Research Bias

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Research bias, also called experimenter bias, is a process where the scientists performing the research influence the results, in order to portray a certain outcome.

Some bias in research arises from experimental error and failure to take into account all of the possible variables.

Other bias arises when researchers select subjects that are more likely to generate the desired results, a reversal of the normal processes governing science.

Bias is the one factor that makes qualitative research much more dependent upon experience and judgment than quantitative research.

For example, when using social research subjects, it is far easier to become attached to a certain viewpoint, jeopardizing impartiality.

Quantitative Research Bias:
Denial of any Bias

Qualitative Research Bias:
Acceptance and Acknowledgment of Bias.

The main point to remember with bias is that, in many disciplines, it is unavoidable. Any experimental design process involves understanding the inherent biases and minimizing the effects.

In quantitative research, the researcher tries to eliminate bias completely whereas, in qualitative research, it is all about understanding that it will happen.

Design Bias

Design bias is introduced when the researcher fails to take into account the inherent biases liable in most types of experiment [1].

Some bias is inevitable, and the researcher must show that they understand this, and have tried their best to lessen the impact, or take it into account in the statistics and analysis.

Another type of design bias occurs after the research is finished and the results analyzed. This is when the original misgivings of the researchers are not included in the publicity, all too common in these days of press releases and politically motivated research.

For example, research into the health benefits of Acai berries may neglect the researcher's awareness of limitations in the sample group. The group tested may have been all female, or all over a certain age.

Selection/Sampling Bias

Sampling bias [2] occurs when the process of sampling actually introduces an inherent bias into the study. There are two types of sampling bias, based around those samples that you omit, and those that you include:

Omission Bias

This research bias occurs when certain groups are omitted from the sample. An example might be that ethnic minorities are excluded or, conversely, only ethnic minorities are studied.

> For example, a study into heart disease that used only white males, generally volunteers, cannot be extrapolated to the entire population, which includes women and other ethnic groups.

Omission bias is often unavoidable, so the researchers have to incorporate and account for this bias in the experimental design.

Inclusive Bias

Inclusive bias occurs when samples are selected for convenience [3].

This type of bias is often a result of convenience where, for example, volunteers are the only group available, and they tend to fit a narrow demographic range.

There is no problem with it, as long as the researchers are aware that they cannot extrapolate the results to fit the entire population. Enlisting students outside a bar, for a psychological study, will not give a fully representative group.

Procedural Bias

Procedural bias is where an unfair amount of pressure is applied to the subjects, forcing them to complete their responses quickly.

> For example, employees asked to fill out a questionnaire [4] during their break period are likely to rush, rather than reading the questions properly.

Using students forced to volunteer for course credit is another type of research bias, and they are more than likely to fill the survey in quickly, leaving plenty of time to visit the bar.

Measurement Bias

Measurement bias arises from an error [5] in the data collection and the process of measuring.

In a quantitative experiment, a faulty scale would cause an instrument bias and invalidate the entire experiment. In qualitative research, the scope for bias is wider and much more subtle, and the researcher must be constantly aware of the problems.

- Subjects are often extremely reluctant to give socially unacceptable answers, for fear of being judged. For example, a subject may strive to avoid appearing homophobic or racist in an interview.

  This can skew the results, and is one reason why researchers often use a combination of interviews, with an anonymous questionnaire, in order to minimize measurement bias.

- Particularly in participant studies, performing the research will actually have an effect upon the behavior of the sample groups. This is unavoidable, and the researcher must attempt to assess the potential effect.
- Instrument bias is one of the most common sources of measurement bias in quantitative experiments. This is the reason why instruments should be properly calibrated, and multiple samples taken to eliminate any obviously flawed or aberrant results.

Interviewer Bias

This is one of the most difficult research biases to avoid in many quantitative experiments

when relying upon interviews.

With interviewer bias, the interviewer may subconsciously give subtle clues in with body language, or tone of voice, that subtly influence the subject into giving answers skewed towards the interviewer's own opinions, prejudices and values.

Any experimental design [6] must factor this into account, or use some form of anonymous process to eliminate the worst effects.

See how to avoid this:
Double Blind Experiment [7]

Response Bias

Conversely, response bias is a type of bias where the subject consciously, or subconsciously, gives response that they think that the interviewer wants to hear.

The subject may also believe that they understand the experiment and are aware of the expected findings, so adapt their responses to suit.

Again, this type of bias must be factored into the experiment [8], or the amount of information given to the subject must be restricted, to prevent them from understanding the full extent of the research [9].

Reporting Bias

Reporting Bias is where an error is made in the way that the results are disseminated in the literature [10]. With the growth of the internet, this type of bias is becoming a greater source of concern.

The main source of this type of bias arises because positive research tends to be reported much more often than research where the null hypothesis [11] is upheld. Increasingly, research companies bury some research, trying to publicize favorable findings.

Unfortunately, for many types of studies, such as meta-analysis [12], the negative results are just as important to the statistics [13].

Links
[1] https://explorable.com/experimental-research
[2] https://explorable.com/sampling-error
[3] https://explorable.com/convenience-sampling
[4] https://explorable.com/survey-research-design
[5] https://explorable.com/systematic-error
[6] https://explorable.com/design-of-experiment
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