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In Chapter 2 we will discuss:

- How we look for laws – The Scientific Approach to Behavior
- How we look for causes – Experimental Research
- How we look for links – Descriptive/Correlational Research
- How we look for flaws – Evaluating Research
- And Ethical issues in doing Research in Psychology

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The goals of the scientific method are:

First to **measure and describe** any phenomenon or behavior in our environment. Describing something gives us the ability to clearly define something, and measuring it helps us to understand its qualities. For example, in studying the effectiveness of muscle relaxation techniques in reducing anxiety, a psychologist must first develop a means of measuring anxiety.

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The second goal is to **understand and predict** the phenomenon or behavior by forming a hypothesis that is really just a best guess as to what we think is the reason for it. And to make predictions of what we think will happen based on the answers.

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The final goal is that of **application and control**. To use the information learned by applying it to help solve everyday problems and help control the negative aspects of some or encourage the positive aspects of some.

Information gathered by scientists may be of some practical value in helping to solve problems in schools, businesses, the legal system, mental health centers, etc.

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A scientific investigation consists of a sequence of carefully planned steps.

There are a couple of advantages to using the scientific method.

One is **clarity and precision**, and the other is an **intolerance for error**.

That is why all scientific research is scrutinized so intently by **peer reviews**.

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An experiment is a research method in which the investigator manipulates a variable under carefully controlled conditions and observes whether any changes occur in a second variable as a result.

An **independent variable** or I.V. is the thing being manipulated by the researcher. If they were studying the effect of a new drug on headaches... the I.V. would be the new drug.

The **dependent variable** or D.V. is the thing being affected by the I.V. – in this case it would be the headache.

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The two groups of subjects are the Experimental and the Control Groups. The Experimental Group is the one receiving the I.V. and Control Group receives a Placebo or fake I.V.

It is not always possible for both groups to be exactly alike, so sometimes there are **extraneous variables** that may interfere with or influence the D.V. that the researcher has no control over – for instance suppose the subjects in the D.V. had hangovers from a party the night before...that would have an effect on the outcomes.

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Researchers can also manipulate more than one IV to see what the combined effect is.

Sometimes, the effect of one variable depends on the effect of another. For example, you might find that having the radio on increases productivity in workers, but only in the morning. In this example, time of day interacts with the effects of the radio.

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The power of the experimental method lies in the ability to draw conclusions about cause-and-effect relationships from an experiment. No other research method has this power.

Experimental research does, however, have limitations. Experiments are often artificial; researchers have to come up with contrived settings so that they have control over the environment.

Some experiments cannot be done because of ethical concerns. For example, you would never want to malnourish infants on purpose to see what the effects are on intelligence.

Others cannot be done because of practical issues - there's no way we can randomly assign families to live in urban vs. rural areas so we can determine the effects of city vs. country living.

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Sometimes, a single group can be used for both experimental and control conditions.

For example, you might study the effects of having the radio on when people are working in an office. You would collect data from the same group of workers twice, once with the radio on and once with it off.

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Researchers can also use more than one dependent variable in a single study to get a more complete picture of the effect of the independent variable.

For example, we might measure not only number of documents workers finish when the radio is allowed to be on while they work, but also worker satisfaction, absenteeism, and attitude. Having one less day of absenteeism per month might make up for a slight decrease in productivity.

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This concept of positive correlation can be confusing at first. One tends to think that two variables going up are positive and two going down together are negative. That is not the case.

It is important to understand that when two variables are moving in the same direction – then it is a positive correlation.

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A negative correlation is when two variables are going in opposite directions.
An example would be the number of absences from class and exam scores.

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The correlation coefficient is a numerical index of the degree of relationship between two variables.
The size of the correlation coefficient varies between zero and plus or minus one. Its size indicates the strength of the association between two variables.

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Naturalistic observation is when a researcher engages in careful observation of behavior without intervening directly with the subjects - allowing researchers to study behavior under conditions that are less artificial than experiments.
It can be particularly useful for studying animals in their natural habitats.
Dr. Jane Goodall conducted ground-breaking research on the social lives of chimpanzee through years of painstaking naturalistic observation.

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A case study is an in-depth investigation of an individual subject.
They provide quite detailed information about a particular person or topic, but they are highly subjective and may not generalize to other situations.

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Surveys use questionnaires or interviews to find out about specific aspects of people's backgrounds, attitudes or opinions.

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While descriptive and correlational methods extend the scope of psychological research, they do not permit scientists to manipulate variables, and therefore a cause and effect relationship cannot be proved.
Clinical samples are often unrepresentative - drawing inferences about a population based on a sample only works if the sample is reasonably representative of the population.

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A sample is the collection of subjects selected for observation in an empirical study.

In contrast, the population is the much larger collection of animals or people (from which the sample is drawn) that researchers want to generalize about.

Sampling bias exists when a sample is not representative of the population from which it was drawn.

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A Placebo Effect occurs when participants' expectations lead them to experience some change even though they receive empty, fake, or ineffectual treatment.

They are attributable to people's expectations.

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Researchers often use information that comes from self-reports on surveys or questionnaires.

They can be very helpful, but they are subject to what is called "social desirability bias" which is the tendency to give socially approved answers to questions about oneself.

Another related problem with self-reports is the "halo" effect, which occurs when someone's overall evaluation of a person, object, or institution spills over to influence more specific ratings.

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Experimenters are fallible, and their research can be affected by a tendency to see what they want to see.

This bias is called experimenter bias.

Robert Rosenthal's research on experimenter bias suggests that researchers may unintentionally influence the behavior of their subjects.

One way to prevent experimenter bias is by conducting a double-blind study - one where neither the participants nor the researcher knows which is the control group and which is the experiment group.

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Deception enables investigation of important issues and empirical evidence suggests that deception is not harmful to subjects.

However, deception is inherently immoral and may undermine participants' trust in others.

Consider this question by Warwick: "If it is all right to use deceit to advance knowledge, then why not for reasons of national security, for maintaining the Presidency, or to save one's own hide?"

When, if ever, do you think deception is justified?

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The use of animals in research is a hot topic and highly debated.

Animals are used when it is unethical to use human subjects.

Some contend that we are violating the rights of animals and others believe the animals are doing us a great service by supplying evidence for research that will ultimately help humans.

Actually only about 7 to 8% of all psychological studies involve animals, most of which are birds and rodents, and rarely involve subjecting them to painful experiments.

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The American Psychological Association (APA) has a set standard for ethical practices in using animals that include:

- 1- No harmful or painful procedures are to be used
- 2- All animals are to have decent living conditions

They also have guidelines for using human participants that include:

- 1- Subjects are voluntarily participating
- 2- They are not subjected to harmful or painful experiences
- 3- They are de-briefed as soon as possible if any degree of deception has been used
- 4- Subjects information is kept in strictest confidence, and privacy is insured