

Chapter 1

Why study research methods?

- 1) To be able to conduct research and evaluate the work of others
- 2) To be able to distinguish between science (fact) and pseudoscience (fiction)
- 3) To learn to think like a scientist - develop a systematic way of asking questions and determining if the findings support the conclusions

Source of knowledge

- 1) **The method of tenacity:** Ideas are accepted as truths because they've been around for awhile and/or based on superstition
- 2) **The method of intuition:** Information is accepted as being true because it makes sense, seems plausible, feels right, etc.
- 3) **The method of authority:** Knowledge obtained from an authority figure or expert in a given area
- 3b) **The method of faith:** Knowledge obtained from an authority figure and based on complete trust - parents, teachers, clergy, spiritual leaders
- 4) **The rational method:** Knowledge acquired through logical reasoning
Begin with known facts or assumptions (premise statements) and use logic (arguments) to arrive at an answer (conclusion)
- 5) **Empiricism:** Knowledge acquired through direct observation or personal experience
Illusions
You cannot even trust your own observations

The scientific method

A systematic way of examining a specific issue

Series of techniques for acquiring new knowledge and also correcting previous knowledge

Knowledge is constantly evolving - what is true today may be proven false tomorrow

Fundamental assumption: The world is orderly and governed by natural laws

There are links between events - cause and effect relationships

The scientific method allows us to uncover these laws

Science doesn't only find positive relationships

One thing is associated with another thing but not necessarily mean one is causing the other

Scientific method uses experiments

You can compare two groups to one another

The importance of logic: We discover the laws of nature through a process of logical thinking

Helps us arrive at an understanding of various cause-effect relationships

If A, then B.... If no A, then no B

Goals of research

-Observe

-Describe

-Explain

-Predict

(Also, control is one (you want to control variables)

The issue of control can be explained in different ways

You want to control the amount of sleep deprivation people get (example)

There's not just research, there is the correlation method

In this case, I can ask how many hours you've slept last week

You're not manipulating in this case, there's no control

The finding could be, the less hours of sleep, the lower the score on the test it

You could find anything, there are several possibilities

This is not an experiment because you did not control the amount of hours you have slept

You can do a cause and effect

With a correlation, you cannot establish a cause and effect (you could do bad on a test because of many other things) Example: you could be sleep deprived because of staying out too late... etc.)

Research approaches

Basic: Understand a particular phenomena

Example: How alcohol affects coordination

Bricks in the wall

If you take out a brick in the wall, it doesn't tell you much

Researchers are not interested

Not interested in applying to the real world

Applied: Solve a particular problem

Example: alcoholism

People are applying the basic research to solve problems in the real world

Alcohol example: Some findings are more acceptable than others

Different jurisdictions, different governments

Those who do the applied stuff, will use findings from the basic research

People who do research on education, teaching methods, etc.

Teachers might want to apply to the real population to solve a real life problem

The scientific method

Scientists put out their findings, it's to advance science

You don't want to use the word proven

Step 1: Observation

Observe a phenomenon and reach a conclusion - develop a theory

Sometimes there's different theories to explain the same phenomena

They compete with each other

Inductive reasoning: make a generalization based on a few observations

Taking an observation and generalizing it

Based on what you observe, you're applying this to every situation

We can apply this everywhere else

Findings in rats and applying it to the external world

Theory

Through observing events, we arrive at an explanation about the cause and effect relationship between them

A theory is a statement or series of statements that:

Organize our observations and ideas

Explain our observations

Predict events not yet observed

Theory - Conditions

Parsimony: Theories gain power when they can explain many results with few concepts

Few concepts as possible can explain a large body of data

If I say play cells in the hippocampus help rats and people get around, that is parsimony

One thing can explain a lot

Example: Older memories have been recalled more compared to recent memories because you

haven't had a chance to recall them as much.... Older memories are still there but recent ones are lost (car accident)

Freud's theory are not parsimony because he relies on many concepts to explain human behaviour

A good theory is parsimonious!!!

You need to resort to a lot of different ideas to explain one thing - not a parsimonious

Why is parsimony bad?

Confusing and misleading

Lose precision

Precision: A theory must be precise enough so that different investigators can agree about its predictions

A theory must be precise so everyone can agree

There is no confusion

Other researchers can agree on the predictions

Testability: A theory must make predictions that can be tested empirically. (falsifiability)

A theory must have a way to be tested

Has to be falsified

Example: Astrology

You can always think of a way to make it right

Horoscope: "You will soon come into money"

Soon can be 10 years, it can be tomorrow

How much money is specified

"I didn't find money" "Well it says 'soon'"

Non-falsifiable: Freud

You always find something to make it right

Theory

No single confirming finding can PROVE a theory correct

Findings support a theory

More data that supports, more confidence we have in the theory

No single disconfirming findings leads to theory rejection

It will lead to further testing, or to an adjustment of the theory

Developed idea

A very supportive hypothesis

A scheme about how something works

A theory needs to be tested

Theories generate hypothesis

Theory takes care of the goals of science

It all fits together

From our observation, we derive theories

It helps to organize our ideas about the phenomenon

Structures of the mind, psychosexual development, defines mechanisms (all these different concepts that explain the same thing) (it's organization)

You're able to predict

Accumulation of evidence

Data supporting theory vs. Data disconfirming theory

Always going to happen

The scientific method

Step 2: Formulating a general hypothesis

Hypothesis: proposed relationship between variables - tentative answer that must be tested and critically evaluated

Must be testable

An educated guess on the effects of one variable on another variable

Some are more testable than others

Suppose you could test a hypothesis?

To say that rats can dream about the maze during their sleep is a bad hypothesis (because we cannot test this)

When you put your ideas out there, your ideas can be replicated

"I'm going to test this in another way..." (based on the findings of...)

It's based on previous findings, it's not made up, it's testable (because it can be recorded)

Testable is such a good hypothesis omg

If the technology isn't advanced enough, it's not testable

Variables

Independent variable: can be thought of as the cause and is manipulated by the experimenter

Dependent variable: the effect that results from the manipulation of the independent variable

Step 3: Generating a research hypothesis

A specific statement about the expected relationship between variables on a given situation

Example: From what we know about the effects of alcohol on the brain

4 standard drinks in one hour, alcohol level of 0.8

Based on what I already know, I predict...

This is a hypothesis

Deductive reasoning: begin with a general observation to make a prediction about a specific situation

Step 4: Making systematic, planned observations

Collect and analyze data

Step 5: Evaluating the research hypothesis

Based on observations, support, refute or refine the research hypothesis

If your data doesn't support your hypothesis, it could just mean previous theories are wrong

Reasoning

Inductive: from data (observations) you develop theories

From the more precise to the more general (narrow to wide)

From the data that you have to support the theories

From the theory, then you want to derive data, which is now....

Deductive: from theories you develop hypotheses to test

Other way around

Think about what the detectives do

They have their observations and they deduce what happened

Crime scene: General (blood, fingerprints, blala)

From that, they deduce

They go into details (deductive reasoning)

Theory data cycle

(Theory -> Deduction (hypothesis) -> Data -> Induction (theory))

Start from theory

Deduct a hypothesis

From the hypothesis you generate data

From the data, you induce a theory

Continuous, back and forth cycle between theories and data (a circular relationship)

Cycling through a continuous process of testing and correcting based on how data fits predictions

Even a theory that is known to have problems may continue to be used and useful

The scientific method

3 important principles:

Empirical: A phenomenon must be systematically observed in order to be accepted

A phenomenon must be observed in order to be accepted

When you submit a paper, it gets peer reviewed

They take the manuscript that you found and then they read it, evaluate the research

Systematic and organized

Public: The methods used must be available to others (transparency) to allow for verification and replication

Must be available to others to allow for replication and verification

Objective: Observations and conclusions must be free of bias and personal opinions

Free of bias

Rare you'll see "I found that.." instead it will be "we"

You cannot tell if it's a man or a woman

Very impersonal

Certain style

Make it as objective SOUNDING as possible

The research process

Choose topic, identify specific problem, research it, develop hypothesis, design experiment, collect data, analyze results, formulate conclusion, communicate findings

EXTRA NOTES

Psychoanalytic theory: Freud

Set of concepts that explain behaviour and personality (why we are the way we are)

Freud wanted to explain why people behave the way they behave

Why do people have these disorders?

Unconscious mind

Unacceptable thoughts and emotions and feelings gets repressed into the unconscious

Develops into anxiety and other things

ID: Unconscious, wants and needs, pleasure (you don't care)

Superego: Completely conscious

Ego: Right in the middle, knows about the unconscious wants

Psycho stages of development - all parts of the subconscious

All of these concepts to explain how a human becomes the way they are

Freud's theory is known as the grand theory, a theory that explains a lot of things but it all has to do with each other

Everything is kind of related

Mini theory: Sort of a grand theory but has sub theories

The concept of the unconscious is the grand theory that explains behaviour
The ID, ego, superego explains personality (mini theory example)
You cannot test this theory very well
You can't test the unconscious
Yes, it's a theory but it's not a good one because it's very difficult to derive any testable hypothesis from it
Theory is a set of concepts that explain data and you can derive predictions from it
Play cells in the hypo campus: that's a good theory because you're able to test it
They all support the theory
When many hypothesis have been generated that support a theory, then the theory is good

Ideally in science, you want to find cause and effect relationships
If you do an actual experiment, you can control it

If you can't imagine where a theory can be false, then it's not a good theory
How are theories supported? Finding evidence
Deriving hypothesis based on the theories and by testing the hypothesis
Science is about replication
About putting your findings out there so others can replicate
If the theory is replicated many times then you have further support on it
The theory will live on as long as there's support for it
Gets rid of the concept of proof
Evidence will be overwhelming but never say proof
"We found evidence for.." "Evidence supports our hypothesis"
"Our results MAY indicate that..."
Always prepared to be wrong
Takes more than one study to disconfirm something
Often, they did it differently
Competing theories

Qualitative research: Qualitative information
Example: Piaget (what kids did at certain ages)