The Scientific Method and Research Methods

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WHAT'S COVERED

This lesson will present the scientific outlook used in psychology research along with the steps in the scientific method and the importance of critical thinking in science. We will also see the differences between basic and applied research. Our discussion breaks down as follows:

1. The Scientific Outlook

The scientific method is the set of procedures scientists use to conduct research. When a psychologist makes a professional statement about human behavior, they strive to back up that statement with evidence gathered from prior research. This is a common quality of scientific inquiry that may not be true for others who seek to understand human behavior and solve social problems. A philosopher doesn't need to repeat experiments before arguing whether humans have free will or not. A politician doesn't need to remain objective when arguing in favor of their preferred social policy. However, a psychologist will consider the scientific method to be the foundation for meaningful theories.

Scientific research should be empirical, objective, and repeatable. **Empirical evidence** is based on observation and experience, especially when they form patterns that consistently repeat. Objective research strives to remain free of personal bias of the researcher. When research results are repeatable in multiple experiments, those results represent stronger evidence with which to form new theories.

Good scientific hypotheses and theories should be general, parsimonious, and falsifiable. They should also allow for viable ideas for further research, rather than closing off all possibilities. When a theory is general, it provides accurate predictions for a wide range of situations. A parsimonious hypothesis is one that suggests

the simplest possible explanation for the observed phenomenon. A falsifiable hypothesis makes specific predictions for a given set of observations and variables so that it can be proven incorrect by that data.

TERM TO KNOW

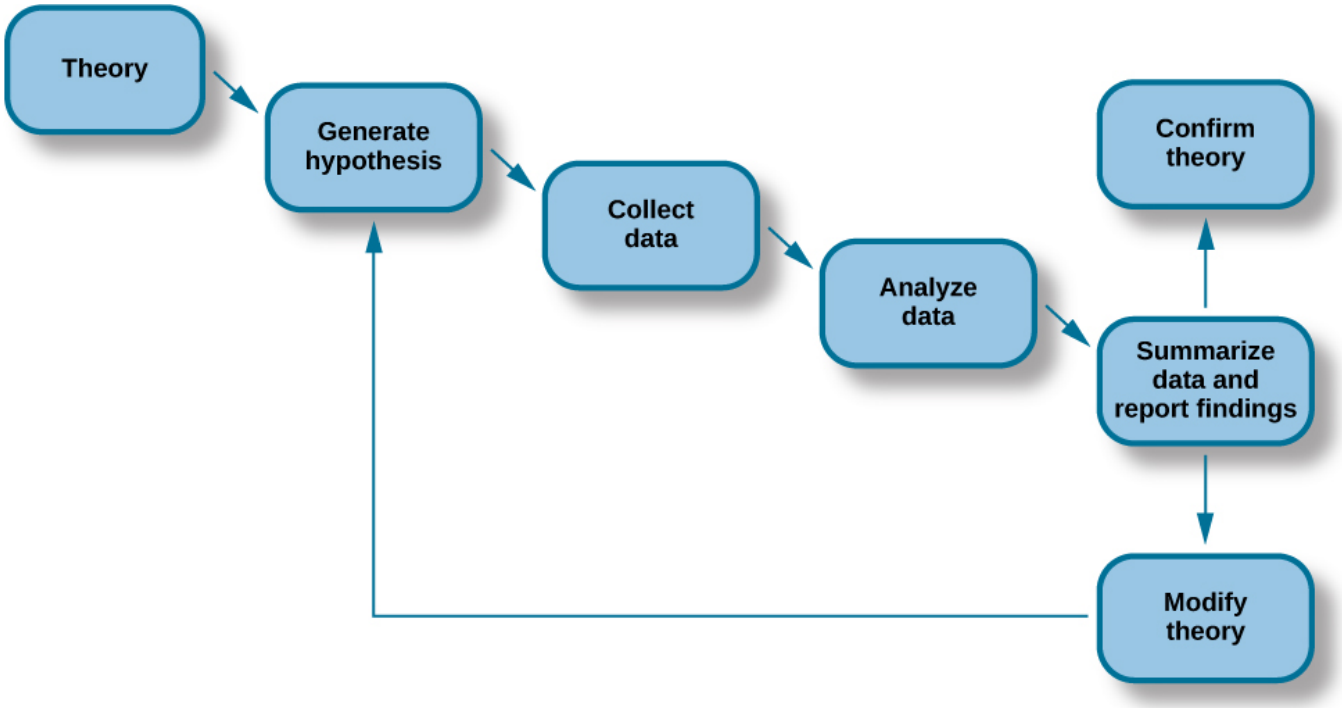
Empirical Evidence

The information gathered through observation and documentation of patterns during experimentation.

2. The Scientific Method

When psychologists use the scientific method, there is a general set of steps they follow to arrive at reliable results.

Step	Description
Observation & Research	Scientists examine the way the world and the universe around them work. They will research through libraries, the Internet, and peers to gather as much information about a particular phenomenon as they can to try to objectively answer the question.
Question Formulation	Once a scientist has researched a particular phenomenon, he or she will ask a question of that phenomenon, such as, “What is consciousness?”
Hypothesis	Scientists will formulate a parsimonious hypothesis, which addresses the question, with a prediction about how the phenomenon works. At this step, they will also design the research method for their experiment.
Testing	Scientists will use experimentation to collect data to test their falsifiable hypothesis and their question.
Analysis	Scientists evaluate the empirical data from their testing. When necessary, they will repeat the experiment to improve the data.
Conclusion	Based on the collected data and information, scientists determine whether their hypothesis was rejected or supported by the results, and communicate their results to the wider scientific community with the goal of contributing to a general theory describing the phenomenon.



A good hypothesis often uses an if-then form that describes the tested situation and expected outcome.

> ↱ EXAMPLE A hypothesis might be, “If drivers talk on the phone while driving a vehicle, then they will be more likely to make errors on a driving course than those who do not talk on the phone.”
>
> The test situation might then be observations of specific driver behavior, where one group of control participants are prevented from using their phones while another group actively uses them. An observer might measure things like the percentage of time a driver is looking out at the road, or count the frequency of accidents occurring between the two groups.

In psychology, the testing step often takes the form of psychological studies where participants are observed during activities and fill out forms for background data.

3. Critical Thinking

Critical thinking is a crucial skill for all people, not just scientists. However, it is especially valuable when conducting research and evaluating prior results and theories. A person is critically thinking when they analyze a source of information, assess its validity, and in the process improve their own understanding of the topic. Critical thinkers are skeptical, open-minded, and will change positions when evidence and reason leads them to do so.

When you are thinking critically about scientific results including in psychology, the information that you are analyzing is usually the empirical evidence gathered by the researchers and the method used to collect it.

10 SKILLS Self and Social Awareness: Skill Reflect

Critical thinking overlaps with the self and social awareness skill. Being willing to improve your own understanding and change your views shows you know that there is still a lot to learn about the world and the people around you.

TERM TO KNOW

Critical Thinking

Thinking that is analytical and supported by empirical evidence.

4. Basic Research

Basic research increases our understanding of psychological phenomena and the world around us. The problem solving skill supports scientists in completing basic research, as they ask questions to find out more about how people experience the world. The majority of psychological research is basic research.

↱ EXAMPLE Trying to understand how memory works or what the effects of culture are on individual psychology are both things that would fall under basic research.

Basic research in psychology generally takes place in universities and in dedicated research institutions. Basic research is most often funded by the government because it doesn't have any commercial value in and of itself. This means that the research findings usually won't make anyone any money.

TERM TO KNOW

Basic Research

Study and research meant to increase our knowledge of psychological phenomena and the world around us.

5. Applied Research

Applied research, on the other hand, is practical research that is based on real-world problems that people are having. Applied research builds on previous theories, usually the ones discovered by basic research. Applied research is more needs-driven, either for financial benefit or to solve real-world problems. This means that organizations and businesses fund it because they want or need the results for their own benefit.

10 SKILLS **Problem Solving: Why it Matters**

In some cases, businesses hire psychological experts that assist them with applied

research.

↱ EXAMPLE Autistic Self Advocacy Network is an example of an organization dedicated to a psychological cause. This organization participates in advocacy and research to further the understanding of Autism Spectrum Disorder.

Applied research typically has more focused areas of research.

↱ EXAMPLE Industrial-organizational psychology studies and assesses people within organizations. Organizations using this kind of research specifically want to know how to best train and evaluate their own employees, rather than to discover general psychological concepts.

There can also be applied research in fields like education, forensics, or even sports. Many different areas of business—and of the world in general—have psychological applied research devoted specifically to them.

TERM TO KNOW

Applied Research

Practical, real-world research meant to address explicit problems people are having.

SUMMARY

In this lesson, we learned about the basic principles that inform **the scientific outlook** on research and the steps that form **the scientific method**, which determines how scientific research is conducted. **Critical thinking** is used to analyze ideas both in science and in self and social awareness. Lastly, we learned about differences in the nature of **basic research** and **applied research**.

You learned that strong problem solving skills can help those who conduct applied research for organizations. This could be you one day!

Good luck!

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TERMS TO KNOW

Applied Research

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Basic Research

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Critical Thinking

Thinking that is analytical and supported by empirical evidence.

Empirical Evidence

The information gathered through observation and documentation of patterns during experimentation.