

Application Note 216: SCORING METHODS FOR ELECTRODERMAL RESPONSE CHANGES

This application note describes post-acquisition scoring, but the same technique can be applied in real time using calculation channels. Several methods can be used to score the number of electrodermal response (galvanic skin response) changes. In all cases, it is assumed that the EDA (GSR) signal was sampled in DC mode. The basic method involves filter the data, defining events, and counting events.

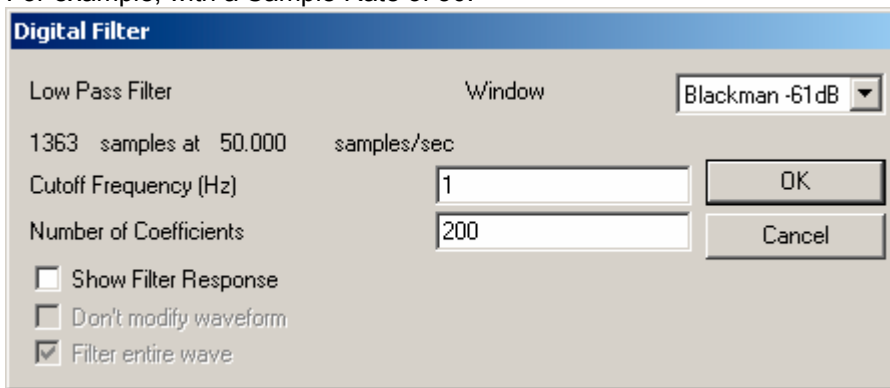
See also: [SCR Note](#)

I. FILTER THE DATA

For best results, a Low Pass Filter is recommended to eliminate any high frequency noise components. Transform > Filter > FIR > Low Pass.

A good rule of thumb to set the number of coefficients is (sample rate x 4)/cutoff frequency.

- For example, with a Sample Rate of 50:

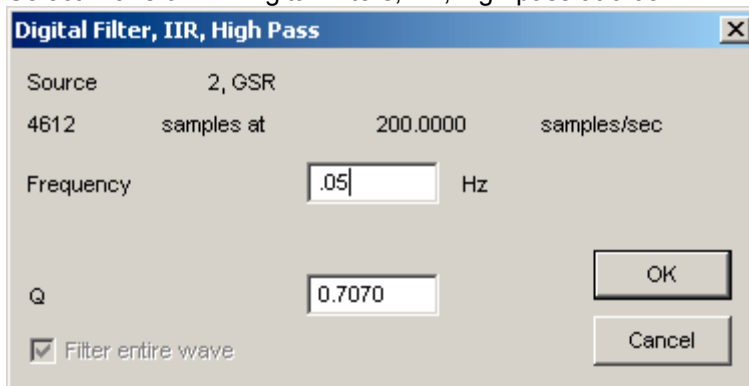


II. DEFINE EVENTS:

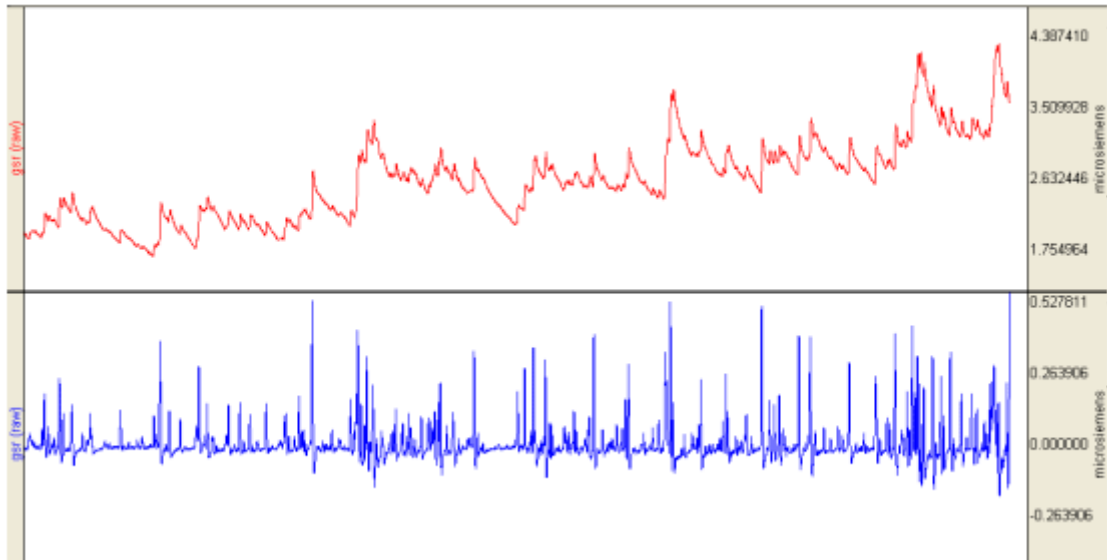
Different methods can be used to determine changes in EDA (GSR). Choose one of the following methods.

A. Apply a filter to convert EDA (GSR) from DC to AC:

- Duplicate the EDA (GSR) waveform.
- Select Transform > Digital Filters, IIR, high pass at 0.05 Hz:

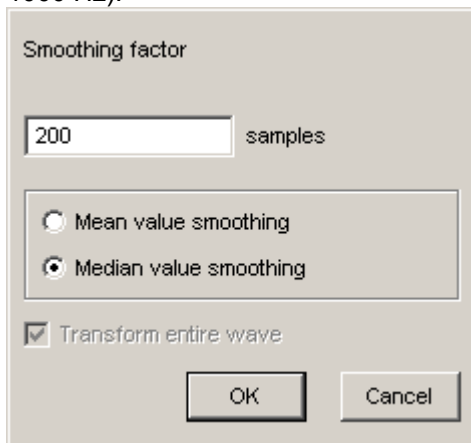


The resultant waveform should resemble the following:

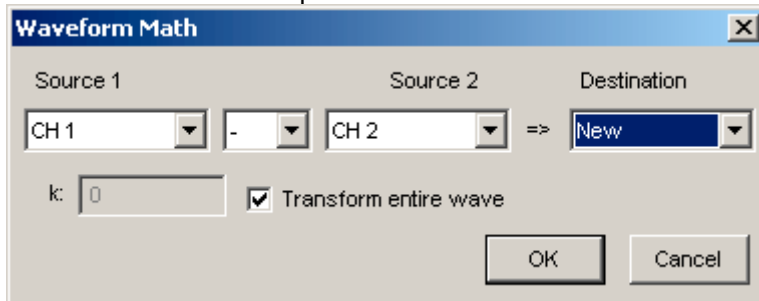


B. Remove baseline from the signal:

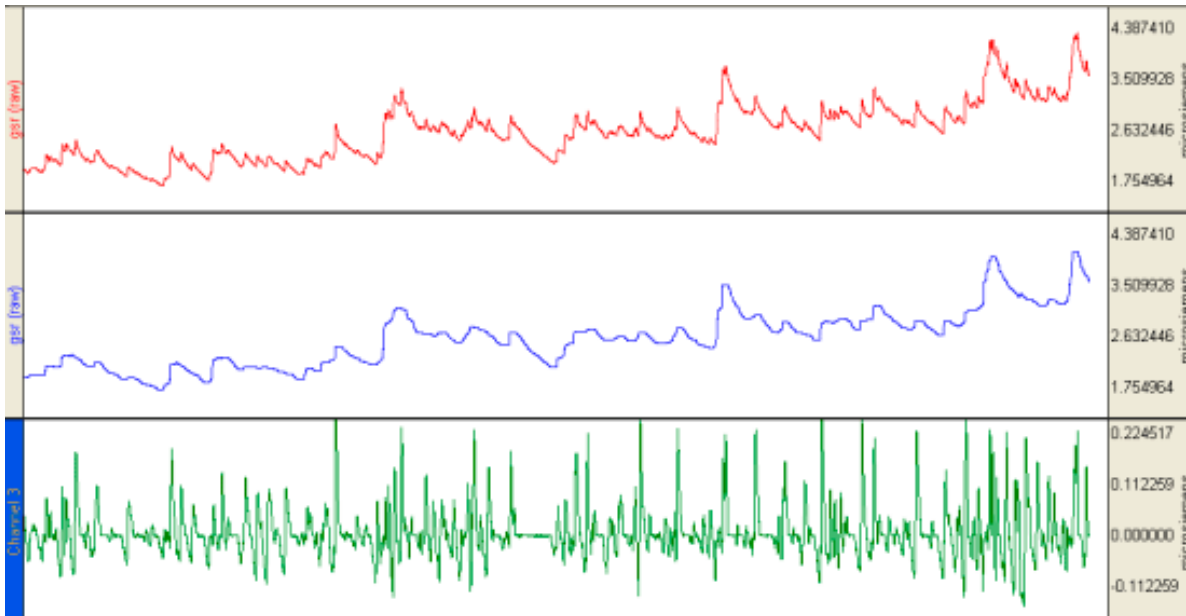
1. Duplicate the raw EDA (GSR) waveform (Edit > Duplicate waveform).
2. Select Transform > Smoothing and set median value smoothing and 200 samples (for data sampled at 1000 Hz).



3. Use either Transform>Equation Generator or Transform > Waveform Math to subtract the waveforms:

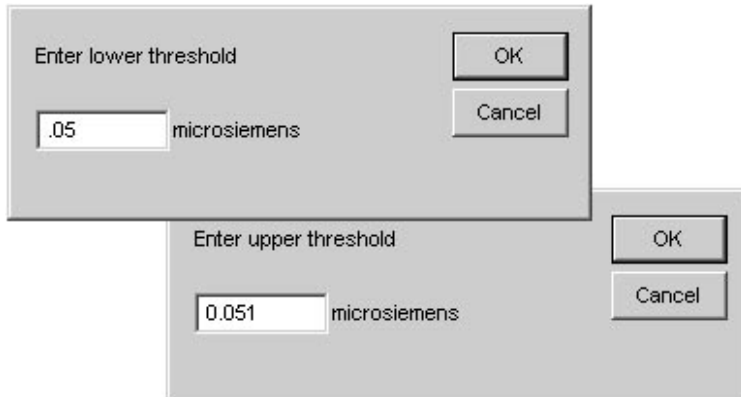


The resultant waveform will consist of a series of spikes representing changes in EDA (GSR).

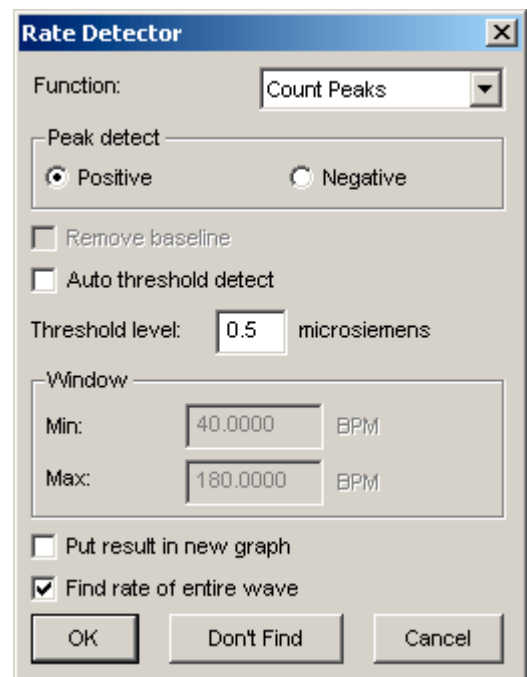


III. COUNT EVENTS

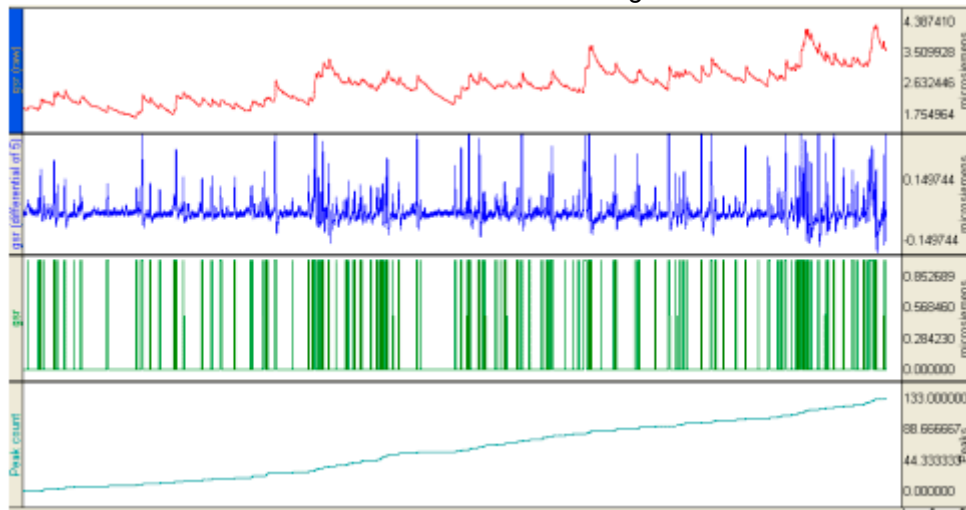
1. Select the entire waveform (Edit > Select All).
2. Select Transform > Math Functions > Threshold and set the following values:



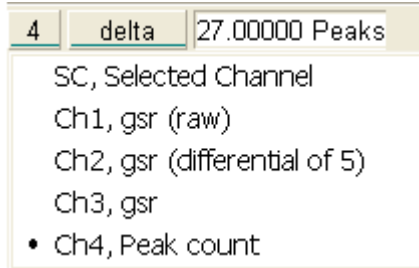
- o The Threshold transformation returns a value of 1 when the criteria is met and zero when it is not met.
 - o This example will detect events that are 0.05 microsiemens or larger and will display the result as a series of spikes that meet the response criteria of being 0.05 microsiemens or larger.
 - o Depending on the method used, you might want to increase or decrease the detection criteria by using the cursor to manually measure what is considered a response.
3. Select the result of the Threshold function, and then select Transform > Find Rate and set Count Peak, threshold 0.5 to count the number of changes that met the criteria.



The resultant waveform should resemble the following:



- To measure the number of changes in a given period (e.g., following an event or at user-defined intervals), use the "delta" measurement on the Count peak waveform.



SCR Note

"When measuring SCR - the number of conductance changes during the same period, keep in mind that: EDA changes take place 1-3 sec after stimulus. IF SCL is 10 microsiemens, a response may be defined as any change of 0.05 or greater that occurred in a specified time (for ex. 1.0 to 3.0 sec.)"

*Source: Psychophysiology Human Behavior and Physiological Response Fourth Edition (p. 199).
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