Independent variables and dependent variables

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Core ideas

The independent variable is the factor the researcher changes or compares.

The dependent variable is the outcome or behaviour the researcher measures.

In experiments, researchers look for whether changes in the independent variable affect the dependent variable.

The independent variable should have clear conditions, such as silence versus background music.

The dependent variable should be measurable, such as recall score, reaction time or rating-scale score.

Confusing the IV and DV can make aims, hypotheses and conclusions unclear.

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Key terms

Independent variable: The factor the researcher changes or compares.

Dependent variable: The behaviour or outcome the researcher measures.

Condition: A version or level of the independent variable.

Measure: A way of recording the dependent variable.

Experiment: A method that tests whether one variable affects another.

Outcome: The result recorded from participants.

Cause-and-effect: A claim that one factor produces a change in another.

Variable: A factor that can change or be measured.

Further detail and evidence

An IV needs identifiable conditions; a DV needs a score, count, time or other defined outcome. Naturally occurring participant differences are not randomly assigned manipulations. Correlational studies instead have two measured co-variables. Not every study has an IV.

Operationalise both variables: identify precisely what changes between conditions and how the outcome is scored. A clear label alone is not enough for another researcher to reproduce the manipulation or measurement.

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Applying the ideas

Andrade: IV = shading supplied shapes versus listening without shading; DV = adjusted recall of names/places. In a new study, "music" is too vague: define track, volume and duration. "Memory" is too vague: define the number of correct words recalled after a stated interval.

Worked example: Identify the IV and DV in a study testing whether caffeine affects reaction time. The independent variable is caffeine intake, such as no caffeine compared with a set dose of caffeine. The dependent variable is reaction time, measured by how quickly participants respond to a stimulus. This is clear because caffeine intake is the factor being compared and reaction time is the outcome recorded.

Worked example: Compare the role of the independent variable with the role of the dependent variable. The independent variable is what the researcher changes or compares to create conditions in a study. The dependent variable is what the researcher measures to see whether the independent variable made a difference. For example, background music could be the IV and number of words recalled could be the DV.

Evaluation and connections

Milgram's main 1963 condition measured maximum shock without manipulating a comparison IV. Naming an outcome does not turn any study into an experiment. A group difference supports a causal account only when design, allocation, controls and measurement justify it.