Tech Talk: Frequently Asked Questions about the LXSoftware PLE Scoring Tool

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1) What is the PLE Tool?

The PLE Tool is a feature extraction tool designed to extract physiological information from the photoplethysmograph (PLE or PPG) sensor that has been shown to be correlated with deception and truth-telling in comparison question test data.

2) What does the PLE Tool measure?

The PLE measurement is the suppression ratio when comparing the stimulus segment to the prestimulus segment. The pulse amplitude for 3 prestimulus seconds is compared to a 5 second stimulus segment beginning 5 seconds after stimulus onset. The feature of interest is a reduction of PLE pulse amplitude in response to the stimulus (Podlesny & Raskin, 1978; Rovner, 1986; Honts et al, 2015).

3) What is the unit of measurement for the PLE pulse amplitude?

Pulse amplitude is measured in digital units that are not connected with any physical measurement of blood pressure. The amplitude is measured by computing the difference between systolic and diastolic points during the 3 second prestimulus and 5 second stimulus segment.

4) What does the PLE Tool do when the PLE pulse amplitude is not reduced during the stimulus segment, or when it increases relative to the prestimulus segment?

If the pulse amplitude is not reduced, then there is no response. If there is no response at the relevant questions (RQ), then the PLE Score is interpreted only if there is a response at the comparison question (CQ). If there is no response at the CQ, then PLE Score is interpreted only if there is a response at the RQ. If there is no response at the RQ or the CQ, then the PLE Score cannot be interpreted, which means there is no PLE Score and this is the same result as if the PLE Score is zero (0).

5) How does the PLE Tool handle artifacts and problem data?

At the present time, the PLE Tool is not designed to identify artifacts or problematic data. At this time, it remains the examiners responsibility to make a global evaluation of data quality prior to numerical or computer scoring.

6) How does the PLE Tool decide which CQ to use for each RQ?

The PLE Tool does not attempt to select a single CQ for each RQ at this time. Instead, it computes a PLE Score for each RQ compared to all other questions. It is still the examiner's responsibility to select the correct CQ to use for scoring each RQ.

7) What do the PLE Scores signify?

PLE Scores are the mathematical ratio of RQ/CQ and are calculated for each selected RQ and all other questions. The actual RQ and CQ value is the ratio of prestimulus pulse amplitude and stimulus pulse amplitude. PLE Scores are therefore a ratio of ratios. To ensure that data conform reasonably to linear assumptions the data are transformed mathematically using the following equation:

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lognormal((lognormal(RQprestim/RQstim)^2/lognormal(CQprestim/CQstim)^2)^.25)
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Using this transformation, the distribution of all possible PLE Scores will have a mean of zero (0). PLE Scores greater than zero are correlated with truth-telling and scores less than zero are correlated with deception.

8) What do the colored dots signify when using the PLE Tool?

A red dot at a comparison question indicates a recommendation for a -1 Numerical Score. A green dot at a comparison question indicates a recommendation for a +1 Numerical Score. A white dot indicates a recommendation for a Numerical Score of zero (0).

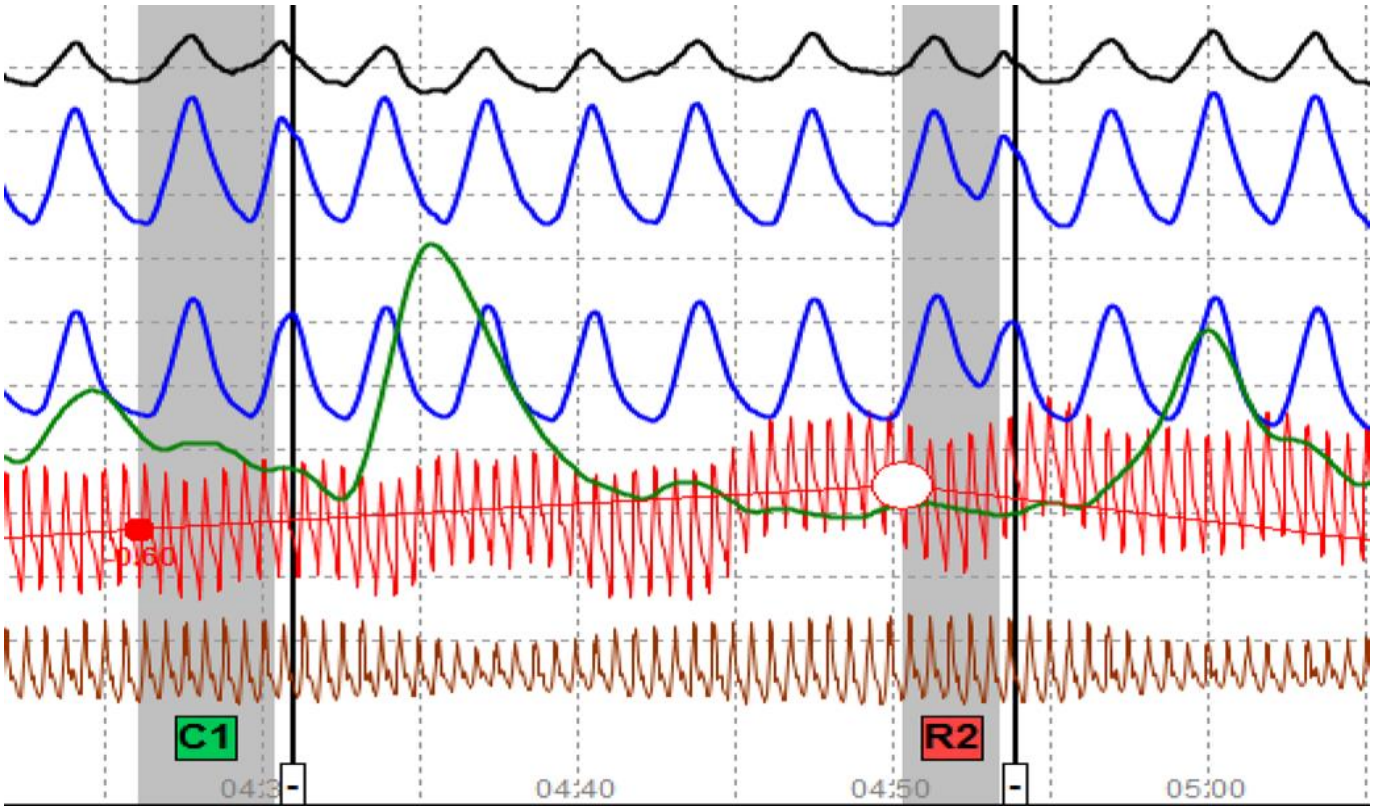
9) Is there a minimum response threshold for recommended PLE Scores?

Numerical scores of +1 and -1 are recommended only when the PLE Score exceeds 10% of the smallest of all possible random PLE Scores. In this case, 10% does not refer to a physical size and refers only to the proportion of all possible PLE Scores. The PLE Score thresholds for this 10% range are +.0993 and -.0993. Numerical Scores of zero (0) are recommend when the PLE Score does not exceed these thresholds. In field practice, the proportion of observed zero (0) scores will be expected to differ from 10% because actual PLE Scores are non-random and are instead correlated with deception and truth-telling.

10) How do I use the PLE Tool?

A simple visual interpretation can be made by observing the vertical elevation of the PLE index dot at the onset of each stimulus question. A higher index dot indicates a greater reduction of the PLE pulse amplitude relative to the other questions. Obtaining a recommended numerical score is a two-step procedure. First click on the RQ, then select the CQ to observe the calculated PLE Score. The recommended Numerical Score will be indicated by the color of the PLE index dot. A red dot at the CQ indicates a recommended -1 numerical score. A green dot at the CQ indicates a recommended +1 Numerical Score. A white dot at the CQ indicates a recommended score of zero (0). See Figure 1 for an example of the PLE Scoring Tool.

Figure 1. PLE Scoring



References

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