Chapter 1:

The Science of Psychology:

1. Methods of Knowing

Intuition:

- Is the first method of knowing
- Is guts, emotions, and instincts to guide
- Does not examine rational thought or facts

Benefits

- Weighing alternatives / possibilities for some people can be hard so decision making via intuition may be superior to analysis

Problems

- Not fact based
- Can be biased
- Can be wrong
- Focusses on details that could be irrelevant

Authority:

- One of most common methods
- Involves accepting new ideas bc some authority figure states they are true
- Authorities include police, government, parents, teachers, doctors' priests, etc

Problem

- In an ideal world we should be able to fully trust authority figures, but history has taught us otherwise bc atrocities can be due to undoubtedly following (Nazi War Crimes, Salem Witch Trials)
- Authorities could be wrong; they be using invalid methods in obtain knowledge

Benefits

- Much easier to come to conclusions as we may not have the time to question and independently research all the material ourselves that the authority is responsible for
- We learn to evaluate the credentials of authority figures and the methods they use to arrive at their conclusions or if they are misleading us

Rationalism:

- Involves using logic and reasoning to acquire new knowledge
- Premises are stated and logical rules are followed to arrive at sound conclusions

Problem

- If the premises are wrong or there is an error in the logic then the conclusion will not be valid, the whole thinking structure/background must be sound
- Unless training formally in the rules of logic it is easy to make an error

Benefit

- If the premises are correct and logical rules are followed appropriately then it is sound means of acquiring knowledge

Empiricism:

- Involves acquiring knowledge through observation and experience

Problem:

- Visual illusions that trick our senses illustrate the problems with relying on this alone to derive knowledge
- We are limited to what we can experience and see and our sense can often trick us
- Our prior experiences can alter the way we perceive events

Benefits:

- At the heart of the scientific method
- Science relies on observations
- Not just any observations but structured ones known as systematic empiricism

The Scientific Method:

- Is a process of systematically collecting and evaluating evidence to test ideas and answer questions
- Use this to go a step further to make careful observations under various controlled conditions in order to test their ideas and they use rationalism to arrive at valid conclusions
- Most likely of all methods to produces accurate knowledge

Problems:

- Not always feasible to use the scientific method, can require considerable time and resources
- Cannot be used to answer all the questions
- Only used to address empirical questions, ones that can be measured in a way

Benefits:

- Most accurate
- Very good results
- Answers a variety of questions

Describe Science:
All sciences have a general approach to understanding the natural world.
Psychology is a science because we seek to understand human behaviour.

Describe the 3 fundamental features of a science:

1. Systematic Empiricism: empiricism refers to learning based on observations and scientists learn of the natural world systematically, by careful planning, making, recording and analyzing observations of it. Unique in their insistence on checking their ideas about the way the world is against their systematic observations.
2. Empirical Questions: are questions about the way the world actually is and therefore can be answered by systematically observing it. Whether things are good or bad cannot be an empirical question as the boundaries are not definite. But testing whether a stereotype is correct or incorrect can be answered empirically. Similarly, the question of whether criminal behaviour has a genetic basis is an empirical question, but the question of what actions ought to be considered illegal is not.
3. Public Knowledge: after the asking if empirical questions, making their systematic observations and drawing conclusions scientists publish their work. Increasingly, scientists are opting to publish their work in open access journals, in which the articles are freely available to all – scientists and non-scientists alike. This important choice allows publicly-funded research to create knowledge that is truly public.

Explain why psychology is a science:
Psychology studies the natural world as we seek to understand human behaviour. It follows the 3 fundamental features of a science. General approach to understanding the natural world.

Define pseudoscience and give some examples:

Refers to activities and beliefs that are claimed to be scientific by their proponents and may appear to be scientific at first but they are not.
he idea is that people's
physical, intellectual, and emotional abilities run in cycles that begin when they are born and continue until
they die. Allegedly, the physical cycle has a period of 23 days, the intellectual cycle a period of 33 days, and the emotional cycle a period of 28 days.
A set of beliefs or activities can be said to be pseudoscientific if (a) it adherents claim or imply that it is scientific but (b) it lacks one of the 3 features of science. In the case of biorhythms there is no systematic empiricism involved and no scientific research available regarding it. that any scientific claim must be expressed in such a way that there are observations that would—if they were made—count as evidence against the claim. In other words, scientific claims must be **falsifiable**.
Helps us bring fundamental features of science into focus. Bring about awareness for harmful practices brought upon by pseudoscience's. Important to distinguish from pseudo-science and real science.

1. Describe the 3 goals of science and give an example of each:

- To Describe: achieved by making careful observations, such as learning to describe certain phenomena due to pertaining factors like what medical weed users use it for. They could look at the prescriptions and see what most people use it for, thus you are able to describe why medical weed can be used.
- To Predict: once we have observed with some regularity the 2 behaviours or events are systematically related to one another we can use that info to predict whether an event or behaviour will occur in certain situation. Once I know that most medical marijuana patients use marijuana to treat pain, I can use that information to predict that an individual who uses medical marijuana likely experiences pain. May not be 100% but there could be a very strong correlation
- To Explain: this goal involves determining the causes of behaviour for example we could ask how medical weed reduces pain or why does pain occur so we can better understand why weed works so well

2. Distinguish between basic research and applied research:

Basic Research in psych is conducted primarily for the sake of achieving a more detailed and accurate understanding of human behaviour without being too specific. Mehl and his buddies fall into this.
Applied Research: to address some practical problems. Research n the effects of cell phone use on driving, for example, was prompted by safety concerns and has led to the enactment of laws to limit this practice.

Not always a clear cut line between the two, as one type of research can eventually lead to the other. All due to the questions and ideas scientists and researchers may have.

1. Explain the limitations of common sense when it comes to achieving a detailed and accurate understanding of human behaviour:

We have intuitive beliefs about people's behaviour, thoughts, and feelings- and these beliefs are collectively referred to as folk psychology. Most of our folk psych is reasonably correct, it is clear that much of it is not.

Forming detailed and accurate beliefs requires powers of observation and memory and analysis which we do not innately possess. We rely on mental shortcuts (heuristics) in forming and maintaining our beliefs. We also tend to focus on cases that confirm our intuitive beliefs and not on cases that disprove them. (Confirmation Bias) We also hope that some of our incorrect beliefs could be true as it makes many feel better.

2. Give several examples of common sense or folk psychology that are incorrect:

Of how when you are angry you must blow off the steam somehow but it actually tends to escalate behaviours.
Most people experience a mid-life crisis in their 40s and 50s
People only use 10% of their complete brain power

3. Define skepticism and its roles in scientific psychology:

Scientists cultivate an attitude of this. It means pausing to consider alternatives and to search for evidence- especially systematically collected empirical evidence-when there is enough at stake to justify doing so. Scientists know they are susceptible to biases such as intuitive beliefs and folk psych, so we use skepticism.

1. Define the clinical practice of psychology and distinguish it from experimental psychology:

Experimental: Scientific research in psych is generally conducted by people with Ph.D.'s and masters. Some work for the government or in the private sector. But the majority are in education such as universities and institutions of this sort. Many are experts in a couple fields of their interest.
Clinical: they assist people by diagnosing and treating psychological disorders and related problems. Term clinical refers to activities of clinicals and counselling psychologists, school psychs, therapists, social workers, and others who help address people's psychological issues.
Experimental is more involved in the scientific method whereas clinical is more practical as it involves individual/group problems many people experience and it focusses on helping these people in a smaller compacity.

2. Explain how science is relevant to clinical practice:

Psychological disorders and other behavioural problems are part of the natural world. Meaning questions about them like causes, their nature, and consequences are empirically testable thus subject to scientific study. Questions of certain psychotherapies and their effectiveness are empirically testable questions that can be answered via research.

3. Define the concept of an empirically supported treatment and give some examples:

Questions about whether a particular
psychotherapy is effective are empirically testable questions that can be answered by scientific research. If a new psychotherapy is an effective treatment for depression, then systematic observation should reveal that depressed people who receive this psychotherapy improve more than a similar group of depressed people who do not receive this psychotherapy (or who receive some alternative treatment). Treatments that have been shown to work in this way are called **empirically supported treatments**.

- Knowledge is acquired in many ways including intuition, authority, rationalism, empiricism, and the scientific method
- Science is a general way of understanding the natural world. Its three fundamental features are systematic empiricism, empirical questions, and public knowledge.
- Psychology is a science because it takes the scientific approach to understanding human behavior.
- Pseudoscience refers to beliefs and activities that are claimed to be scientific but lack one or more of the
  three features of science. It is important to distinguish the scientific approach to understanding human
  behavior from the many pseudoscientific approaches.

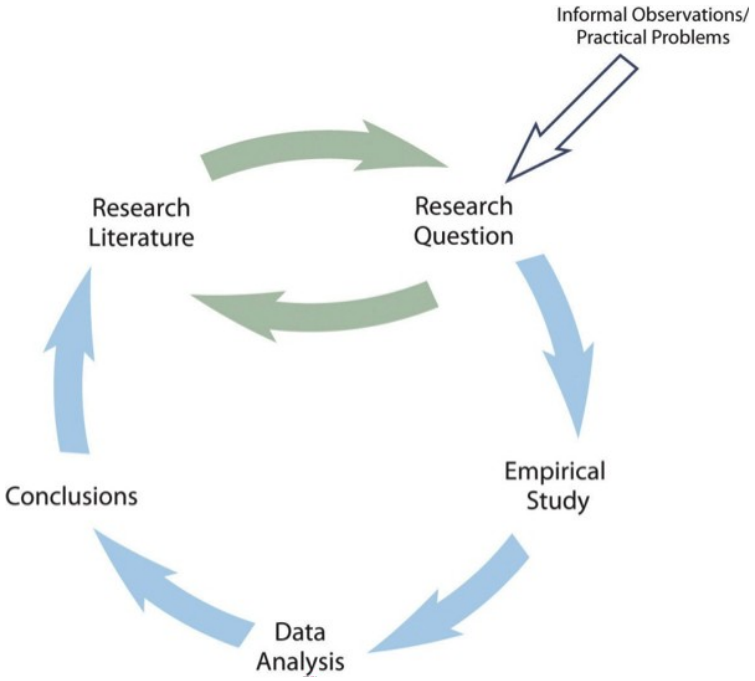
- Psychologists conduct research in order to describe basic phenomenon, to make predictions about
  future behaviors, and to explain the causes of behavior.
- Basic research is conducted to learn about human behavior for its own sake, and applied research is
  conducted to solve some practical problem. Both are valuable, and the distinction between the two is not
  always clear-cut.
- People's intuitions about human behavior, also known as folk psychology, often turn out to be wrong. This
  is one primary reason that psychology relies on science rather than common sense.
- Researchers in psychology cultivate certain critical-thinking attitudes. One is skepticism. They search for
  evidence and consider alternatives before accepting a claim about human behavior as true. Another is tolerance for uncertainty. They withhold judgment about whether a claim is true or not when there is insufficient evidence to decide.
- Scientific research in psychology is conducted mainly by people with doctoral degrees in psychology and related fields, most of whom are college and university faculty members. They do so for professional and for personal reasons, as well as to contribute to scientific knowledge about human behavior. Most psychologists are experimental psychologists and they conduct research.
- The clinical practice of psychology—the diagnosis and treatment of psychological problems—is one important application of the scientific discipline of psychology.
- Scientific research is relevant to clinical practice because it provides detailed and accurate knowledge about psychological problems and establishes whether treatments are effective.

Chapter 2:

A model of scientific research in psychology:

1. Review a general model scientific research in psychology.

First researchers create a question, conduct an empirical study designed to answer the question, analyze the resulting data, draw conclusions about the answer to the question and then publish the results so that they become part of the research literature. Because researchers use this literature to create more questions, this model inevitably becomes a cycle. New research basically broadens the scope of thought as there are an infinite way things react and are the way they are (human behaviour in this case). Shows questions can come from outside sources either from informal or formal observations and problems. But in most cases the researcher will check to see if their problem or question has occurred before and been solved.



Finding a Research Topic:

1. Learn some common sources of research ideas:

- Informal observations: include direct observations of our own and others' behaviour as well as second hand observations from non-scientific sources like the news, social media, tv, etc
- Practical problems such as issues in law, health, education, medicine, and sports. Such as does typing notes help more than writing notes.
- The most common is previous research as most ideas have infinite areas expansion. One idea branches off to another.

2. Define the research literature in psychology and give examples of sources that are part of the research literature and sources that are not:

Research literature is all the published research in that field. Reviewing this means finding, reading, and summarizing the relevant publications.

- It can tell you if a research question has already been answered.
- It can help you evaluate the interestingness of a research question.
- It can give you ideas for how to conduct your own study.
- It can tell you how your study fits into the research literature.

Some examples of this are scholarly articles and books dating to the beginning of the field. Does not include self-help and pop-psychology books, dictionary and encyclopaedia entries, websites, and similar sources that are intended for the general public. These are not trusted because they have not been reviewed by peer researchers and scientists.
Articles in professional journals and scholarly psychology books is what we will mainly use.

3. Describe the use several methods for finding previous research on a particular research idea or question:

Electronic resources such as Academic Search Premier, JSTOR, and ProQuest for all academic disciplines, ERIC for education, and PubMed for medicine and related fields. Most important for us is PsycINFO used by the APA. PsycINFO consists of individual records for each article, book

chapter, or book in the database. Each record includes basic publication information, an abstract or summary of the work (like the one presented at the start of this chapter), and a list of other works cited by that work.
you want to focus on sources that help you do four basic things: (a) refine your research question, (b) identify appropriate research methods, (c) place your research in the context of previous research, and (d) write an effective research report. Several basic principles can help you find the most useful sources.
First look for fairly recent articles and sources unless stated otherwise by an important articles try to keep in 1-5 year range.
Secondly look for review articles on your topic bc they will provide a usefull overview of it-often discussing important definitions, results, theories, trends, and controversies- giving a good sense of where your research fits in.
Professional researchers use an average of 50 sources per article.

Generating Good Research Questions:

1. Describe some techniques for turning research ideas into empirical research questions and use those techniques to generate questions:

Questions expressed in terms of a single variable or relationship between variables.
Look at the discussion area of a article on the topic of interest which may have suggestions.
You can also generate your own whilst keeping your area interest in mind. Then conceptualize it and ask how frequent or intense various variables may be in relation. IF that don't work then look for a relationship or correlation that may be of interest to you between variables.
Ask yourself these:

- What are some possible causes of the behavior or characteristic?
- What are some possible effects of the behavior or characteristic?
- What types of people might exhibit more or less of the behavior or characteristic?
- What types of situations might elicit more or less of the behavior or characteristic?

IF you were looking to expand on a relationship use these :

- Are there other ways to define and measure the variables?
- Are there types of people for whom the relationship might be stronger or weaker?
- Are there situations in which the relationship might be stronger or weaker—including situations with
  practical importance?

2. Explain what makes a research question interesting and evaluate research questions in terms of their interestingness:

First: a question is interesting to the extent that its answer is in doubt. Already answered stuff is not that interesting to new empirical research. But not being scientifically answered does not make something interesting. But when a question could have the possibility of having multiple outcomes then it could be interesting.
Second: will the question being answered fill a gap in scientific research? If so, then it might be interesting. Means that it might not already be answered, partly. But also means is a natural question for those in the field.
Finally: Does the question have important practical implications and applications? Whether taking notes online is better than writing them is an example of this.

Developing a Hypothesis:

1. Distinguish between a theory and hypothesis:

A theory is a coherent explanation or interpretation of one or more phenomena. In common theories go beyond the phenomena they explain by including variables, structures, processes, functions, or organized principles that have not been observed directly. Outside of science, when referring to a theory it means it is untested. A theory is simply an explanation or interpretation of a set of phenomena.

A hypothesis is a specific prediction about a new phenomenon that should be observed if a particular theory is accurate. It is an explanation that relies on just a few key concepts. They are developed by considering existing evidence and using reasoning to infer what will happen in the specific context of interest. Don't always come from theory.

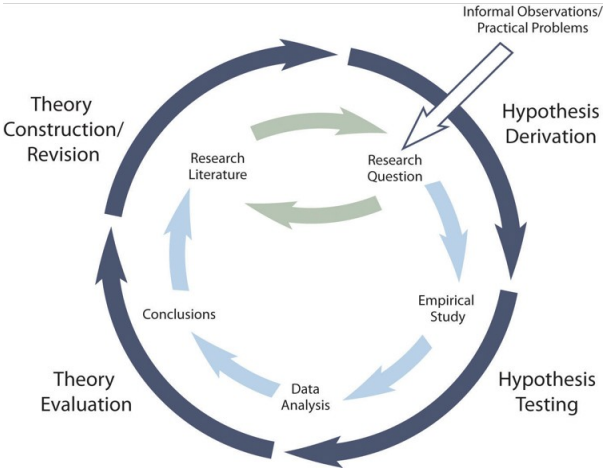
2. Discover how theories are used to generate hypotheses and how the results of studies can be used to further inform theories:

Theories and hypotheses always have this *if-then* relationship.

One way is to generate a research question using the techniques discussed in this chapter and then ask whether any theory implies an answer to that question.

A second way to derive hypotheses from theories is to focus on some component of the theory that has not yet been directly observed.

Primary way researchers use theories is called hypothetico-deductive method. You begin with a set of phenomena and either construct a theory to explain or interpret them or choose an existing theory to work with. They then make a prediction about some new phenomenon that should be observed if the theory is correct. This prediction is called a hypothesis. Then a empirical study is conducted to study the hypothesis. Seen as a cycle as more hypotheses can come from this.



be aware that there are two basic ways that researchers usually include theory. The first is to raise a research question, answer that question by conducting a new study, and then offer one or more theories (usually more) to explain or interpret the results. he second way is to describe one or more existing theories, derive a hypothesis from one of those theories, test the hypothesis in a new study, and finally reevaluate the theory. This format works well when there is an existing theory that addresses the research question

3. Understand the characteristics of a good hypothesis:

Among the very best hypotheses are those that distinguish between competing theories.

First, a good hypothesis must be **testable and falsifiable**. We must be able to test the hypothesis using the methods of science and if you'll recall Popper's falsifiability criterion, it must be possible to gather evidence that will disconfirm the hypothesis

Second, a good hypothesis must be **logical.** As described above, hypotheses are more than just a random guess. Hypotheses should be informed by previous theories or observations and logical reasoning. Typically, we begin with a broad and general theory and use *deductive reasoning* to generate a more specific hypothesis to test based on that theory. we use *inductive reasoning* which involves using specific observations or research findings to form a more general hypothesis.

Finally, the hypothesis should be **positive.** That is, the hypothesis should make a positive statement about the existence of a relationship or effect, rather than a statement that a relationship or effect does not exist. As scientists, we don't set out to show that relationships do not exist or that effects do not occur so our hypotheses should not be worded in a way to suggest that an effect or relationship does not exist.

Designing a Research Study:

1. Define the concept of a variable, distinguish quantitative from categorical variables, and give examples of variables that might be of interest to psychologists:

A variable is a quantity or quality that varies across people or situations. (something that varies)
quantitative variable is a quantity, such as height, that is typically measured by assigning a number to each individual.
A **categorical variable** is a quality, such as chosen major, and is typically measured by assigning a category label to each individual (e.g., Psychology, English, Nursing, etc.)
operational definition—a definition of the variable in terms of precisely how it is to be measured.
Most variables that researchers are interested in studying cannot be directly observed or measured and this poses a problem because empiricism (observation) is at the heart of the scientific method.

2. Explain the difference between a population and a sample:

Population: Researchers in psychology are usually interested in drawing conclusions about some very large group of people. could be all American teenagers, children with autism, professional athletes, or even just human beings—depending on the interests and goals of the researcher.
Sample: But they usually study only a small subset or **sample** of the population. For example, a researcher might measure the talkativeness of a few hundred university students with the intention of drawing conclusions about the talkativeness of men and women in general.
One method of obtaining a sample is **simple random sampling**, in which every member of the population has an equal chance of being selected for the sample. The most common alternative to random sampling is **convenience sampling**, in which the sample consists of individuals who happen to be nearby and willing to participate (such as introductory psychology students).

3. Distinguish between experimental and non-experimental research

Experimental: Researchers who want to test hypotheses about causal relationships between variables (i.e., their goal is to explain) need to use an experimental method. This is because the experimental method is the only method that allows us to determine causal relationships. They manipulate one or more variables while attempting to control extraneous variables, and then they measure how the manipulated variables affect participants' responses. The terms independent variable and dependent variable are used in the context of experimental research. The **independent variable** is the variable the experimenter manipulates (it is the presumed cause) and the **dependent**

variable is the variable the experimenter measures (it is the presumed effect). **Extraneous variables** are any variable other than the dependent variable. **Confounds** are a specific type of extraneous variable that systematically varies along with the variables under investigation and therefore provides an alternative explanation for the results. So confounds are bad, they disrupt our ability to make causal conclusions about the nature of the relationship between variables.

Non-experimental: Researchers who are simply interested in describing characteristics of people, describing relationships between variables, and using those relationships to make predictions can use non-experimental research. Using the non-experimental approach, the researcher simply measures variables as they naturally occur, but they do not manipulate them. It is important to point out that non-experimental does not mean nonscientific. Non-experimental research is scientific in nature. It can be used to fulfill two of the three goals of science (to describe and to predict). However, unlike with experimental research, we cannot make causal conclusions using this method; we cannot say that one variable causes another variable using this method.

4. Distinguish between lab studies, field studies, and field experiments:

A **laboratory study** is a study that is conducted in the laboratory environment. In contrast, a **field study** is a study that is conducted in the real-world, in a natural environment.
Laboratory experiments typically have high **internal validity**. Internal validity refers to the degree to which we can confidently infer a causal relationship between variables. When we conduct an experimental study in a laboratory environment we have very high internal validity because we manipulate one variable while controlling all other outside extraneous variables. In contrast, because field studies are conducted in the real-world, the experimenter typically has less control over the environment and potential extraneous variables, and this decreases internal validity, making it less appropriate to arrive at causal conclusions.

External validity simply refers to the degree to which we can generalize the findings to other circumstances or settings, like the real- world environment. When internal validity is high, external validity tends to be low; and when internal validity is low, external validity tends to be high. So laboratory studies are typically low in external validity, while field studies are typically high in external validity. Since field studies are conducted in the real-world environment it is far more appropriate to generalize the findings to that real-world environment than when the research is conducted in the more artificial sterile laboratory

field experiments where an independent variable is manipulated in a natural setting and extraneous variables are controlled. Depending on their overall quality and the level of control of extraneous variables, such field experiments can have high external and high internal validity.

Analyzing the Data:

1. Distinguish between descriptive and inferential statistics:

Descriptive statistics are used to summarize the data and inferential statistics are used to generalize the results from the sample to the population. In turn, inferential statistics are used to make conclusions about whether or not a theory has been supported, refuted, or requires modification.
Descriptive stats are used to organize and summarize a set of data. examples include percentages, measures of central tendency (mean, median, mode), measures of dispersion (range, standard deviation, variance), and correlation coefficients. Measures of central tendency are used to describe the typical, average and center of a distribution of scores.
Inferential stats allow researchers to draw conclusions about a population based on data from a sample. Inferential statistics are crucial because the effects (i.e., the differences in the means or the correlation coefficient) that researchers find in a study may be due simply to random chance variability or they may be due to a real effect

2. Identify the different kinds of descriptive statistics researchers use to summarize their data:
The **mode** is the most frequently occurring score in a distribution. The **median** is the midpoint of a distribution of scores. The **mean** is the average of a distribution of scores. Measures of dispersion are also considered descriptive statistics. They are used to describe the degree of spread in a set of scores. The **range** is a measure of dispersion that measures the distance between the highest and lowest scores in a distribution. The **standard deviation** is a more sophisticated measure of dispersion that measures the average distance of scores from the mean. The **variance** is just the standard deviation squared. So it also measures the distance of scores from the mean but in a different unit of measure. Mean and Sd's are for more experimental. For non-experimental we use simple percentages for those who did and those who did not. A **correlation coefficient** describes the strength and direction of the relationship between two variables. The values of a correlation coefficient can range from −1.00 (the strongest possible negative relationship) to +1.00 (the strongest possible positive relationship). A value of 0 means there is no relationship between the two variables. Positive correlation coefficients indicate that as the values of one variable increase, so do the values of the other variable

3. Describe the purpose of inferential statistics:
Researchers use inferential statistics to determine whether their effects are statistically significant. A **statistically significant** effect is one that is unlikely due to random chance and therefore likely represents a real effect in the population. More specifically results that have less than a 5% chance of being due to random error are typically considered statistically significant. When an effect is statistically significant it is appropriate to generalize the results from the sample to the population. In contrast, if inferential statistics reveal that there is more than a 5% chance that an effect could be due to chance error alone then the researcher must conclude that their result is not statistically significant.

4. Distinguish between Type 1 and Type 2 errors:
First, researchers can make a **Type I error**, which is a false positive. It is when a researcher concludes that their results are statistically significant (so they say there is an effect in the population) when in reality there is no real effect in the population and the results are just due to chance (they are a fluke). When the threshold is set to 5%, which is the convention, then the researcher has a 5% chance or less of making a Type I error. You might wonder why researchers don't set it even lower to reduce the chances of making a Type I error. The reason is when the chances of making a Type I error are reduced, the chances of making a Type II error are increased. **Type II error** is a missed opportunity. It is when a researcher concludes that their results are not statistically significant when in reality there is a real effect in the population and they just missed detecting it. Once again, these Type II errors are more likely to occur when the threshold is set too low (e.g., set at 1% instead of 5%) and/or when the sample was too small.

Drawing Conclusions and Reporting the Results:

1. Identify the conclusions researchers can make based on the outcome of their studies
If the results are statistically significant and consistent with the hypothesis and the theory that was used to generate the hypothesis, then researchers can conclude that the theory is supported. Not only did the theory make an accurate prediction, but there is now a new phenomenon that the theory accounts for. If a hypothesis is disconfirmed in a systematic empirical study, then the theory has been weakened. It made an inaccurate prediction, and there is now a new phenomenon that it does not account for.

2. Describe why scientists avoid the term "scientific proof.":

The bottom line here is that because statistics are probabilistic in nature and because all research studies have flaws there is no such thing as scientific proof, there is only scientific evidence. First, confirming a hypothesis can strengthen a theory but it can never prove a theory. In fact, scientists tend to avoid the word “prove” when talking and writing about theories. One reason for this avoidance is that the result may reflect a type I error. Another reason for this avoidance is that there may be other plausible theories that imply the same hypothesis, which means that confirming the hypothesis strengthens all those theories equally. A third reason is that it is always possible that another test of the hypothesis or a test of a new hypothesis derived from the theory will be disconfirmed.

3. Explain the different ways that scientists share their findings:

As described in the section on Reviewing the Research Literature in this chapter, results are typically reported in peer-reviewed journal articles and at conferences.

The most prestigious way to report one’s findings is by writing a manuscript and having it published in a peer-reviewed scientific journal. Manuscripts published in psychology journals typically must adhere to the writing style of the American Psychological Association (APA style). You will likely be learning the major elements of this writing style in this course.

Another way to report findings is by writing a book chapter that is published in an edited book. Preferably the editor of the book puts the chapter through peer review but this is not always the case and some scientists are invited by editors to write book chapters.

A fun way to disseminate findings is to give a presentation at a conference. This can either be done as an oral presentation or a poster presentation. Oral presentations involve getting up in front of an audience of fellow scientists and giving a talk that might last anywhere from 10 minutes to 1 hour (depending on the conference) and then fielding questions from the audience. Alternatively, poster presentations involve summarizing the study on a large poster that provides a brief overview of the purpose, methods, results, and discussion.

- Research in psychology can be described by a simple cyclical model. A research question based on the research literature leads to an empirical study, the results of which are published and become part of the research literature.
- The research literature in psychology is all the published research in psychology, consisting primarily of articles in professional journals and scholarly books.
- Early in the research process, it is important to conduct a review of the research literature on your topic to refine your research question, identify appropriate research methods, place your question in the context of other research, and prepare to write an effective research report.
- There are several strategies for finding previous research on your topic. Among the best is using PsycINFO, a computer database that catalogs millions of articles, books, and book chapters in psychology and related fields.
- Research questions expressed in terms of variables and relationships between variables can be suggested by other researchers or generated

by asking a series of more general questions about the behavior or psychological characteristic of interest.

- It is important to evaluate how interesting a research question is before designing a study and collecting data to answer it. Factors that affect interestingness are the extent to which the answer is in doubt, whether it fills a gap in the research literature, and whether it has important practical implications.
- It is also important to evaluate how feasible a research question will be to answer. Factors that affect feasibility include time, money, technical knowledge and skill, and access to special equipment and research participants.
- A theory is broad in nature and explains larger bodies of data. A hypothesis is more specific and makes a prediction about the outcome of a particular study.
- Working with theories is not "icing on the cake." It is a basic ingredient of psychological research.
- Like other scientists, psychologists use the hypothetico-deductive method. They construct theories to explain or interpret phenomena (or work with existing theories), derive hypotheses from their theories, test the hypotheses, and then reevaluate the theories in light of the new results.
- Variables vary across people or situations and may be quantitative (e.g., age) or categorical (e.g., course subject).
- A sample is a small subset of a larger population that is selected to participate in the research study. There are many different ways of sampling participants including convenience sampling and simple random sampling.
- Experimental research involves manipulating an independent variable to observe the effects on a measured dependent variable while non-experimental research involves measuring variables as they naturally occur (i.e., without manipulating anything).
- Research can be conducted in the field or the lab. Laboratory experiments tend to have high internal validity (allowing us to make strong causal conclusions), while field studies often have more external validity (allowing us to generalize to the real world).
- The mean, median, and mode are measures of central tendency used to describe the typical, average, or center scores in a distribution. The range, standard deviation, and variance are measures of how dispersed or spread apart the scores are. Measures of central tendency and dispersion are important descriptive statistics.
- Inferential statistics allow researchers to determine whether their findings are statistically significant, that is, whether they are unlikely to be due to chance alone and therefore are likely to represent a real effect in the population.

- Since statistics are probabilistic in nature we never know if our conclusions are correct. We can make type I errors (concluding an effect is real when it is not) or type II errors (concluding there is no effect when there actually is a real effect in the population).
- Theories can be supported by not proved. Similarly, disconfirming a hypothesis does not necessarily mean that theory has been disproved.
- The final step of the research process involves reporting results at scientific conferences, in journal articles, and/or in books.

Chapter 3:

Moral Foundations of Ethical Research:

1. Describe a simple framework for thinking about ethical psychological research.

The rows of Table 3.1 represent four general moral principles that apply to scientific research: weighing risks against benefits, acting responsibly and with integrity, seeking justice, and respecting people's rights and dignity. (These principles are adapted from those in the American Psychological Association [APA] Ethics Code.) The columns of Table 3.1 represent three groups of people that are affected by scientific research: the research participants, the scientific community, and society more generally. The idea is that a thorough consideration of the ethics of any research project must take into account how each of the four moral principles applies to each of the three groups of people.

Informed Consent:

- researchers obtain participant's agreement to participate in a study after having informed them of what might be expected to affect their decision
- risks of participating are provided to participants (e.g.) fatigue from long testing sessions

Participant Privacy:

- **Confidentiality:** an agreement not to disclose a participant's personal information without their consent or some appropriate legal authorization
- **Anonymity:** participant's name and other personally identifiable information is not collected at all. Instead, names are replaced by random numbers

Ethical Standards:

- Principles are established to:
  - Promote the accuracy of scientific knowledge
  - Protect research participants
  - Protect intellectual property
- Reporting of research finding must be accurate
- Raw data must be retained for at least 15 years after an article is published on those data
- Avoid piecemeal or duplicate publications
- Acknowledge and cite the work of others in research articles
- Conflict of interest must be disclosed:
  - Royalties from a psychological test,
  - Research grants
  - Consulting fees
  - Reviewers of manuscripts should not review the work of colleagues, collaborators, friends, or a recent student

- Reviewers must maintain the confidentiality of a manuscript
    - Discussions about the manuscript are not allowed
    - Lifting information from an unpublished manuscript to benefit one's own (or someone else's) work is prohibited without the author's consent
- Contributions required for publication (authorship) credit:
    - Writing all (or major portions) of the manuscript
    - Making substantial professional contributions
    - (e.g.) formulating the hypotheses, developing the experimental design, taking charge of the statistical analyses, interpreting the results
- Authorship is not warranted for the following contributions:
    - Recruiting participants
    - Designing the apparatus
    - Data collection, data entry
    - Advising about statistical analysis
- order of authorship should be determined early in the process

APA Ethics Code Standard 8: Research and Publication

- review sections on:
    informed consent
    debriefing
    deception in research
    plagiarism

Ethics:

- research conducted at universities, hospitals, and other institutions that receive support from the federal government (e.g. CIHR, SSHRC, NSERC) must be reviewed by an institutional review board (IRB)- a committee at the institution that reviews research protocols, The goal of this process to be sure the research conforms to ethical standards

Chapter 4:

Writing Abstracts: Guidelines

1. begin an abstract by describing the problem under investigation in one sentence
2. highlights of the methodology and results should be summarized
3. if a study is strongly linked to a theory, name the theory in the abstract
4. conclude the abstract by mentioning implications and/or suggestions for future research

(e.g.) We used data from the Betula Study to examine associations between total cholesterol, triglycerides, and apolipoprotein E on 10-year changes in cognitive performance. Tests assessing episodic memory (recall and recognition), semantic memory (knowledge and fluency), and visuospatial ability (block design) were administered to 524 nondemented adults (initial age of 55–80 years); multilevel modeling was applied to the data. Higher triglyceride levels were associated with a decline in verbal knowledge. Lipid levels moderated the influence of apolipoprotein E on episodic memory, such

that among e4 allele carriers, decline in recognition was noted for individuals with higher cholesterol levels. Cholesterol and triglyceride levels are pharmacologically modifiable risk factors that account for variation in normal cognitive aging.

Psychological Measurement:

- measurement is the assignment of scores to individuals so that the scores represent some characteristic(s) of the individuals
- psychological measurement can be achieved in a wide variety of ways, including self-report (e.g. personality questionnaire), behavioural (e.g. hours of exercise per week) and physiological (e.g. blood pressure) measures
- **psychological constructs:** these are variables that cannot be directly observed
    - personality traits: conscientiousness, neuroticism
    - emotional states: happiness, anxiety
    - abilities: cognition, athleticism, working memory capacity

Reliability:

- reliability refers to the consistency of a measure/instrument
- psychologists consider three types of consistency:
    - a. over time (test-retest reliability)
    - b. across items of a questionnaire (internal consistency) and
    - c. across researchers (inter-rater reliability)

Test-retest Reliability:

- assessing test-retest requires using the measure on a group of people at one point in time, and then administering it again on the same group of people at a later point in time
- afterwards, the test-retest correlation between the two sets of the scores is computed
- a test-retest correlation greater than 0.80 is indictive of good reliability.

Internal Consistency:

- internal consistency: consistency of people's responses across the items on a multiple-item measure/instrument
- (e.g. if a scale (e.g. extroversion) has 5 items then internal consistency would be demonstrated by similar responses on all items of that scale.
- If people's responses to the different items of the same scale (e.g. extroversion) are not correlated with each other, then we could no longer say that they are all measuring the same underlying psychological construct

How to Assess Internal Consistency:

- (1) Split-half correlation:
    - The items of a scale are split into two sets, such as the first and second halves of the items or the even- and odd-numbered items

    - A score is then computed for each set of items, and the relationship between the two sets of scores is examined
    - A correlation greater than +0.80 is considered a good internal consistency
- (2) Cronbach's a (alpha)
    - Cronbach's alpha is the average of all possible split-half correlations for a set of items
    - A correlation greater than +0.80 is considered good internal consistency

Inter-rater Reliability:

- this type of reliability refers to the extent to which different observers are consistent in their judgments
- for example; if you were interested in measuring uni. students' social skills, you could create video recordings of their interactions with new people, Then you could have two observers ('raters') watch the videos and rate each student's level social skills

Measurement Validity:

- **validity:** is the extent to which the scores from a measure/instrument represent the variable (e.g. extraversion, self-efficacy) they are intended to.

Types of Validity:

- **Face Validity:**
    - Does the test "look like" it is measuring the psychological construct of interest
    - This is the weakest form of validity
    - Typically based on people's intuition which can be biased
- **Content Validity:**
    - Does the test/instrument cover the breadth of the content domain?
    - If a researcher conceptually defines test anxiety as involving both sympathetic nervous system activation (leading to the nervous feelings) and negative thoughts, then the test should include items containing aspects of nervous feelings and negative thoughts
- **Criterion Validity:**
    - There are 3 forms of criterion validity. For example, if a researcher is interested in examining "physical risk taking" then this domain should be related to their behaviour (participation) in extreme sports (e.g. rock climbing) (i.e. "the criterion")
    - (1) concurrent validity: when the criterion is measured at the same time as the construct
    - (2) predictive validity: when the criterion is measured in the future (relative to the construct)
    - (3) convergent validity: how closely the new scale is related to other measures of the same construct
- **Discriminant Validity:**
    - It is the extent to which scores on a measure are not correlated with measures of variables that are conceptually distinct
    - (e.g.) grip strength should not be highly correlated with math skills

- Measurement is the assignment of scores to individuals so that the scores represent some characteristic of the individuals. Psychological measurement can be achieved in a wide variety of ways, including self- report, behavioral, and physiological measures.
- Psychological constructs such as intelligence, self-esteem, and depression are variables that are not directly observable because they represent behavioral tendencies or complex patterns of behavior and internal processes. An important goal of scientific research is to conceptually define psychological constructs in ways that accurately describe them.
- For any conceptual definition of a construct, there will be many different operational definitions or ways of measuring it. The use of multiple operational definitions, or converging operations, is a common strategy in psychological research.
- Variables can be measured at four different levels—nominal, ordinal, interval, and ratio—that communicate increasing amounts of quantitative information. The level of measurement affects the kinds of statistics you can use and conclusions you can draw from your data.
- Psychological researchers do not simply assume that their measures work. Instead, they conduct research to show that they work. If they cannot show that they work, they stop using them.
- There are two distinct criteria by which researchers evaluate their measures: reliability and validity. Reliability is consistency across time (test-retest reliability), across items (internal consistency), and across researchers (interrater reliability). Validity is the extent to which the scores actually represent the variable they are intended to.
- Validity is a judgment based on various types of evidence. The relevant evidence includes the measure's reliability, whether it covers the construct of interest, and whether the scores it produces are correlated with other variables they are expected to be correlated with and not correlated with variables that are conceptually distinct.
- Good measurement begins with a clear conceptual definition of the construct to be measured. This is accomplished both by clear and detailed thinking and by a review of the research literature.
- You often have the option of using an existing measure or creating a new measure. You should make this decision based on the availability of existing measures and their adequacy for your purposes.
- Several simple steps can be taken in creating new measures and in implementing both existing and new measures that can help maximize reliability and validity.
- Once you have used a measure, you should revaluate its reliability and validity based on your new data. Remember that the assessment of reliability and validity is an ongoing process.

Manuscript Structure:

Introduction Section:

- Length of the Introduction:
    - Three pages
    - Double-spaced

- Purpose of a literature review search:
    - To summarize the results of previous research to form a foundation on which to build your own research
    - To collect ideas on how to gather data
    - To investigate methods of data analysis
    - To study instrumentation that has been used
    - To assess the success of the various research designs of the studies already undertaken
- Introduction Section: Guidelines
    - (1) Introduce the problem under study
        - Example: the role of lifestyle engagement on executive functions in older adults
        - To understand how specific lifestyle activities differentially affects executive functions in older adults
        - To understand whether having an engaged lifestyle mediates the effects of cognitive status on executive function
    - (2) Present the hypothetical constructs as they are used in past research:
        - Define concepts that are consistent with the field (use citations)
    - (3) Discuss theories that are relevant to the research:
    - (4) Literature Review:
        - Emphasize the finding of the most pertinent previous research
    - (5) mention gaps in the literature
    - (6) mention theoretical implications
    - (7) do not use direct quotations, rather paraphrase
    - (8) do not include the author's affiliation or journal name in the introduction
    - (9) flows from the general to the specific
    - (10) state your study aims and hypotheses
- Writing Style: (APA manual)
    - No headings are used for the introduction
    - Maintain continuity in your presentation of concepts and names of your participants groups
    - Spell out words the first time they appear, then use abbreviation. Be sure it is defined in first appearance.
    - Double-spaced, 12-point font
    - Be concise, eliminate redundancy
        - (e.g.) "three different groups were used to..." ; "..it is absolutely essential that."
    - Tone: present contrasting views in a professional manner.
        - Example: "Johnson (2006) did not address…" is acceptable, whereas "Johnson (2006) completely overlooked…" is not acceptable
    - Avoid writing only short or long sentences
    - Avoid colloquial expressions and approximations of quantity
        - (e.g.) "quite a large part of the..."
    - Pronouns: don't make the reader search for the meaning
        - (e.g.) "this shows that…" this what?
    - Racial and ethnic groups are proper nouns and should be capitalized

- Guidelines for reducing bias:
  - To describe age groups, specify the exact age range (e.g. ages 50-69 years), instead of a broad category (e.g. over 50 years)
- Be sensitive to labels:
  - E.g. use “older adults” not “the elderly
  - E.g. use “people diagnosed with depression” not “the depressives”
  - E.g. use “dementia group” not “the demented”
- Gender:
  - Don’t use the generic “he”
  - E.g., “when an individual conduct this kind of self-appraisal, he is a much stronger person” Change to “When an individual conduct this kind of self-appraisal, that person is much stronger.”
- Grammar:
  - Use active voice
  - E.g., “we conducted the survey in a controlled setting” is preferred over “The survey was conducted in a controlled setting”
  - Use the past tense when discussing another researcher’s study
    - E.g.,
    - (Correct): “Fox (2005) presented similar results.”
    - (Incorrect): “Fox (2005) presents similar results.”
- Preferred spelling:
  - Appendix / appendices
  - Datum / data
- Hyphenation: (see examples Table 4.1, pp. 98-99)
- Grammar:
  - Use italics to identify the anchors of a scale
  - E.g., we ranked the items on a scale ranging from 1 (*all of the time)* to 5 (*never*)
- Abbreviations:
  - See Table 4.4, p. 109 and table 4.5, p. 119-122 for specific examples
  - cf.= compare; e.g., = for example; vs.= versus; , etc. =, and so forth
  - do not abbreviate the following units of time: day, week, month, year
  - abbreviate hour (hr), minute (min), millisecond (ms), second (s)
- Capitalize exact titles of published and unpublished tests, but not generic titles:
  - (e.g.) Stroop Colour-Word Interference Test
  - (e.g.) a vocabulary tests
- Numbers:
  - Use numerals to express
    - Numbers 10 and above (e.g., 16 words)
    - Numbers in the abstract or in graphical displays
    - Numbers that immediately precede a unit of measurement (e.g., a 10-mg dose)
    - Numbers that represent precentages (e.g., less than 40% of the sample)
    - Numbers that represent time, dates, ages, scores, points on a scale
      - E.g., 40-year olds

        - E.g., the x group scored 5 on a 7-point scale
    - Use words to express
        - Any number that begins a sentence, title, or text heading…
        - E.g., forty-five percent of the sample showed

Method Section: APA Guidelines (a main heading; centered in bold)

Participants: (a subheading; flush left in bold)

- Describe the participants

- Provide the following information:
    - Number of participants (including # women, # men)
    - Age of sample (mean, SD)
    - Level of education (mean, SD)
    - Specify relevant eligibility and exclusion criteria
    - Ethnic and/or racial group (give the N for each group)
    - Specify how participants were recruited
    - Specify if IRB approval was received
    - A total # participants (# men and # women) will be recruited from (insert location). The participants ranged from # to # years (M=#; SD=#) The mean level of education was # years (SD=#).
      The participants will be recruited from…
      The study will be received by the University Ethics Review Board.

Method: (a subheading; flush left in bold)

- Provide information on all tasks used in your study
- Provide the name of the testing instrument, cite the last name(s) of the author(s), and specify what construct it measures
- If relevant, indicate the # of items in the questionnaire/test
- Mention the outcome variable to be used in the analyses:
    - E.g., correct answers, error scores, total score, average scale score

- Example; ***Verbal knowledge***. —We used a revised 30-item multiple choice synonym test (Dureman, 1960) as an index of semantic knowledge. The task involved selecting the synonym of each target word from among five alternatives in a 7-min time frame. The performance score was the number of correctly identified synonyms.

- Example: Attitude toward school was measured with a nine-item questionnaire developed for use in this study.

- Improved example: Attitude toward school was measured with a questionnaire developed for use in this study. It contains nine statements. The first three measure attitudes toward academic subjects. The next three measure

attitudes administrators. The last three measure attitudes toward the environment around them in school. Participants were asked to rate each statement on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). The complete questionnaire is shown in Appendix A.

Procedure:

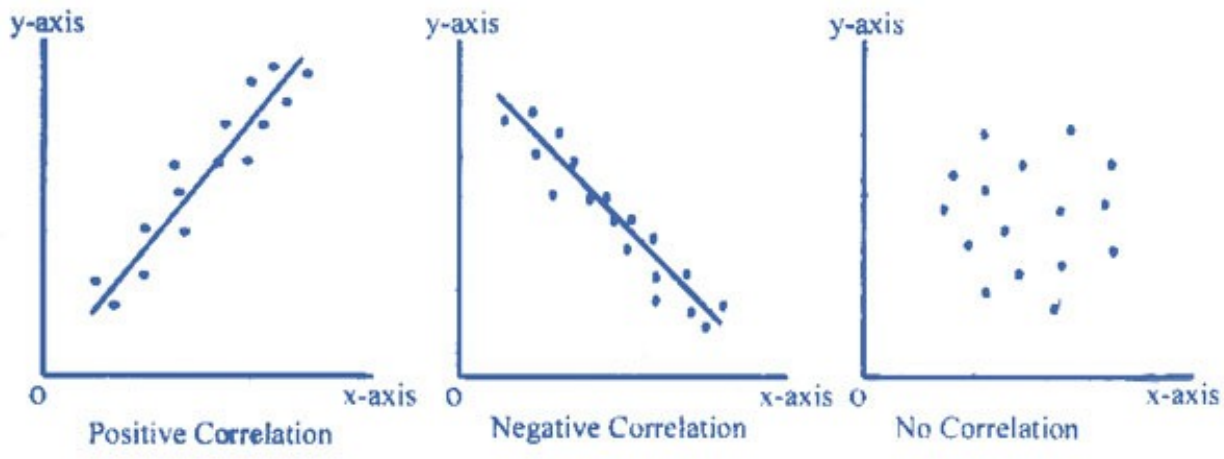
- Mention the duration of the testing session
- Mention if payment was made to participants
- In the last (stand-alone) paragraph of the Method section, add as sentence on the alpha level used to specify statistically significant
- Alpha levels of $p < 0.50$ were specified as the threshold to indicate statistical intelligence

This week for presentations talks to group and select a topic for the presentation. Select 3 research articles that relate to your topic. There must be literature support. Not required or expected to do a complete literature search.
Should be correlational study, not observational or qualitative research
Must not be a single case study

Peer-reviewed vs. Non-Peer Reviewed Publications:
-Non-peer reviewed: scientific American, Washington Post, NY Times, Reader's Digest, National Geographic, Wikipedia
-**Peer reviewed:** Journal of Experimental Psychology, Journal of Personality and Social Psychology, Psychology and Aging, Journal of Cognitive Psychology, Neuropsychology

Correlational Research:

- The independent variable is not manipulated. Rather we look at the relations between 2 variables
- (e.g.) Age x Sleep Quality
- (e.g.) Cardiovascular health x Happiness
- Values range from -1 to +1



Independent Variables:

- Example 1: student achievement (GPA)

Manuscript Structure:

Results Section:

- Outline:
  - Understand the structure of the results section
  - Understand how to present your results
- Structure:
  - Organize the results section around the research hypothesis stated in the introduction
  - Mention expected results that support your expectations
  - Mention expected results that do not support your expectations
  - Statistical symbols should be italicized
  - E.g., "*p*" not "p"
  - Do not interpret the results in this section
  - Do not include individual scores or raw data
  - Do not discuss the implications of the results in this section
- APA Guidelines:
  - Do not teach the reader statistics
  - Do not interpret your results, only report them
  - Be sure to make reference to any tables and figures that you present in your results section
  - Be sure to include all the data to be discussed in your discussion section

References Section:

- Presented on a separate (NEW) page
- Heading is centered at the top of the page in upper- and lower-case letter
- Use a hanging indent format (i.e., the first line of each new reference is flush left, and the other lines are indented)

Survey Research:

Data Collection Methods:

- you must get permission from the author and if it's not published
- guidelines for developing your own questionnaire:
    - establish which variables you're interested
    - the language must be clear and unambiguous
    - decide how you will score the data (e.g., Likert? Checklist?)
- using the internet for primary research:
    - web-based experiments using printed material, interactive tasks, and games
    - send a request for participation prior to sending the survey itself
    - maintain participant anonymity

survey:

- summary of opinions, attitudes or behaviour
    - e.g., polls about public opinion, smoking behaviour, factual information (e.g., income)
- can be done via telephone, mail, online, out in public
- How to write good survey questions:
    - Use correct spelling, punctuation, grammar
    - Use specific questions:
        - "Did you read a newspaper yesterday? Is better than asking "Did you read a newspaper?"
    - Avoid questions that do not have a single answer.
        - E.g., "Do you like to walk and ride to work?"
    - Avoid negative phrasing
        - E.g., "Should the school not be improved?"
- Response Format:
    - Open-ended (respondent formulates own answer)
        - E.g., What leisure activities do you participate in?
    - Closed ended (select a response from a list)
        - E.g., Do you participate in leisure activities? Yes _ No _
- Dichotomous, continuous, Likert Scale?

Data Collection Methods for Your Projects

- Surveys
- Questionnaires
- Lab Experiments
- Not a naturalistic "observational study"
- Should be quantitative, not qualitative

Online Survey Tools:

- Qualtrics—https://www.qualtrics.com/

- SurveyMonkey—https://surveymonkey.com
- PsyToolkit—https://www.psytoolkit.org/
- PsycData—https://www.psychdata.com/

Presenting statistics on writing:

- Example: The correlation between reaction time performance and exercise was significant
  (r = -.55***, p < .001) indicating that reaction time is faster (i.e., shorter latencies) as the number of hours spent exercising per week increases.

Correlations

		Reaction Time (ms)	Exercise per week (hours)
Reaction Time (ms)	Pearson Correlation	1	-.552**
	Sig. (2-tailed)		.000
	N	40	40
Exercise per week (hours)	Pearson Correlation	-.552**	1
	Sig. (2-tailed)	.000	
	N	40	40

**. Correlation is significant at the 0.01 level (2-tailed).