



## Estimating Base Rates of Guilt

The following is a simple method of calculating a testing population's base rate of guilt (or prior probability). The base rate of guilt (BRG) is the number of guilty people in the testing group.

To do this calculation, you will need the average accuracy of the test protocol and the historical rate of test failure for the testing group. Note: The examinees who fail a test include the true positives (the guilty who fail) and false positives (the innocent who fail).

### Definitions

- Sensitivity (TP): proportion of guilty subjects correctly classified by the test
- Specificity (TN): proportion of innocent subjects correctly classified by the test
- FN Rate:  $1 - TP\%$
- FP Rate:  $1 - TN\%$
- Base Rate of Failure (BRF) = historical number of people that fail the test (includes TP + FP)

### How to Calculate the Base Rate of Deception (BRG)

$$BRG = (BRF - FP Rate) / (TP Rate - FP Rate)$$

Example:

- Given EyeDetect MCT accuracy
  - TP Rate (Sensitivity) = .87
  - FN Rate = .13
  - TN Rate (Specificity) = .89
  - FP Rate = .11
- Estimated or historical BRF = .30

Given the formula:  $BRG = (BRF - FP Rate) / (TP Rate - FP Rate)$

Applying the data for MCT and a sample BRF of 30%, you have:

$$BRG = (.30 - .11) / (.87 - .11)$$

$$BRG = .19 / .76$$

$$BRG = 25\%$$