Random Assignment

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Random assignment, also referred to as randomization, is an integral step in conducting experimental research. Much like probability sampling—that utilizes randomness in the selection of a sample from a target population to ensure that each participant (i.e., observation) has an equal chance of being included in the study—random assignment selects participants from the sample to be included in certain experimental conditions based on the notion that each participant has the same odds of being selected for each treatment. In experimental research design, there are at least two different groupings in one sample, the first being a control group (i.e., the group that does not receive the treatment or exposure to the variable) and the other being the experimental group (i.e., the group that does receive the treatment). For example, a researcher may wish to carry out an experiment testing the efficacy of listening to music via headphones (Y) while retaining information (X). The group that represents the control could read stories without listening to music and then take a short comprehension quiz once finished, while the experimental group would do the same thing, only with the addition of listening to music while reading the stories. By establishing these two differing groups, where the only difference should ideally be the treatment in the experiment, cause and effect relationships can be thought to be a function of the manipulated variable (i.e., listening to music via headphones). In order to establish this causation, random assignment must be exercised during the treatment or condition selection phase of the research design to guarantee that each participant has an equal chance of being in either the control or experimental group, and that the only difference between the two is the treatment. This entry focuses on the uses and principles of random assignment in terms of experimental design and testing for causation.

Necessitation of Randomness

As part of the basis for experimental research, random assignment is applied to the selection of participants for treatments in order to remove any possible influence from confounding variables (i.e., unknown variables that could influence the relationship between known variables being tested). This is possible because the variables in the groups have been controlled according to whatever the research design may be. For instance, the experiment from the prior example is interested in understanding how well people retain information (X) while listening to music via headphones (Y). This experiment is most likely carried out in the controlled environment of a laboratory where outside distractions can be reduced, and the only variable that should influence differences in the observations or scores of information retention (X) is listening to music via headphones (Y).

Random assignment begins to establish the necessary parameters for determining causation by highlighting a direct linear relationship between variables (i.e., when variable X changes, a change in Y also occurs). Statistical testing, such as linear regression, can determine whether or not one variable is causing the other, but the experimental design must be properly laid out and include random assignment for any meaningful causation to be determined. On occasion the researcher can make a mistake in randomly assigning participants, and assignment bias completely negates any results or causal relationships found during analysis. The goal of random assignment is to create two groups in one sample that are homogenous except for the experience of the treatment. When assignment bias occurs, there are differences between groups other than the experience of an experimental treatment. The treatment cannot be singled out to represent the cause of these differences, so any further analysis on the data is useless. In addition to providing the necessary foundation for causation, random assignment also assists with the internal validity of a study. Internal validity refers to the idea that the research design is measuring what it purportedly set out to measure. For example, if a researcher proposes that fewer hours of sleep (Y) is a cause of quality of work (X), then controlling the conditions that the variables are tested in becomes paramount. Remember, random assignment is trying to establish linear relationships between the variables so that no outside interference (i.e., confounding variable) hinders the understanding of the cause-and-effect relationship. In this example, the experimental group would sleep fewer hours than normal and then perform some work-related tasks to be graded on a scale. Ensuring validity, the control group would sleep their normal amount of hours and then perform the same work-related tasks, so that the only main difference between the two sample groups is the experience of the treatment. When performed correctly, random assignment guarantees internal validity and supports the existence of causal relationships.

In Practice

Once a researcher has recruited participants from the population to be included in the sample (i.e., random selection), he or she may then decide how to randomly assign the participants to different treatments. No matter what the selection method is, each participant must have an equal chance of being selected for either the control or experimental group. There are several strategies available for accurately selecting participants at random, ranging from the simple flipping of coin to using computer applications and programs to generate random number tables or lists. For example, a simple experiment may only have two conditions (i.e., control group and experimental group) and 10 total participants. To select which participants are in each respective group, the researcher assigns “heads” as the control group and “tails” as the experimental group. He or she would then flip a coin 10 times, at which point all participants would have been selected for one of the treatment groups. In a more complex experiment, more than two groups will exist as treatments, and a more meticulous random assignment method could be used. Random number generators use algorithms to create unique lists of arbitrary numbers that cannot be repeated or predicted, and assigns each participant to a group. In these more complex experimental studies, it may prove necessary to randomly assign whole groups of people in the sample to treatments rather than on an individual level. For instance, consider the music/comprehension example; if the researchers were interested in larger trends across a college campus, it would make sense to randomly assign whole groups rather than individuals (i.e., grade classification, major program, full-time or part-time enrollment). The reason for randomly assigning groups rather than individuals depends on the overall experimental design and perspective of the researcher.

Sometimes randomization is not an option or matching is the preferred method of selecting participants for experimental treatments. Matching resembles quota sampling in that both techniques try to mirror the larger group from which they were selected. Quota sampling is a purposive procedure that creates a proportionately exact replica of the population from which it is drawn. For example, suppose a population of university faculty and staff can be broken down to reflect 40% full-time workers, 50% part-time, and 10% special contract. For a sample of 100 participants from this population, 40 would be full time, 50 would be part time, and 10 would be special contract. Applying matching scheme to the sample, rather than random assignment, entails using the actual number of participants in the sample rather than percentages of the population. To compare the control group with the experimental group, the different groupings or classifications of the sample participants are assigned to both treatments, equally. In this example, 20 full-time workers would be assigned to the control group and 20 would be assigned to the experimental group, 25 part-time workers would be assigned to the control group and 25 would be assigned to the experimental group, and so on, until each grouping of the participants is evenly distributed into both the treatment and nontreatment groups. If using a matching scheme, the same goals associated with random assignment still drive the selection of participants into groups—establishing causal relationships and internal validity.

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See also Causality; Linear Regression; Random Assignment of Participants; Sampling, Probability; Sampling, Random; Validity, Measurement of

Further Readings

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