**Data Evaluation**

Precision, Accuracy, Reliability & Validity

Errors can affect the quality of your data and the four aspects below.

1. **Random Errors**
   1. Usually caused by the users
   2. These errors may be different each time the method is followed
   3. They are ‘one-off’ changes that may affect the results to various degrees.
   4. If you identify some of these in your lab ensure you state how it impacts data and justify
   5. REDUCE impact by increasing sample size and using an average.
2. **Systematic Errors**
   1. These are usually caused by the equipment. Because it might be calibrated wrongly, the data is consistently ‘off’ the whole time.
   2. These are harder to notice
   3. They usually will cause an overall shift in the graph (up or down)
   4. REDUCE impact by repeating measurements with different equipment.

**Accuracy** – how close to the actual value might it be? Ie. are your results correct

* Tools being calibrated correctly achieves better accuracy
* Random and systematic errors can affect the accuracy, however accuracy is mainly INCREASED when there are less systematic errors.

**Precision** – how consistent is the data? How fine in resolution?

* How consistently you can get the results using the same method
  + Compare to class average, etc.
  + Improve by more finely tuned equipment and when your method allows for less guessing and estimating

**Reliability** – can you trust it?; are you sure you would get these results again?

* This is related to precision and accuracy above – an overall judgement
* You can focus on the method – does it allow for reliability?
* How could it be improved so it does so better?
* Reliability is INCREASED when there is less random error.

**Validity** – does the investigation actually answer what you want to know? Can it do so?

* Is it measuring what it is supposed to measure?
* Eg. using potato cubes to simulate cells?
* Not totally valid because 55 degrees isn’t really relevant to living tissue
* Not totally valid because catalase normally is at work within a living cell

**KEY:**

**An “A” level evaluation will state to what degree for each of these aspects of the data and justify clearly why this is the case.**