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DifferencesControl GroupExperimental GroupFAQs In a controlled experiment, scientists compare a control group, and an experimental group is identical in all respects except for one difference – experimental manipulation. Unlike the experimental group, the control group is not exposed to the independent variable under investigation. So, it provides a baseline against which any changes in the experimental group can be compared. Since experimental manipulation is the only difference between the experimental and control groups, we can be sure that any differences between the two are due to experimental manipulation rather than chance. Almost all experimental studies are designed to include a control group and one or more experimental groups. In most cases, participants are randomly assigned to either a control or experimental group. Because participants are randomly assigned to either group, we can assume that the groups are identical except for manipulating the independent variable in the experimental group. It is important that every aspect of the experimental environment is the same and that the experimenters carry out the exact same procedures with both groups so researchers can confidently conclude that any differences between groups are actually due to the difference in treatments. A control group consists of participants who do not receive any experimental treatment. The control participants serve as a comparison group. The control group is matched as closely as possible to the experimental group, including age, gender, social class, ethnicity, etc. The difference between the control and experimental groups is that the control group is not exposed to the independent variable, which is thought to be the cause of the behavior being investigated. Researchers will compare the individuals in the control group to those in the experimental group to isolate the independent variable and examine its impact. The control group is important because it serves as a baseline, enabling researchers to see what impact changes to the independent variable produce and strengthening researchers' ability to draw conclusions from a study. Without the presence of a control group, a researcher cannot determine whether a particular treatment truly has an effect on an experimental group. Control groups are critical to the scientific method as they help ensure the internal validity of a study. Example Assume you want to test a new medication for ADHD. One group would receive the new medication, and the other group would receive a pill that looked exactly the same as the one that the others received, but it would be a placebo. The group that takes the placebo would be the control group. Types of Control Groups Positive Control Group A positive control group is an experimental control that will produce a known response or the desired effect. A positive control is used to ensure a test's success and confirm an experiment's validity. For example, when testing for a new medication, an already commercially available medication could serve as the positive control. Negative Control Group A negative control group is an experimental control that does not result in the desired outcome of the experiment. A negative control is used to ensure that there is no response to the treatment and help identify the influence of external factors on the test. An example of a negative control would be using a placebo when testing for a new medication. Experimental Group An experimental group consists of participants exposed to a particular manipulation of the independent variable. These are the participants who receive the treatment of interest. Researchers will compare the responses of the experimental group to those of a control group to see if the independent variable impacted the participants. An experiment must have at least one control group and one experimental group; however, a single experiment can include multiple experimental groups, which are all compared against the control group. Having multiple experimental groups enables researchers to vary different levels of an experimental variable and compare the effects of these changes to the control group and among each other. Example Assume you want to study to determine if listening to different types of music can help with focus while studying. You randomly assign participants to one of three groups: one group that listens to music with lyrics, one group that listens to music without lyrics, and another group that listens to no music. The group of participants listening to no music while studying is the control group, and the groups listening to music, whether with or without lyrics, are the two experimental groups. Frequently Asked Questions Put simply, an experimental group is a group that receives the variable, or treatment, that the researchers are testing, whereas the control group does not. These two groups should be identical in all other aspects. A control group is essential in experimental research because it: Provides a baseline against which the effects of the manipulated variable (the independent variable) can be measured. Helps to ensure that any changes observed in the experimental group are indeed due to the manipulation of the independent variable and not due to other extraneous or confounding factors. Helps to account for the placebo effect, where participants' beliefs about the treatment can influence their behavior or responses. In essence, it increases the internal validity of the results and the confidence we can have in the conclusions. Not all experiments require a control group, but a true "controlled experiment" does require at least one control group. For example, experiments that use a within-subjects design do not have a control group. In within-subjects designs, all participants experience every condition and are tested before and after being exposed to treatment. These experimental designs tend to have weaker internal validity as it is more difficult for a researcher to be confident that the outcome was caused by the experimental treatment and not by a confounding variable. Yes, studies can include multiple control groups. For example, if several distinct groups of subjects do not receive the treatment, these would be the control groups. The control group and the experimental group(s) are treated identically except for one key difference: exposure to the independent variable, which is the factor being tested. The experimental group is subjected to the independent variable, whereas the control group is not. This distinction allows researchers to measure the effect of the independent variable on the experimental group by comparing it to the control group, which serves as a baseline or standard. Bailey, R. A. (2008). Design of Comparative Experiments. Cambridge University Press. ISBN 978-0-521-68357-9. Hinkelmann, Klaus; Kempthorne, Oscar (2008). Design and Analysis of Experiments, Volume I: Introduction to Experimental Design (2nd ed.). Wiley. ISBN 978-0-471-72756-9. Saul McLeod, PhD BSc (Hons) Psychology, MRes, PhD, University of Manchester Editor-in-Chief for Simply Psychology Saul McLeod, PhD., is a qualified psychology teacher with over 18 years of experience in further and higher education. He has been published in peer-reviewed journals, including the Journal of Clinical Psychology. Olivia Guy-Evans, MSc BSc (Hons) Psychology, MSc Psychology of Education Associate Editor for Simply Psychology Olivia Guy-Evans is a writer and associate editor for Simply Psychology. She has previously worked in healthcare and educational sectors. Julia Simkus Editor at Simply Psychology BA (Hons) Psychology, Princeton University Julia Simkus is a graduate of Princeton University with a Bachelor of Arts in Psychology. She is currently studying for a Master's Degree in Counseling for Mental Health and Wellness in September 2023. Julia's research has been published in peer reviewed journals. What is a Control Group in Science Experiment? In the world of science, a control group, also known as a control sample, is a crucial component of any experiment. It is a group of subjects, samples, or individuals that are not exposed to the variable being tested or manipulated. The control group serves as a benchmark against which the results of the experiment can be compared. In this article, we will delve into the world of control groups, exploring what they are, why they are essential, and how they work. What is a Control Group? A control group is a group of subjects that is not exposed to the variable being tested or manipulated in the experiment. This group is often referred to as the "control" or "standard" group, and it serves as a baseline against which the results of the experiment can be compared. The control group is typically identical to the experimental group in every way, except for the variable being tested or manipulated. Why is a Control Group Necessary? A control group is essential in any scientific experiment because it provides a baseline or standard against which the results of the experiment can be compared. Without a control group, it would be impossible to determine whether any observed effects are due to the experimental manipulation or some other factor. A control group helps to: Ensure that the experiment is valid: A control group ensures that the experiment is designed to test a specific hypothesis and that the results are not biased by external factors. Identify the effect of the experimental manipulation: By comparing the results of the control group to the experimental group, scientists can determine the impact of the experimental manipulation on the variable being tested. Control for confounding variables: A control group helps to control for variables that could influence the results of the experiment, such as age, sex, or environmental factors. How is a Control Group Created? Creating a control group involves several steps: Identifying the control group: The control group is typically identified at the beginning of the experiment, before any manipulations are made. Matching the control group with the experimental group: The control group is matched with the experimental group in terms of characteristics such as age, sex, and background variables. Blinding the control group: To prevent bias, the control group is often "blinded" to the experimental treatment, meaning that they are not aware of the treatment they are receiving. Types of Control Groups There are several types of control groups, including: Positive control group: This type of control group is identical to the experimental group in every way, except for the variable being tested or manipulated. Negative control group: This type of control group is not exposed to the variable being tested or manipulated, and is often used as a reference group to compare the results of the experiment. Historical control group: This type of control group is a group that has been studied previously and is used as a reference point for comparison. Table: Types of Control Groups Type Description Purpose Positive Control Group Identical to the experimental group, except for the variable being tested or manipulated Provides a baseline against which to compare results Negative Control Group Not exposed to the variable being tested or manipulated Provides a reference group for comparison Historical Control Group A group that has been studied previously Used as a reference point for comparison Conclusion In conclusion, a control group is a vital component of any scientific experiment. It provides a baseline against which results can be compared, ensuring that the experiment is valid and the results are reliable. By understanding the concept of a control group, scientists can design and conduct experiments that are more effective and reliable, leading to a better understanding of the world around us. Your friends have asked us these questions - Check out the answers!