**Cohen’s Kappa Statistic**

Cohen’s Kappa statistic measures interrater reliability (sometimes called interobserver agreement). Interrater reliability, or precision, happens when your data raters (or collectors) give the same score to the same data item.

This statistic should only be calculated when:

* Two raters each rate one trial on each sample, *or*.
* One rater rate two trials on each sample.

The Kappa statistic varies from 0 to 1, where.

* 0 = No agreement
* 0.1 – 0.20 = slight agreement.
* 0.21 – 0.40 = fair agreement.
* 0.41 – 0.60 = moderate agreement.
* 0.61 – 0.80 = substantial agreement.
* 0.81 – 0.99 = near perfect agreement
* 1 = perfect agreement

The formula to calculate Cohen’s kappa for two raters is:  
  
  
where:  
P0 = the relative observed agreement among raters.  
Pe = the hypothetical probability of chance agreement

**Example**: Consider a medical test where two radiographers rated 50 images for needing further study. The researchers (A and B) either said Yes (for further study) or No (No further study needed).

* 20 images were rated Yes by both.
* 15 images were rated No by both.
* Overall, rater A said Yes to 25 images and No to 25.
* Overall, Rater B said Yes to 30 images and No to 20.

Calculate Cohen’s kappa for this data set.

Step 1: **Calculate p0**(the observed proportional agreement):  
20 images were rated Yes by both.  
15 images were rated No by both.  
 = number in agreement / total = (20 + 15) / 50 = 0.70.

Step 2: Find the probability that the raters would randomly both say Yes.  
Rater A said Yes to 25/50 images, or 50% (0.5).  
Rater B said Yes to 30/50 images, or 60%(0.6).  
The total probability of the raters both saying Yes randomly is:  
0.5 \* 0.6 = 0.30.

Step 3: Calculate the probability that the raters would randomly both say No.  
Rater A said No to 25/50 images, or 50%(0.5).  
Rater B said No to 20/50 images, or 40%(0.6).  
The total probability of the raters both saying No randomly is:  
0.5 \* 0.4 = 0.20.

Step 4: **Calculate Pe**. Add your answers from Step 2 and 3 to get the overall probability that the raters would randomly agree.  
Pe = 0.30 + 0.20 = 0.50.

Step 5: Insert your calculations into the formula and solve:

Therefore,