Our apologies are sent to Mr. Ray Nelson at Lafayette. The photos in the Nov. 2010 Tech Corner were printed incorrently. The same article is reprinted here with the correct images.

Using Lafayette Electrodermal Modes

By Raymond Nelson

LXSoftware 11.0 includes a substantial improvement to the EDA sensors, and now includes several operating modes: **1)** Manual EDA, **2)** Automatic EDA, and **3)** Detrended EDA. All modes are completely serviceable with results that will be highly correlated. There is no reason to regard any of the available EDA modes to be superior or inferior to the others. All LXSoftware 11.0 EDA modes are completely suitable for use in field settings. All Lafayette EDA modes are intended to provide some important advantage to the field examiner. LXSoftware 11.0 allows the field examiner to view two EDA modes simultaneously and to change the displayed modes to any desired selection upon review.

Manual EDA

LX Software 11.0 includes an improved manual EDA mode that allowing field examiners to view the unprocessed signal. The new software version includes a powerful new adjustment that will improve the usability of manual EDA data beyond what has been presented in the past. Like driving a vehicle with a manual transmission, manual EDA mode will require the greatest amount of attention and management, in the form of centering and adjusting during the examination. To the extent that the raw unprocessed EDA data are not impaired by an strong offending frequency that would cause a prominent trend (usually descending) in the data, the Manual EDA mode may at times make the greatest amount of data available to view and score. Manual EDA will also display the fastest level of response, and the highest volume of noise within the recorded data. Noise can be high-frequency activity of no interpretable value, or more commonly low frequency activity causing a persistent descending trend in the data. (See Figure 1.) Persistent ascending data are also known, but are much less common. Historically, all EDA modes have included two adjustment settings: centering and sensitivity level. The new adjustment is a simple mathematical slope adjustment to the proportion of downward activity displayed to the examiner. Downward moving EDA is of no interpretable significance to field examiners, and is a feature of evaporation of sweat and re-sorption of acetylcholine. Upward reacting EDA is interpretable as activation of the sympathetic nervous system, from which we can make statistical inferences about the salience of the test stimulus, if we aggregate the measured or observed reactions from multiple iterations or presentations of the test stimuli. The new adjustment to the manual slope of the EDA is therefore designed to correct only that data which is descending, leaving completely untouched data indicative of upward movement or sympathetic activation.

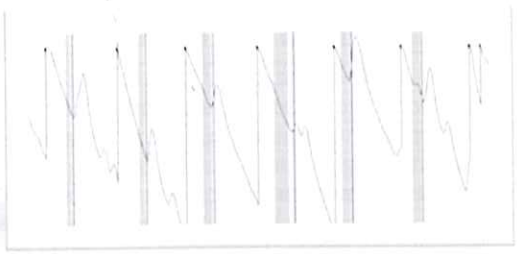

FIGURE 1

Persistent ascending data are also known, but much less common.

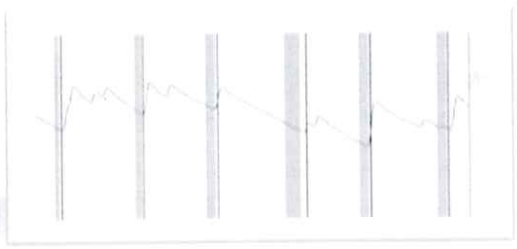

FIGURE 2

Shows the same data after attenuating the descending trend by adjusting the manual slope control.

Note that sympathetic reaction segments (upward activity) are perfectly rendered while using the manual slope adjustment. While the manual slope control will greatly increase the usability of the manual EDA, some hands-on management of the data will always be necessary when using the manual EDA mode.

Automatic EDA

LXSoftware 11.0 includes a new and highly sophisticated automatic filter, intended to provide field examiners with a robust EDA solution that is easy to use and will remain responsive with a vast majority of examinee physiological profiles. Automatic EDA, or filtered EDA, has been included in every polygraph system for many decades. Automatic EDA has been the classical *set-it-and-forget-it* EDA mode for examiners who want to devote as much attention as possible to the examinees behavior during testing. Like driving a vehicle with an automatic transmission, the convenience of Automatic EDA comes with some inevitable compromises in the form of some loss of responsiveness in favor of smooth operation. This will be observed in the form of reducing high frequency activity and occasional attenuation of response complexity and response duration. Because of the complexity of EDA activity and variety of human physiology, EDA data is not anchored to any linear scale or unit of measurement, and is interpreted only through the evaluation of the degree of relative reaction within an array of question stimuli. It is estimated that approximately 90% or more of the interpretable signal is retained by the improved Automated EDA mode. There may be occasional differences in individual point score assignment with the Automatic EDA and Manual EDA modes. However the final test results will retain a very high level of correlation. Field examiners may want to learn to evaluate their data using multiple EDA modes for critical cases.

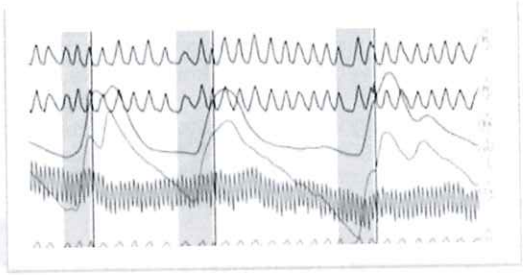

FIGURE 3

Shows an example of manual EDA with adjustment to the slope, along with automatic EDA mode.

Detrended EDA

Detrended EDA is a sophisticated mathematical solution to the challenge of providing a hands-free or *set-it-and-forget-it* mode of operation, like the Automatic EDA mode, while preserving the maximum amount of unprocessed sympathetic reaction data, like the Manual EDA mode. Detrended EDA mode operates, in principle by attenuating all activity below the tracing arrow, and by faithfully recording and displaying all sympathetic reaction segments. Although the Detrended EDA mode will assertively manage most, if not all, unstable EDA data, there may be some loss of normal (sensory) feedback activity in between stimulus segments when the data is persistently descending. Because of this known loss of some *road-feel* with unstable EDA data, some examiners may prefer the Manual EDA or Automatic EDA mode over the Detrended EDA mode.

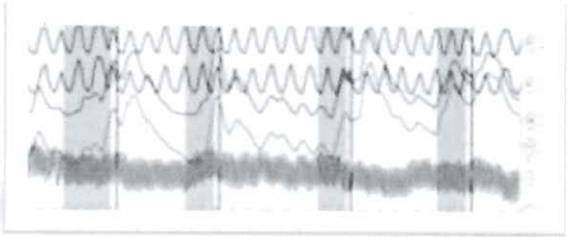

FIGURE 4

Shows the correspondence between the detrended and manual EDA modes.

In summary, all EDA modes have their advantages and disadvantages. Manual EDA is thought to provide the most accurate data (though there is some evidence this assumption may be incorrect), but requires the greatest amount of effort to use. Automatic EDA mode can provide the most satisfying field user experience with most examinees. Automatic EDA will manage most noisy and descending EDA problems effectively while ensuring maximum responsiveness of the signal data of interest to polygraph examiners. Detrended EDA mode provides an effective solution to the desire for both an accurate rendering of the raw sympathetic reaction segments achieved with the Manual EDA mode along with the hands-free operation of the Automatic EDA mode, though with some loss of the normal response variance (road feedback) when the raw data are very unstable. None of the electrodermal modes, nor any changes in sensitivity or display settings, actually change the recorded data. Instead, the raw data is always preserved in the electronic file, and changes in settings are processed only for the purpose of display and printing. Selection of an EDA operating mode is entirely a matter of preference for the field examiner or agency.

For further detailed reference on Electrodermal, we invite you to visit our website at
www.lafayettepolygraph.com

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