

LXSoftware Preferences for the ESS Report Generator

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The ESS Report Generator is a powerful tool that can save examiners time and reduce errors by automatically executing the procedure that an examiner would execute manually when calculating and reporting probabilistic and categorical results for ESS numerical scores. The LXSoftware ESS Report Generator produces a printable written report that can be viewed for preliminary review and then printed or saved if desired. In addition to the ESS scores and technical details pertaining to the probabilistic and categorical results, the ESS Report also includes a narrative summary paragraph describing the results in both technical and practical terms, along with a summary paragraph describing and evidence-based computation of the expected range of the dimensional accuracy characteristics of the polygraph technique used to conduct the examination.

A number of configurable settings are available for the ESS Report Generator. The settings can be accessed through the LXSoftware **Tools → Preferences** menu. Click on **Hand Score** in the left window pane, and then use the **scroll-bar** to move to the **bottom** of the list of Hand Score preferences. There are 13 different user configurable settings for the ESS Report Generator.

1) **Enable ESS Report Generation** is set to **Yes** by default. Users who wish to disable the ESS report and disable the ESS Report Generator can do so by selecting **No** from the **drop-down selector**.

2) Statistical reference data for the ESS were calculated for 3 or more charts. For this reason, the number of required test charts (presentations of each test stimulus) is set to 3. Evidence at this time suggests that more stimulus presentations can result in minor increases in test precision but substantial reductions in inconclusive results. Examiners whose written policy requirements or local regulations permit the use of less than 3 test charts can set the **Minimum number of charts to score** to a desired minimum value by either **typing the desired number** or selecting the number from the **drop-down selector**.

3 and 4) As a matter of tradition, the LXSoftware default name for the lower (abdominal) **Pneumo 1 sensor name** is **P1**, and the default name for the upper (thoracic) **Pneumo 2 sensor name** is **P2**. For many examiners, it may make little difference which sensor is used in which position. However, some evidence indicates the diagnostic or discriminate coefficients can be different for the two sensors. Examiners who find the traditional names non-intuitive can rename the sensors by **typing the in the field name area** to replace the pneumo sensor names. The new name will appear on subsequent new score sheets and ESS reports. Replacing the name changes only the name and does not change the actual sensor or data.

5) Examiners can also replace the **EDA sensor name** by **typing a different sensor name** in the field name area for the EDA sensor. Again, replacing the name changes only the name and does not change the actual sensor or data.

6) Similarly, examiners can replace the name of the **Cardio sensor** name by **typing in the field name area**. This changes only the name of the sensor and has no effect on the actual sensor or data.

7) ESS results can be described using different statistical terms by changing the **Result type** option. ESS results are shown as a **p-value** by default, and this refers to a probability of error associated with a categorical conclusion. Examiners can use the **drop-down selector** to report probability results in the form of an **Odds Ratio** if they feel it will provide a more intuitive description. Similarly, examiners may select the option to describe the probability results in terms of a **Confidence Level**, though it is incorrect to simplistically interpret the compliment of an ESS p-value as a confidence level without also using an additional Bayesian computation.

8) **Simple cutscores** affects only the NSR cutscores for multiple issue screening exams, and it is set to **Yes** by default. This will ensure that a single statistically corrected cutscore is used for NSR classifications regardless of the number of relevant stimulus targets (2, 3, or 4) in a multiple issue screening exam. Computation of the single cutscore is accomplished by averaging the probability reference tables for 2, 3 and 4 relevant questions. In practical terms, this appears equivalent to the probability table for 3 RQs. Examiners who wish to use more precise probability and numerical cutscores can change the **drop-down selector** to **No**, and the result will be that the ESS Report Generator will select more precise NSR cutscores that may differ for 2, 3, or 4 relevant due to mathematical differences in the statistical correction for the different number of questions.

9) The **Inverse odds** option is set to **No** by default. Examiners can change the setting in the **drop down selector** to achieve the most intuitive presentation of the odds ratio (e.g., **1 in 10** vs. **9 to 1**). This does not affect the computation or probabilistic meaning of the test result.

10) **Bayesian conditional** is set to **No** by default. Examiners should set this to **Yes** whenever the probability results are shown as a Confidence Level. This will compute the Bayesian conditional probability that the categorical test result is correct, by comparing the probability result to declarative knowledge or assumption of a prior probability (i.e., prior base-rate) of deception.

11) **Prior probability** is set to **.5** by default, and it refers to the known or assumed probability of deception prior to conducting the polygraph test. This is a commonly used prior probability value for calculating Bayesian condition probabilities when there is little clear indication about the actual prior probability. Simply **type a new value** in the **field value area** when there is information available to support an assumption of a lower or higher prior probability of deception.

12) **DI/SR alpha** is set to **.05** by default, and it refers to the area under the normal curve of the empirical reference distribution for *truthful* cases. This can be thought of as the proportion of truthful cases in the population represented by the statistical reference sample that are expected to produce a similar DI/SR ESS score. This value is always set prior to conducting and scoring an examination; to do otherwise is to statistically increase the probability of an erroneous conclusion. Field examiners do not normally select the alpha boundary. However, when an agency or referring professional has reason to constrain the false-positive error rate to lower level can be selected by **typing a desired alpha** (e.g., $\alpha = .01$) in the **field value area**. Similarly, examiners can respond to the needs of a program or referring professional who desires to reduce the occurrence of inclusive results by typing a more inclusive (i.e., less restrictive) or more sensitive DI/SR classification boundary (e.g., $\alpha = .10$) in the field value area.

13) **NDI/NSR alpha** is set to **.05** by default, and it refers to the area under the normal curve of the empirical reference distribution for *deceptive* cases. This can be thought of as the proportion of deceptive cases in the population represented by the statistical reference sample that are expected to produce a similar NDI/NSR ESS score. Alpha values are always set prior to conducting and scoring an examination; to do otherwise would increase the probability of an erroneous conclusion. Alpha boundaries represent a tolerance for error when using a probabilistic test method, and they are normally selected by the agency or referring professional. Examiners can respond to the needs of agencies or referring professionals who have reason to constrain the occurrence of false-negative errors to a lower level by **typing** a more restrictive alpha boundary (e.g., $\alpha = .01$) in the **field value area**. Similarly, examiners can reduce inclusive results by typing a more inclusive alpha boundary (e.g., $\alpha = .10$) that will increase test specificity while still constraining errors to a desired level. Note that alpha is a tolerance for error, and it is statistically and scientifically incorrect to attempt to interpret the compliment of the alpha ($1 - \alpha$) or compliment of the p-value ($1 - p$) as a probability of deception or confidence level. Examiners who wish to report statistical result in terms of a confidence level should only do so with the additional computation of the Bayesian conditional probability.

One additional ESS option exists at the bottom of the Hand Score dialog. All ESS options can be reset to the installation defaults by clicking on the words **Reset to ESS default settings**. All of the procedures executed by the ESS Report Generator are identical to the procedures used when manually scoring the ESS, manually interpreting, and typing the results. Examiners are encouraged to become familiar with the execution of the manual ESS procedure. This will provide

a substantial basis of knowledge and experience with which to understand the probabilistic meaning of the categorical ESS results. Manually executing the ESS procedure will help to teach and reinforce understanding of statistical and decision theoretic concepts as they apply to the scoring and interpretation of comparison question test results. Using the ESS Report Generator can help to ensure the correct and accurate execution of tedious and detailed data analytic and statistical reporting tasks, but it is not intended to replace the skills of a competent examiner. Instead, the ESS Report Generator is a convenience tool intended to manage repetitive detailed task requirements more automatically, thereby allowing expert examiners to focus on human interaction tasks that cannot be automated.