



Module 2 Lecture - Psychological Research

Introductory Psychology

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1 Overview and Introduction

1.1 Textbook Learning Objectives


- Explain how scientific research addresses questions about behavior
- Discuss how scientific research guides public policy
- Appreciate how scientific research can be important in making personal decisions
- Describe the different research methods used by psychologists
- Discuss the strengths and weaknesses of case studies, naturalistic observation, surveys, and archival research
- Compare longitudinal and cross-sectional approaches to research
- Compare and contrast correlation and causation
- Explain what a correlation coefficient tells us about the relationship between variables
- Recognize that correlation does not indicate a cause-and-effect relationship between variables
- Discuss our tendency to look for relationships between variables that do not really exist
- Explain random sampling and assignment of participants into experimental and control groups
- Discuss how experimenter or participant bias could affect the results of an experiment
- Identify independent and dependent variables
- Discuss how research involving human subjects is regulated
- Summarize the processes of informed consent and debriefing
- Explain how research involving animal subjects is regulated

1.2 Instructor Learning Objectives

- Understand the critical role research plays in solidifying psychology as a science
- Understand the pitfalls and dangers of unethical research
- Be able to identify the core components and features of a described research design

1.3 Introduction


- As we learned in the last module, many psychologists have attempted to _____ different phenomena, via many different perspectives and methods
- Research is not a straightforward, set process, but rather, a set of very _____ and mindful decisions about what we are investigating, and what is the best way to do it
 - This module is all about introducing us to the many decisions we can make in the research process, and the _____ that follow from these decisions

 Discuss: Have you ever heard from someone, or the news: 'The research says...'? Try to think of or find an example of one of the things you've heard previously, and speculate on whether it was true

2 Why is Research Important

2.1 Introduction

- What makes us trust an idea or claim?
 - Do we rely on the _____ or possible expertise of who is talking
 - Do we rely on our _____ or “gut feeling”?
 - Do we rely on our own _____ experience?
- The above options may sound okay, especially in our everyday life, but are especially prone to error and fallacies - or _____ in logic
- Instead, we need to primarily rely on **empiricism**, or the rigorous _____ and measurement of a phenomenon
 - But _____ the internal mind is rather difficult...

 Some of the historical psychologists discussed previously rejected the notion that psychologist should/could study the internal mind, who was one of these naysayers?

- A) Skinner
- B) Freud
- C) Wundt
- D) Rogers

Explanation:

2.2 Use of Research Information

- There has been a _____ of available information, via the internet and even scientific journals
 - However, that situation has been made increasingly difficult to wade through and make sense of a very _____ body of research

! Important

Even for someone like myself, who loves research, it can still be really tough to wade through and understand!

- Generally, we should start from the perspective of healthy _____ when we hear a claim or idea
 - Sometimes a matter of just asking, “how do you know that?”
 - Another, useful mindset, “Trust, but verify”
- When we examine evidence, we should look for _____ or, put another way, we are examining the **weight of evidence** to see if most studies point in the same direction
 - We have the undesirable situation of parsing out **facts**, from **opinions** when we consume research and media
 - Facts are what we can _____ and confidently know and observe, whereas opinions are more subjective judgements and claims - and the world has a lot more opinions than facts!
 - If a fact is true, it should be something that can be readily _____

? Which of the following can likely be independently verified as a fact?

- A) I am the smartest person I know
- B) It seems like it will storm tomorrow
- C) It is 80 degrees outside right now
- D) I am probably going to get an C on the test

Explanation:

2.3 Not Just Western Researchers

- There have been very many, _____ researchers, far too many to just cover in this presentation (or class) - we'll be consistently revising imminent theorists

“I don't mind not knowing. It doesn't scare me.” — Richard P. Feynman

during the course, and discussing their findings

- Many of the earliest prominent _____ psychologists were covered in the previous module, but we should also highlight how psychology research and science developed outside the Western world.
 - For example, in South America, **Horatio Pinero**, and in India, **Guanmudian David Boaz**, both established the first formalized psychology research labs in their respective geographic areas.
 - Having broader representation among researchers of different _____ and parts of the world lend more nuance and complexity to how we understand the pervasiveness of certain theories.
- Keep this in mind as we continue to introduce new names into the mix!

2.4 The Process of Scientific Research

- The _____ of scientific reasoning can take two different forms, inductive and dependent reasoning, which comes from whether the hypothesis or empirical observation came first
- **Inductive Reasoning** is when an _____ observation turns into a hypothesis, but **deductive reasoning** is when a _____ hypothesis is followed by empirical observations
 - Example of inductive reasoning: I saw several turtles laying on a rock in the sun, I suspect that they enjoy the heat
 - Example of deductive reasoning: I suspect that cats can see ghosts, so I watch their observations closely to see if I can detect and presences

! Important

Like many of the differing perspective presented in this class, neither form of reasoning is 'worse' for scientific research, but we should be mindful of what we can conclude based upon one or the other

- However, its pretty common to the deductive approach in psychological research, starting with a theory, moving to a _____ hypothesis, and gathering data to determine if that hypothesis holds weight, and then analyzing the data gathered to refute or support the original hypothesis.
- But, hypotheses should be **falsifiable**, which means that they can be shown to be incorrect
 - In a sense, science should be readily _____, and upfront acknowledgment we may be wrong

- This is where Freud (and many other early theorists) got tripped up - many produced hypotheses that had no good way to firmly test whether it was true or not

3 Approaches to Research

3.1 Introduction


- There's a lot of ways to _____ a hypothesis and gather data, each with their own distinct pros and cons - the following section will give details on a subset of methodologies
- These different approaches may be called research _____, and there are many more than we can cover here.

! Important

Methodology is often decided mostly by what claim we are trying to make, and with what limitations. Bold claims require equally bold and robust evidence!

3.2 Clinical or Case Studies

- **Clinical/case studies** are done on small groups or even single individuals with _____ or rare situations not easily created or otherwise observed
 - Hypothetical example: A neurologist carefully observes someone with “Alien hand syndrome” and extensively documents their ability to accomplish motor tasks.
- Their _____ comes from a very limited **generalizability**, basically, it's hard to say much about a larger group of people, based on these case studies
- Why focus on so few individuals when the conclusions from such a small group may be _____?
 - They provide _____ amount of information about specific cases, and because of that, can reveal otherwise obscured nuances

 Discuss: Try coming up with your own example of a case study that you might find interesting!

3.3 Naturalistic Observation

- **Naturalistic observation** is, as the name suggests, mostly centered on simply _____ and recording information about natural behaviors and processes, without directly interacting with the subject or participant
 - Hypothetical example: I _____ how many men and women enter a particular store in the mall
- This method is especially useful in _____ research, where much can be learned by watching their behaviors when not in contact with humans.
- Doing this well hinges on being un-intrusive and “blending in” to the _____
 - as to not accidentally change the behavior of the things you are observing, something referred to as **observer effects**
- We also run into **observer bias**, where a _____ rater or observer may accidentally bias their observation and measurements because they expect a certain outcome. This can be partially controlled for by:
 - Taking inter-rater _____ and comparing multiple sets of observations
 - By blinding the observers to the exact hypothesis of the study
 - By having clear codebooks that leave less room for _____
- Another weakness of this strategy is that there is relatively little _____ that the researcher has over the situation, meaning results may not be very clear-cut or interpretable

3.4 Surveys

- **Surveys** are questionnaires or _____ that ask a series of questions or ask for responses to certain prompts.
 - Example: like the perspectives survey I had all of you all do!

- Benefits
 - Easy to create and _____ to relatively large groups, compared to the previously discussed methods - especially when done via the internet
 - This larger sample usually lends to _____ more generalizability than case studies or naturalistic observation
- Weaknesses
 - Not able to collect as _____ information on each participant, due to the naturally limited questions on the survey form
 - Liable to _____ responding from participants, if they feel that they should respond a certain way.

? I carefully tally the number of frogs that I see swimming in a pool at different times of the day, watching them from the house where they do not see me. This is best described as...

- A) A survey
- B) None of these
- C) A case study
- D) Naturalistic observation

Explanation:

3.5 Archival Research

- **Archival research** involves gathering data that already exists, sometimes from a different study or possibly some other data collection effort for a purpose other than research
 - A lot of data already exists, such as health information in charts, or _____ data
- In this research it is very “easy” to _____ the data, due to not needing to have any new participants
 - It may be somewhat restricted to only certain individuals, especially in the case of potentially sensitive data (e.g., health or educational info)
- But the data is still _____ to the problems in the original collection or research, and the new analysis will still be subject to those flaws and issues
 - I.e., if the initial collection of the data was problematic, it may still pose an issue for any conclusion from later archival research

3.6 Longitudinal and Cross-Sectional Research

- **Longitudinal Research** is done when data is gathered on the same group of individuals over a _____ period of time, repeatedly
 - These are particularly useful when trying to parse out small or complex changes in the long-term, like in _____ tracking and treatment
 - However, they are very time _____, and deal with problems such as **attrition** (i.e., drop-out from the study over time)
- **Cross-sectional Research**, on the other hand, deals only with data gathered at one time between two separate groups
 - This is much easier to accomplish, and suffers less from possible attrition than longitudinal studies
 - But, without the _____ aspect, it is difficult to know how things change over time

? Which of the following subfields do you suspect often employs longitudinal research?

- A) Cognitive
- B) Behavioral
- C) Biopsychology
- D) Developmental

Explanation:

4 Analyzing Findings

4.1 Introduction

- So now we've given a bunch of ways to gather data, but what do we actually do with it?!
- Much like our actual research _____ discussed above, how we analyze the data is important in what conclusions we can draw.
 - Sidebar: We are only going to touch on the analysis methods here - there is much more out there

4.2 Correlational Research

- **Correlation** is a measure of how much (or how little) two or more variables are _____ to one another.
- While there are several ways to _____ the **correlation coefficient**, the most common is called Pearson's product-moment correlation coefficient or r for short. This is a numeric value from -1 to 1 that indicates the strength and direction of a relationship between two variables.
- A **positive correlation** suggest that as one variable _____, so does the other, whereas a **negative correlation** means that as one variable increases, the other tends to decrease.
- A r value closer to 1 or -1 suggests a "stronger" relationship, where the variables are more closely related, and a r close to 0 implies little to no relationship.

? If I have an r of 0.01 between number of hours of sleep and test score, how could this be described?

- A) Strong negative relationship
- B) Strong positive relationship
- C) Modest positive relationship
- D) No relationship

Explanation:

- Correlation is a well-established and extraordinarily useful measure in analysis, but can have some trickiness in how we interpret it...

4.3 Correlation Does Not Indicate Causation

- A easy mistake to make when _____ two variables is believing that one causes the other, especially if it seems intuitive.
 - Basically, a correlation alone is never going to _____ establish **cause-and-effect** between two or more variables
- However, we must be careful to not _____ a causal effect, especially as there could be **confounding** variables that complicate the relationship between the two we correlated
 - Even if we don't have a clear _____ of what might be confounding the relationship, we cannot automatically assume we are in the clear.

- Example: Energy level is positively correlated with mental health, therefore high Energy level causes better mental health... WRONG! There could be many explanations

4.4 Illusory Correlations

- **Illusory correlations** are those that we _____ exist on the basis of intuition or pre-scientific belief, when, in reality, no such relationship exists.
 - This _____ understanding may originate from our “gut feelings” or our pre-existing beliefs, but does not rely on empirical evaluation
- Example: Every time I’m running behind, my car acts funky. It’s not likely this is the case, but it becomes more salient when you are already

! Important

Illusory correlation are NOT something for us to base our beliefs or decisions upon, as they are not empirical in nature

4.5 Causality: Conducting Experiments and Using the Data

- So, if correlation cannot provide evidence of _____, what can?
 - For this, we must perform an experimental-type _____, one of the most rigorous and detailed studies we can perform in science
 - Rather than just _____ data, experiments require that we actively intervene to cause some hypothesized effect

4.6 The Experimental Hypothesis

- To begin we need to establish a falsifiable hypothesis that is rooted in some good evidence or _____
 - Ideally, our hypotheses should not be guesses, they should be _____ guesses based off of the information we currently have
- However, we often try to explore a _____ hypothesis that hasn’t previously been addressed or explored by other researchers

4.7 Designing an Experiment

- Experiments come in _____ flavors, with some extraordinarily complex designs

“I don’t mind not knowing. It doesn’t scare me.” — Richard P. Feynman

- For simplicity, we'll focus on an example that _____ two groups, an **experimental group** and a **control group**.
- In such a case, the experimental group is exposed to some intervention or _____ stimulus, while the control group is not; they are both _____ measured on some outcome and then compared.
- But we need to be very _____ in how we define both what we measure as our outcome, and what we manipulate or change between the two groups.
 - These detailed definitions and measurements for our variables are called **operational definitions**
- Like with other studies, we need to be mindful of things that could confound or introduce _____ into an experiment
 - Participants may change their behaviors from their natural state if there are aware of what condition they are in - Such bias can be limited by using a **single-blind** study
 - **Experimenter bias** may occur when an experiment unintentionally (or maybe intentionally) acts in a manner that changes the study outcome to better fit their hypothesis - this can be _____ with a double-blind study, when the person gathering the data is also unaware of whether participants are in the experimental or control groups
- One especially salient example of what can go _____ without blindness in a study is the **placebo effect**
 - This is where a positive effect occurs just due to the sheer belief that a treatment will have a positive effect, even if it is _____

4.8 Independent and Dependent Variables

- In the working, simple example of an experiment we have been using, an **independent variable** is one that we can _____ or manipulate; i.e., we can put a person either in the control or experimental group
 - This is usually some sort of treatment or intervention
- Then, the **dependent variable** is what outcome we measure that is believed to change in _____ to the independent variable
 - We are looking to see if this dependent variable shows a notable difference between our two groups

? In a study, I create two groups of participants, one group gets a new drug treatment while the other gets nothing, and then I examine their change in appetite to see if it may have changed due to the treatment. What here is the dependent variable?

- A) My participants
- B) Whether they get the drug treatment or not
- C) Their appetite level
- D) None of the above


Explanation:

4.9 Selecting and Assigning Experimental Participants

- Of course, to run a study at all, we need **participants** or people willing to partake in the _____ of our study. Ideally, we want to identify a **population of interest**, which specifies what type of person we want to study with our hypothesis.
- Then from that population of interest, we attempt to gather a **sample**, or _____ of the population, that we can actually use in our study
 - Ideally, such a sample is gathered via **random sampling**, in the sense that no one member of the population of interest is more likely to be included than another
 - A truly random sample will be _____ of the broader population, and results on that sample will reflect in the population well
- Once we have a sample, we must do **random assignment**, which means to _____ half of our participants into the experimental group and half into the control group, in a random fashion.

4.10 Issues to Consider

- Experiments have to have an independent variable that can be manipulated or changed by the researcher. Certain circumstances or _____ cannot be ethically or practically manipulated by the researchers.
 - Examples: You can't modify someone to have suffered through childhood trauma or change their personality type
- Experiments also tend to be very time consuming and involve a lot more researcher engagement with the procedures

 Discuss: Try to think of more traits or circumstances you couldn't ethically or practically manipulate in an experiment

4.11 Interpreting Experimental Findings

- Experiments are normally analyzed with a **statistical analysis**, or probability-based _____ that a certain outcome happened due to random chance.
 - Such an analysis can give evidence beyond a reasonable _____ that our results did not simply occur due to chance, but rather due to a genuine difference between the two groups on the dependent variable.
 - When there is sufficient evidence that an effect isn't due to chance, we call this **statistical significance**.

4.12 Reporting Research

- High-quality scientific studies are primarily published in **peer-reviewed journals**, that have high-standards and _____ guidelines for publishing.
 - The peer review process involves having several other anonymous scientist review the writings, findings, and procedures of a study and evaluate whether it is rigorous, clear, valid, and useful.
 - Good studies should include enough detail so that they could be replicated and reproduced by another researcher, with a different sample
- In fact, many fields of psychology have been plagued with concerns that not enough results show evidence that they can be replicated, calling into question how _____ the original findings were.

4.13 Reliability and Validity

5 Ethics

5.1 Introduction

- _____ is something to never ignore or neglect in the research we do - period
- Psychology as a field has a long, and unfortunate history with _____ ethical conduct
 - While modern research has many more safeguards than some older research, we still must be especially mindful of protecting those who volunteer for our studies

5.2 Research Involving Human Participants

- Research conducting on humans is often referred to as “human-subjects research” (HSR), and research of this type should be _____ by an institution’s **Institutional Review Board (IRB)**
 - Each _____ has it’s own IRB, made up of staff and community members dedicated to ensuring all HSR is _____ with good ethical practice
 - While there are many steps, perhaps the most critical is that **informed consent** is always gathered from participants, where they are reasonably informed of any _____ or benefits in participating in the research.

? Which historical theorist had a similar notion to informed consent, where participants should participate only of their own free will?

- A) Wundt
- B) Skinner
- C) Freud
- D) None of these people had this belief

Explanation:

- In addition to informed consent, we may need to also weigh the need to use **deception** in our studies, as sometimes knowing what is being studied (i.e., the _____) may change how a participant behaves.
 - Any deception that is used must be _____ by the IRB, and the participant has to be **debriefed** when the study concludes, or told about the deception and why it was necessary.

! Important

Deception is not inherently a bad research practice, but it must be done with caution and only when absolutely necessary to the goals of the study. We cannot sacrifice the well-being of our participants for the study to succeed.

5.3 Research Involving Animal Subjects

- Most animal based research is done upon rodents or birds.
- Animals used in research are not _____ by the oversight of IRBs, and are instead governed by bodies called **Institutional Animal Care and Use Committee (IACUC)**
 - This committee likely had different standards, rules, and expectations for animal-based research, relative to IRB's requirements for humans.
 - However, there is still a great deal of attention paid to humane treatment, shelter, and care of these animals.

6 Conclusion

6.1 Recap

- Research is the modern core of psychology - focused on refinement and improvement of our theories based upon rigorous evaluation of theories and ideas through numerous different designs and analyses
- With the different approaches to research design and analyses, there are varying complications and drawbacks - we should be mindful of what hypothesis we are trying to answer and whether a particular method and analysis is suitable to that
- Good research is very detailed and nuanced, it is worthwhile to be very careful in the conclusions we draw, and qualify our results with any relevant limitations
- Ethics is a critical part of a good research process, and cannot be discarded or ignored in order to create a "better" study

6.2 Lecture Check-in

- Get into assigned groups for our weekly group work activity!