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True Experimental Design

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True experimental design is regarded as the most accurate form of experimental research, in that it tries to prove or disprove a hypothesis mathematically, with statistical analysis.

For some of the physical sciences, such as physics, chemistry and geology, they are standard and commonly used. For social sciences, psychology and biology, they can be a little more difficult to set up.

For an experiment to be classed as a true experimental design, it must fit all of the following criteria.

- The sample groups must be assigned randomly.
- There must be a viable control group.
- Only one variable can be manipulated and tested. It is possible to test more than one, but such experiments and their statistical analysis tend to be cumbersome and difficult.
- The tested subjects must be randomly assigned to either control or experimental groups.

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Advantages

The results of a true experimental design can be statistically analyzed and so there can be little argument about the results [1].

It is also much easier for other researchers to replicate the experiment and validate the results.

For physical sciences working with mainly numerical data, it is much easier to manipulate [2] one variable, so true experimental design usually gives a yes or no answer.

Disadvantages

Whilst perfect in principle, there are a number of problems with this type of design. Firstly, they can be almost too perfect, with the conditions being under complete control [3] and not being representative of real world conditions.

For psychologists and behavioral biologists, for example, there can never be any guarantee that a human or living organism will exhibit 'normal' behavior under experimental conditions.

True experiments can be too accurate and it is very difficult to obtain a complete rejection or acceptance of a hypothesis [4] because the standards of proof required are so difficult to reach.

True experiments are also difficult and expensive to set up. They can also be very impractical.

While for some fields, like physics, there are not as many variables so the design is easy, for social sciences and biological sciences, where variations are not so clearly defined it is much more difficult to exclude other factors that may be affecting the manipulated variable.

Summary

True experimental design [5] is an integral part of science, usually acting as a final test of a hypothesis [6]. Whilst they can be cumbersome and expensive to set up, literature reviews [7], qualitative research [8] and descriptive research can serve as a good precursor to generate a testable hypothesis, saving time and money.

Whilst they can be a little artificial and restrictive, they are the only type of research that is accepted by all disciplines as statistically provable.

Source URL: <https://explorable.com/true-experimental-design>

Links

[1] <https://explorable.com/statistically-significant-results>

[2] <https://explorable.com/independent-variable>

[3] <https://explorable.com/controlled-variables>

[4] <https://explorable.com/research-hypothesis>

[5] <http://www.socialresearchmethods.net/kb/desexper.php>

[6] <https://explorable.com/hypothesis-testing>

[7] <https://explorable.com/what-is-a-literature-review>

[8] <https://explorable.com/qualitative-research-design>