

Experimental Design Revision Notes

Aim

To investigate the independent variable on the dependent variable

OR

TO investigate the dependent variable at different values of the independent variable

Variables

Independent variable

The variable you are changing

Dependent variable

The variable you are measuring.

Indirect measure (IDM) of Dependent Variable

Note there is usually more than one way to measure the dependent variable

Tables & graphs contain the indirect measure (IDM) of the dependent variable.

However conclusions should be about the dependent variable not IDM.

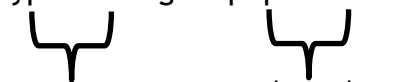
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Dependent variable: metabolic rate

Indirect measures (IDM): oxygen consumption OR heat given out OR carbon dioxide production

Example

Aim: To investigate the type of drug on pepsin activity.


Independent variable dependent variable

Table

Independent
variable

Indirect measure
(IDM)

Painkiller	Mass of egg white broken down (g)
Paracetamol	1.4
Aspirin	1.1
Ibuprofen	1.3

IDM & Dependent variable link

The higher the mass of egg white broken down = The higher the catalase activity.

Conclusion

Paracetamol has the least inhibition of pepsin activity OR Aspirin has the highest inhibition of pepsin activity.

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Validity

Only the independent variable should be deliberately changed in an experiment.

ALL other variables should be kept constant to ensure a valid conclusion.

(not fair test/accuracy/reliability).

In exam questions ensure you DO NOT mention a variable already mentioned as being held constant in the text OR diagrams

For lab chemical experiments examples include

1. temperature
2. pH
3. Volumes of solutions
4. Temperatures of solutions
5. Mass of powders
6. Species/Type of
7. Number of
8. Size/surface area of gel beads
9. Distance of light bulb from lamp
10. Concentration of yeast
11. Age of yeast

For human experiments examples include

1. Gender
2. Age
3. Diet
4. Sleep
5. Hydration levels
6. Clothing/foot wear
7. Fitness levels
8. Health status
9. Weight (divide by kg to compare for VALID results)

Light experiments

Should be carried out in the dark to prevent other light affecting dependent variable.

Temperature should be held constant via a water bath.

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Controls/placebo

Description

Exact same setup but remove independent variable (& replace with same volume of water).

Explanation of importance

To prove the independent variable affects the dependent variable.

Reliability

To increase reliability

1. Repeat and take an average
2. Repeat at each measure of the independent variable
3. Repeat with more subjects
4. Repeat entire investigation again (independent replicate)

Remember you can tell if there has been more than 1 subject if results in table/graphs say

AVERAGE.

Group & subjects

Also remember it is not the number of groups in an experiment that make it reliable as each group will have a different value of the independent variable, it is the **number of subjects in each group** that does this.

Example

4 groups of 6 people. Each group was given a different drug A-D.

Remember it is the **6 people per group that makes it reliable** NOT the 4 groups who each were given a different drug.

Accuracy

Colorimeters (spectrophotometers) are a more accurate way of measuring colour changes (absorbance) in an experiment compared to a colour chart.

Using a scale with more divisions makes the results more ACCURATE.