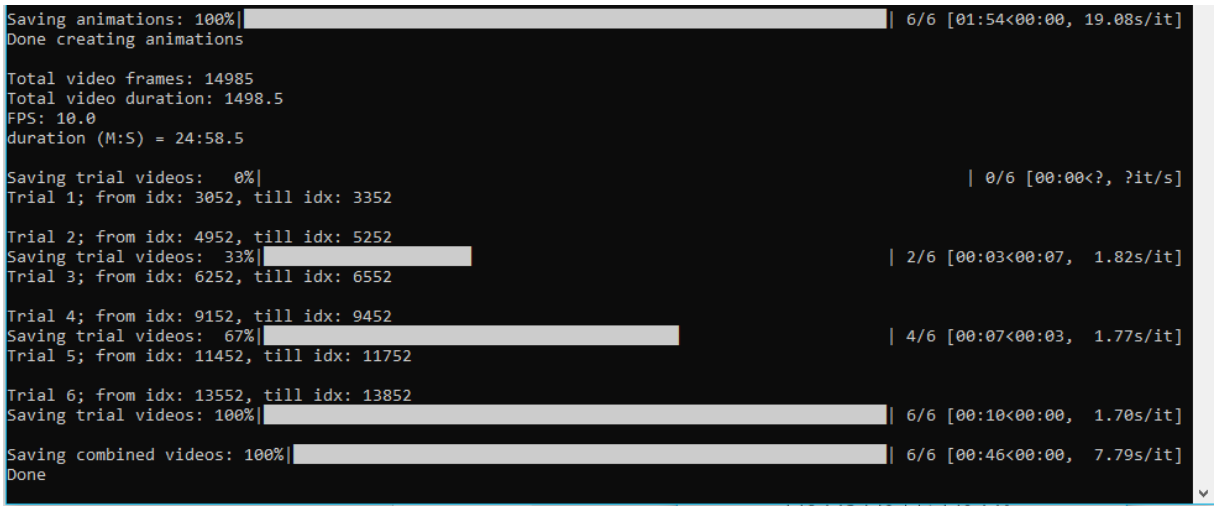

Fig9. Progress bars in the console inform about the state of the analysis.

4.1. Video frame by frame

The original video file will be decomposed to jpg files. Each file representing a single video frame. All these files will be saved in the folder named as the original video file _frames. This step will be skipped if the folder with frames was already created for that video. That is if the user runs the app on the same video file and saves the results in the same location.

4.2. Peri-event animation trace

For each trial, the app creates mp4 animation of the down sampled, normalized peri-event trace of the user defined duration.

4.3. Trial Videos

For each trial, a separate video file will be created that has the duration of the selected peri-event window.

4.4. Combined Trial Videos

For each trial, a new video file is created that shows trial video recording above the trace animation.

All result videos are saved in the subfolder with the same name as the original video file and shift used to align video with the event onset and _video. For example, 14733D1_16064D1_FearConditioning_Cam1_shift5_videos

5. Cam event alignment with selected event onset time

I have the trial onset time plus the offset from the first cam event timestamp, then I check average interval between Cam events (i.e. 0.05). Then, I take the first cam event (index) before event onset and the first Cam event (index) after the event onset and start counting before and after seconds. There should be always two Cam events between *trial onset - average interval* and *trial onset + average interval*. If more than two Cam events are detected this way, I take the closest before and after. If less than two Cam events, I increase the interval and take the closest two Cam events.

The Cam events read from TDT data tank are indexed from 0. The single frame jpg files from the video are also named from 0. That is how I match the index of the timed Cam event with the frame of the video.