Slide 1


research
knowledge
fact
society
model
interpretation
support
structure
work
idea
practical
practice
expansion
information
Research: Part 1
Host: Dr. Bryan Hawley

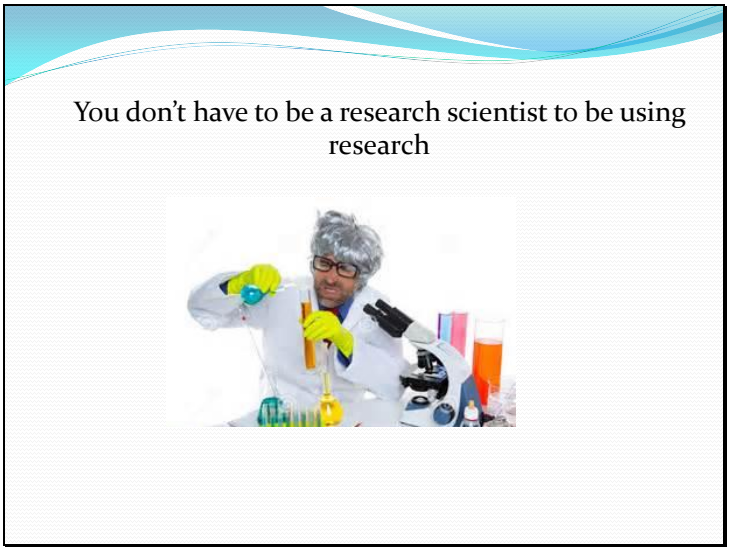
Slide 2

Housekeeping

- Notes and recording will be sent out tomorrow
- Certificates will be emailed 1 week out
- Questions
- All presented tonight is based off OUR OWN CLINIC system
- Email (info@drbryanhawley.com)
- Lets begin

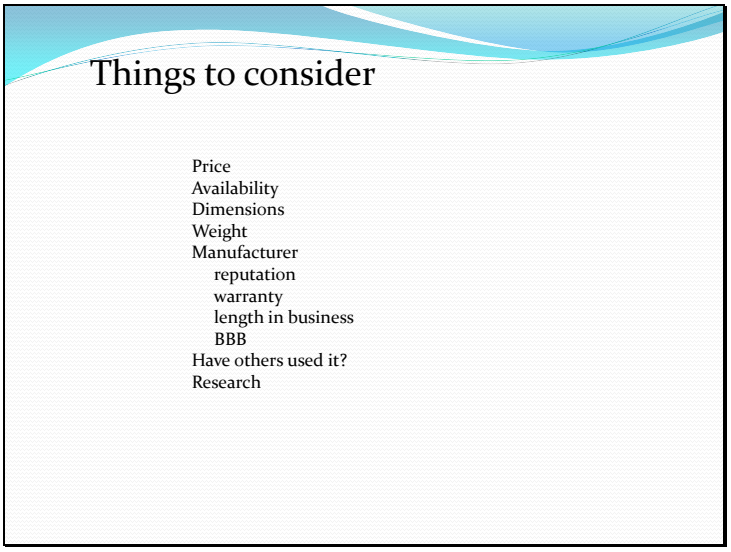
Slide 3

Slide 4

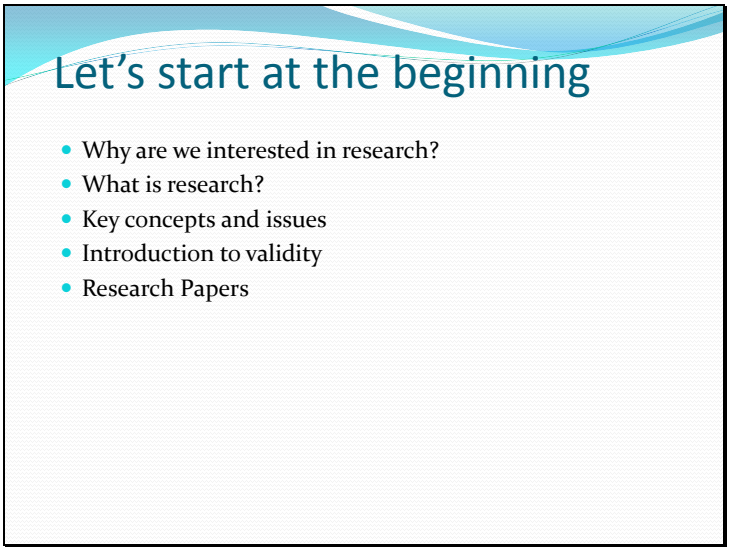

You don't have to be a research scientist to be using research

Slide 5

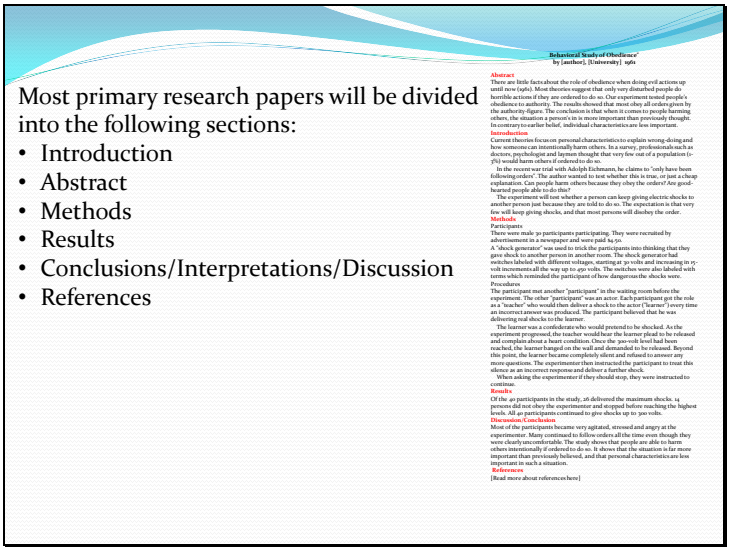
Slide 6


Things to consider
Price
Availability
Dimensions
Weight
Manufacturer
reputation
warranty
length in business
BBB
Have others used it?
Research

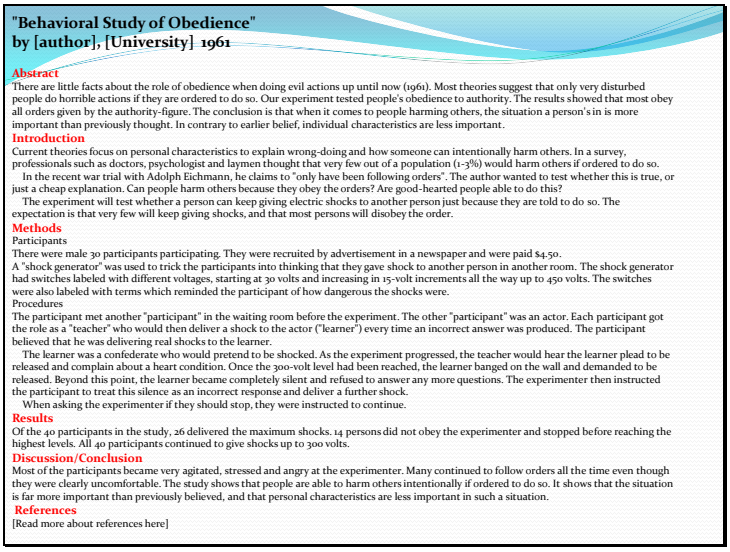
Slide 7


Let's start at the beginning
Why are we interested in research?
What is research?
Key concepts and issues
Introduction to validity
Research Papers

Slide 8


Most primary research papers will be divided into the following sections:
• Introduction
• Abstract
• Methods
• Results
• Conclusions/Interpretations/Discussion
• References
Behavioral Study of Obedience'
by [author], [University] 1961
Abstract
There are little facts about the role of obedience when doing evil actions up until now (1961). Most theories suggest that only very disturbed people do horrible actions if they are ordered to do so. Our experiment tested people's obedience to authority. The results showed that most obey all orders given by the authority figure. The conclusion is that when it comes to people harming others, the situation a person's in is more important than previously thought. In contrary to earlier belief, individual characteristics are less important.
Introduction
Current theories focus on personal characteristics to explain wrong-doing and how someone can intentionally harm others. In a survey, professionals such as doctors, psychologist and laymen thought that very few out of a population (1-3%) would harm others if ordered to do so.
In the recent war trial with Adolph Eichmann, he claims to "only have been following orders". The author wanted to test whether this is true, or just a cheap explanation. Can people harm others because they obey the orders? Are good-hearted people able to do this?
The experiment will test whether a person can keep giving electric shocks to another person just because they are told to do so. The expectation is that very few will keep giving shocks, and that most persons will disobey the order.
Methods
Participants
There were male 30 participants participating. They were recruited by advertisement in a newspaper and were paid $4.50.
A "shock generator" was used to trick the participants into thinking that they gave shock to another person in another room. The shock generator had switches labeled with different voltages, starting at 30 volts and increasing in 15-volt increments all the way up to 450 volts. The switches were also labeled with terms which reminded the participant of how dangerous the shocks were.
Procedures
The participant met another "participant" in the waiting room before the experiment. The other "participant" was an actor. Each participant got the role as a "teacher" who would then deliver a shock to the actor ("learner") every time an incorrect answer was produced. The participant believed that he was delivering real shocks to the learner.
The learner was a confederate who would pretend to be shocked. As the experiment progressed, the teacher would hear the learner plead to be released and complain about a heart condition. Once the 300-volt level had been reached, the learner banged on the wall and demanded to be released. Beyond this point, the learner became completely silent and refused to answer any more questions. The experimenter then instructed the participant to treat this silence as an incorrect response and deliver a further shock.
When asking the experimenter if they should stop, they were instructed to continue.
Results
Of the 40 participants in the study, 26 delivered the maximum shocks. 14 persons did not obey the experimentor and stopped before reaching the highest levels. All 40 participants continued to give shocks up to 300 volts.
Discussion/Conclusion
Most of the participants became very agitated, stressed and angry at the experimenter. Many continued to follow orders all the time even though they were clearly uncomfortable. The study shows that people are able to harm others intentionally if ordered to do so. It shows that the situation is far more important than previously believed, and that personal characteristics are less important in such a situation.
References
[Read more about references here]

Slide 9



"Behavioral Study of Obedience"
by [author], [University] 1961

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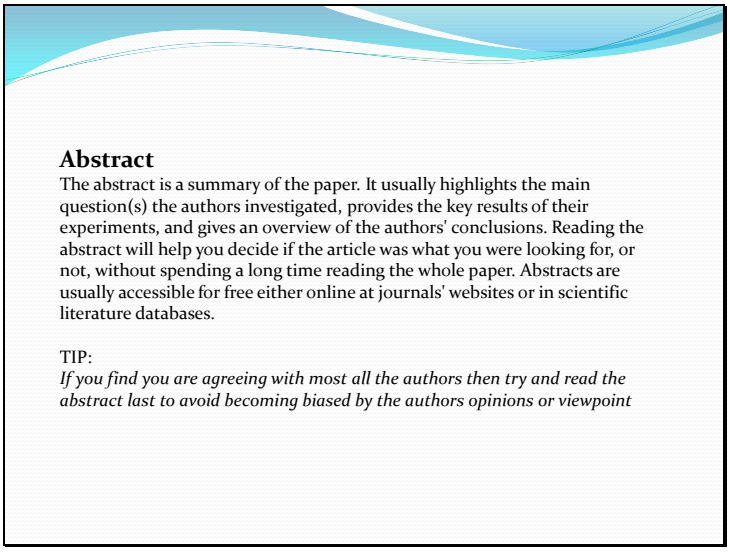
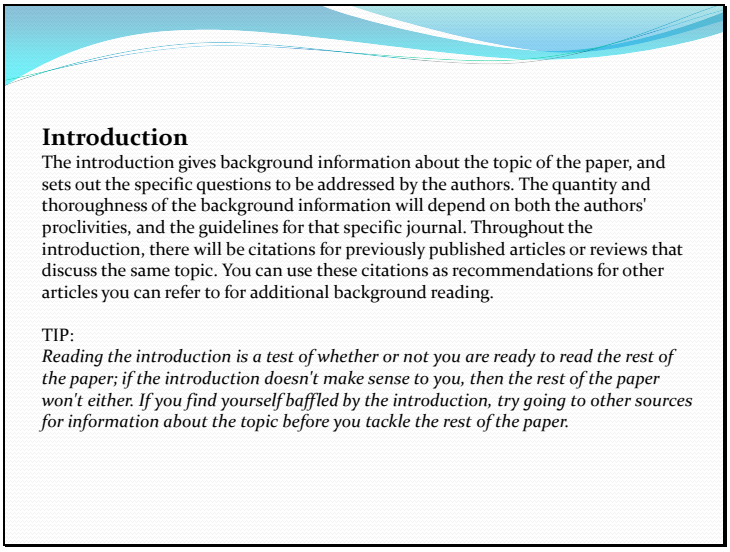
Slide 10


Abstract
The abstract is a summary of the paper. It usually highlights the main question(s) the authors investigated, provides the key results of their experiments, and gives an overview of the authors' conclusions. Reading the abstract will help you decide if the article was what you were looking for, or not, without spending a long time reading the whole paper. Abstracts are usually accessible for free either online at journals' websites or in scientific literature databases.
TIP:
If you find you are agreeing with most all the authors then try and read the abstract last to avoid becoming biased by the authors opinions or viewpoint

Slide 11


Introduction
The introduction gives background information about the topic of the paper, and sets out the specific questions to be addressed by the authors. The quantity and thoroughness of the background information will depend on both the authors' proclivities, and the guidelines for that specific journal. Throughout the introduction, there will be citations for previously published articles or reviews that discuss the same topic. You can use these citations as recommendations for other articles you can refer to for additional background reading.
TIP:
Reading the introduction is a test of whether or not you are ready to read the rest of the paper; if the introduction doesn't make sense to you, then the rest of the paper won't either. If you find yourself baffled by the introduction, try going to other sources for information about the topic before you tackle the rest of the paper.

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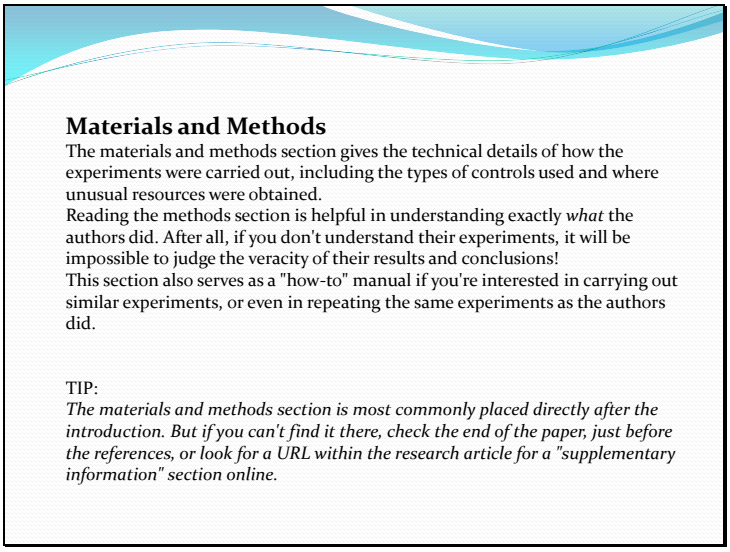
Materials and Methods
The materials and methods section gives the technical details of how the experiments were carried out, including the types of controls used and where unusual resources were obtained.
Reading the methods section is helpful in understanding exactly what the authors did. After all, if you don't understand their experiments, it will be impossible to judge the veracity of their results and conclusions!
This section also serves as a "how-to" manual if you're interested in carrying out similar experiments, or even in repeating the same experiments as the authors did.
TIP:
The materials and methods section is most commonly placed directly after the introduction. But if you can't find it there, check the end of the paper, just before the references, or look for a URL within the research article for a "supplementary information" section online.

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Results

The results section is the real meat of a primary research article; it contains all the data from the experiments. The figures contain the majority of the data. The accompanying text contains verbal descriptions of the pieces of data the authors feel were most critical. The writing may also put the new data in the context of previous findings. However, often due to space constraints, authors usually do not write text for all their findings and instead, rely on the figures to impart the bulk of the information. So to get the most out of the results section, make sure to spend ample time thoroughly looking at all the graphs, pictures, and tables, and reading their accompanying legends!

Three types of information can be extracted from the results section: **data** from the experiments, **ideas** about how to improve the methods, and an **understanding** of how to represent similar data.

TIP:

This is the section of the paper you refer to if you need to know exactly what the researchers found out, particularly if you need data to compare with your own findings, or to use to build your own hypothesis.

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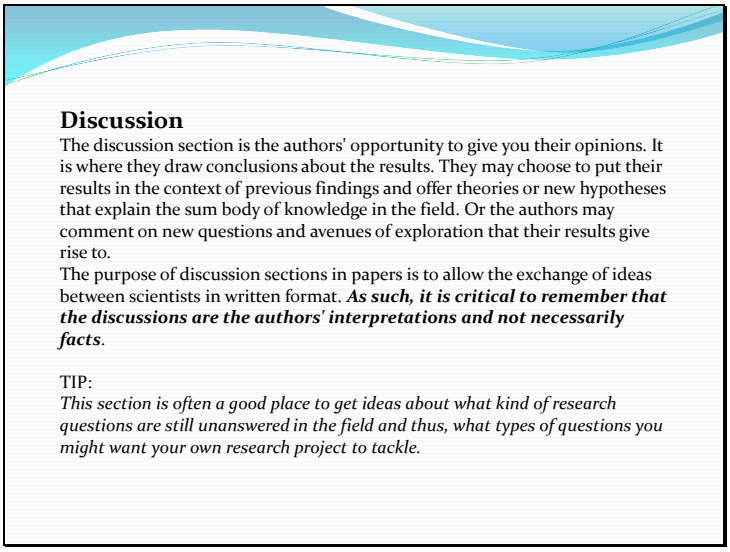
Discussion
The discussion section is the authors' opportunity to give you their opinions. It is where they draw conclusions about the results. They may choose to put their results in the context of previous findings and offer theories or new hypotheses that explain the sum body of knowledge in the field. Or the authors may comment on new questions and avenues of exploration that their results give rise to.
The purpose of discussion sections in papers is to allow the exchange of ideas between scientists in written format. As such, it is critical to remember that the discussions are the authors' interpretations and not necessarily facts.
TIP:
This section is often a good place to get ideas about what kind of research questions are still unanswered in the field and thus, what types of questions you might want your own research project to tackle.

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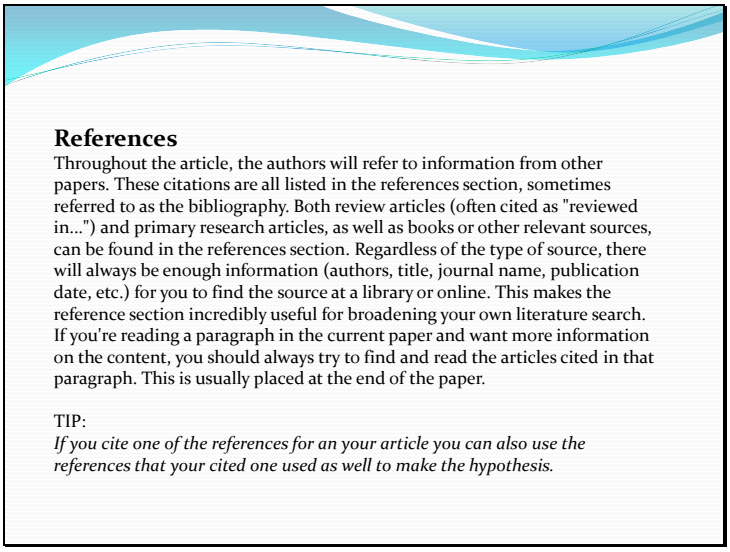
References
Throughout the article, the authors will refer to information from other papers. These citations are all listed in the references section, sometimes referred to as the bibliography. Both review articles (often cited as "reviewed in...") and primary research articles, as well as books or other relevant sources, can be found in the references section. Regardless of the type of source, there will always be enough information (authors, title, journal name, publication date, etc.) for you to find the source at a library or online. This makes the reference section incredibly useful for broadening your own literature search. If you're reading a paragraph in the current paper and want more information on the content, you should always try to find and read the articles cited in that paragraph. This is usually placed at the end of the paper.
TIP:
If you cite one of the references for an your article you can also use the references that your cited one used as well to make the hypothesis.

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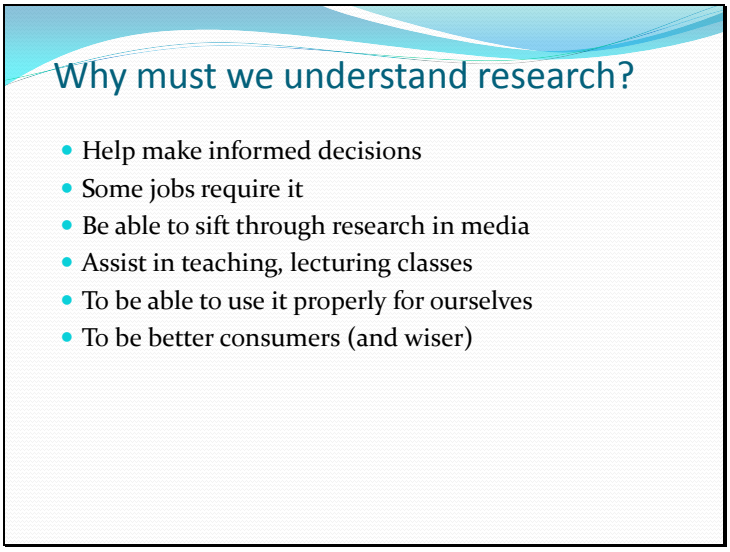
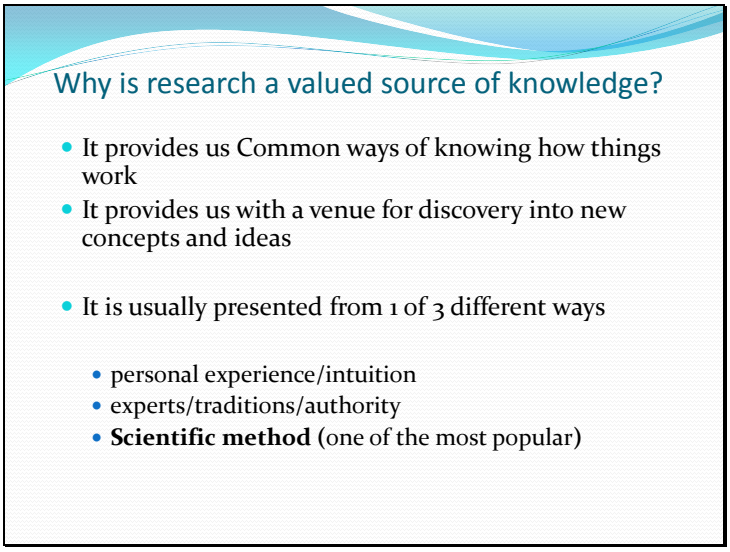

Why must we understand research?
Help make informed decisions
Some jobs require it
Be able to sift through research in media
Assist in teaching, lecturing classes
To be able to use it properly for ourselves
To be better consumers (and wiser)

Slide 17


Why is research a valued source of knowledge?
It provides us Common ways of knowing how things work
It provides us with a venue for discovery into new concepts and ideas
It is usually presented from 1 of 3 different ways
personal experience/intuition
experts/traditions/authority
Scientific method (one of the most popular)

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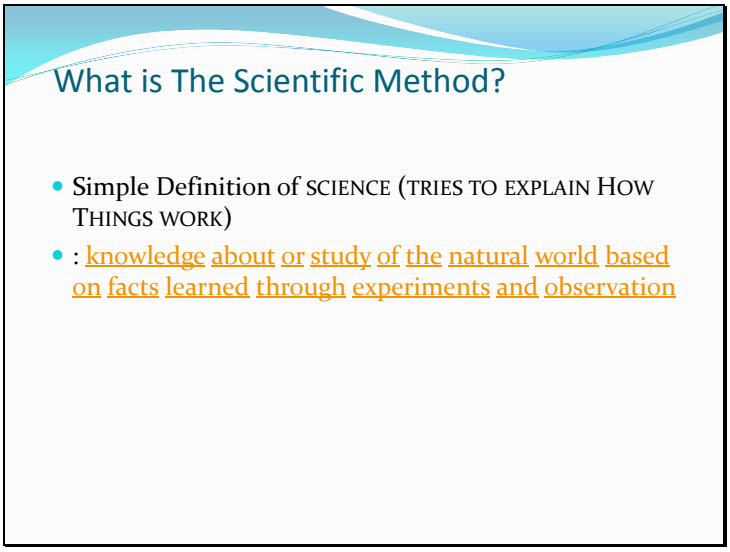
What is The Scientific Method?
Simple Definition of SCIENCE (TRIES TO EXPLAIN HOW THINGS WORK)
: knowledge about or study of the natural world based on facts learned through experiments and observation

Slide 19

What is Science, the Scientific Method, and Research?

- Scientific Method…
  - involves the principles and processes regarded as characteristic of or necessary for scientific investigation
  - process or approach to generating valid and trustworthy knowledge based off current science.

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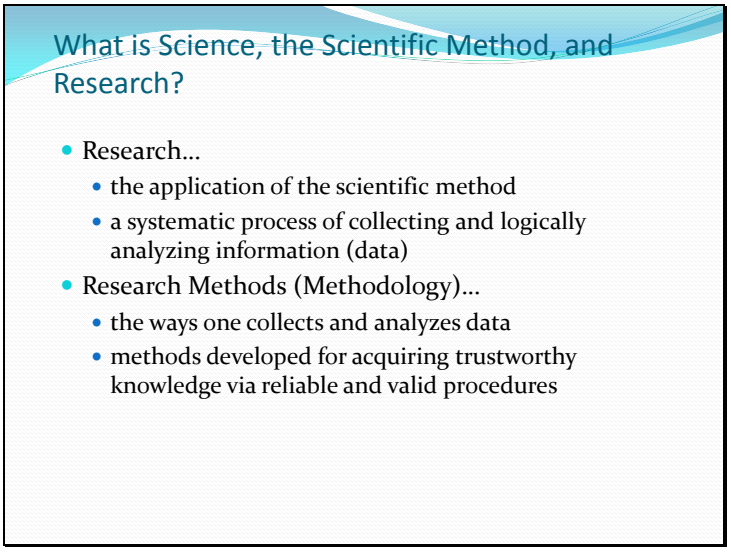
What is Science, the Scientific Method, and Research?
Research…
the application of the scientific method
a systematic process of collecting and logically analyzing information (data)
Research Methods (Methodology)…
the ways one collects and analyzes data
methods developed for acquiring trustworthy knowledge via reliable and valid procedures

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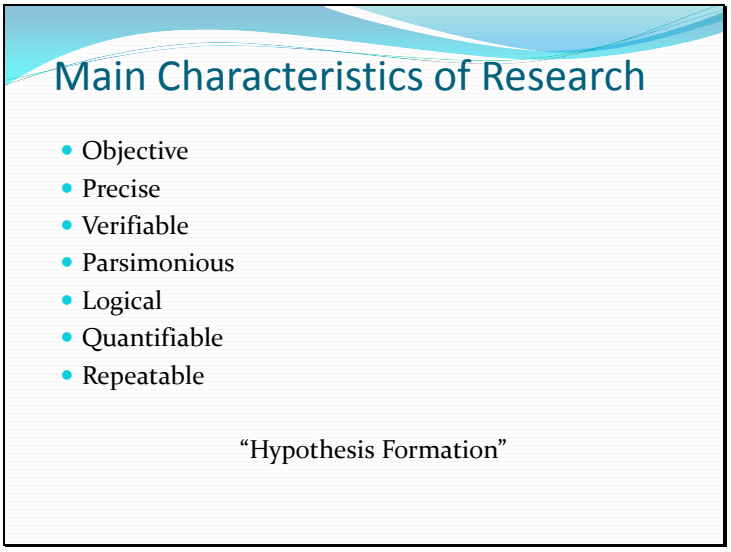
Main Characteristics of Research
Objective
Precise
Verifiable
Parsimonious
Logical
Quantifiable
Repeatable
"Hypothesis Formation"

Slide 22

Hypothesis Formation

A scientific hypothesis is the initial building block in the **scientific method.** Many describe it as an "educated guess," based on prior knowledge and observation. While this is true, the definition can be expanded. A hypothesis also includes an explanation of why the guess may be correct.

S.W.A.G.
"Scientific Wild Ass Guess"

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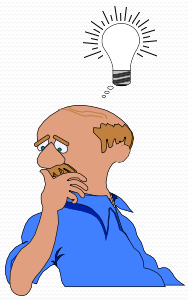
Hypothesis Formulation of a Study

--- **Formulate a hypothesis**

--- **Frame the hypothesis in a format that is testable**

--- **Test the hypothesis**



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Hypothesis Formulation

- Observations from:
  - Literature (review PubMed on topic area)
  - Natural experiments (e.g. migrant studies)
  - Multi-national comparisons
  - Descriptive studies (assessment of person, place, and time characteristics)
  - Creativity, imagination

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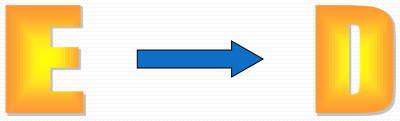
Here is an example of

Descriptive studies (assessment of person, place, and time characteristics)

Hypothesis: "Exposure to disease causes disease"
Is there an association between them?



Exposure

Disease / Health Outcome

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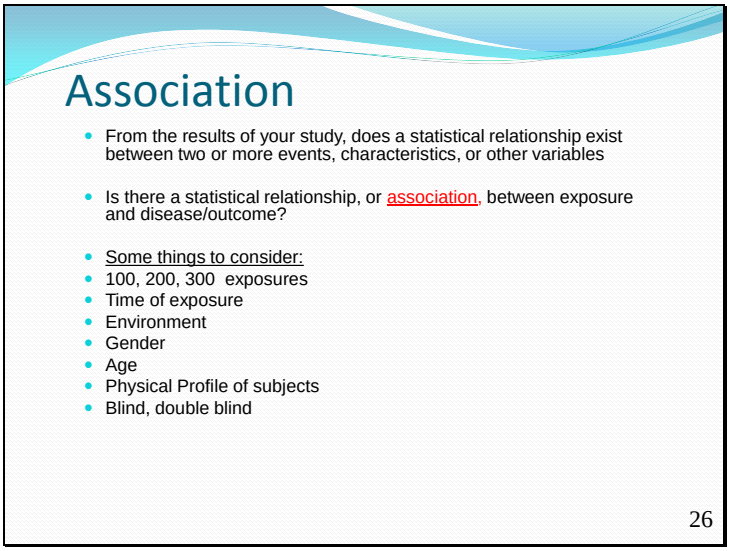
Association
From the results of your study, does a statistical relationship exist between two or more events, characteristics, or other variables
Is there a statistical relationship, or association, between exposure and disease/outcome?
Some things to consider:
100, 200, 300 exposures
Time of exposure
Environment
Gender
Age
Physical Profile of subjects
Blind, double blind
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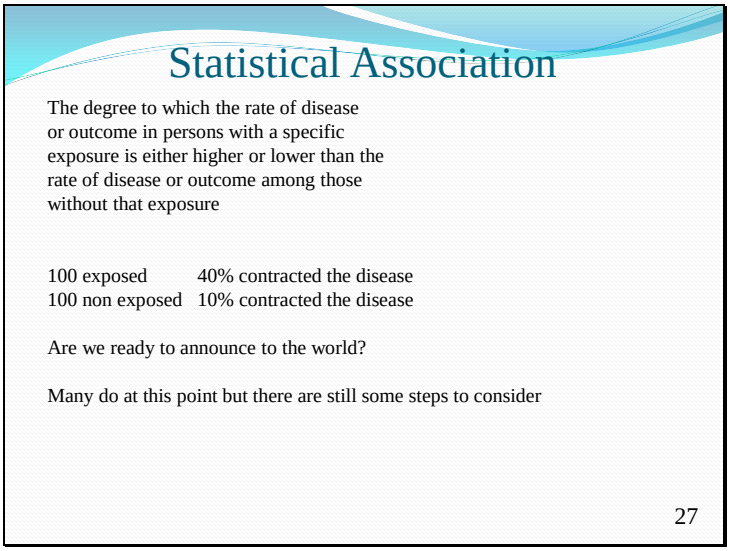
Statistical Association
The degree to which the rate of disease or outcome in persons with a specific exposure is either higher or lower than the rate of disease or outcome among those without that exposure
100 exposed 40% contracted the disease
100 non exposed 10% contracted the disease
Are we ready to announce to the world?
Many do at this point but there are still some steps to consider
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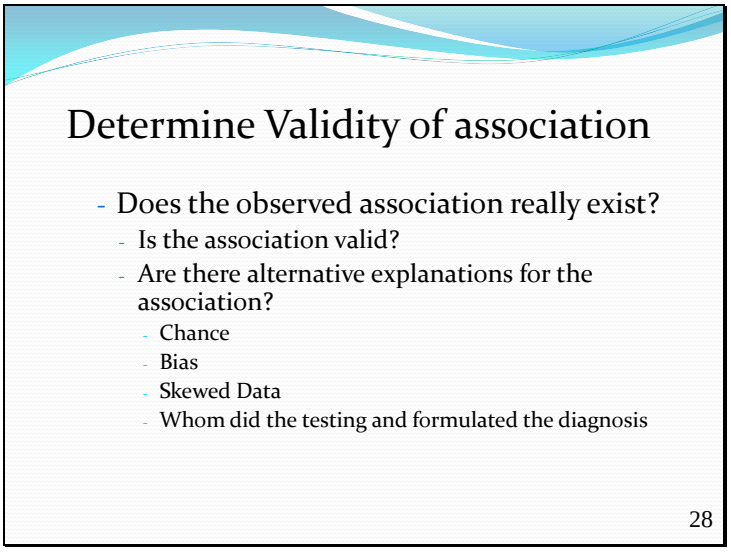
Determine Validity of association
- Does the observed association really exist?
  - Is the association valid?
  - Are there alternative explanations for the association?
    - Chance
    - Bias
    - Skewed Data
    - Whom did the testing and formulated the diagnosis
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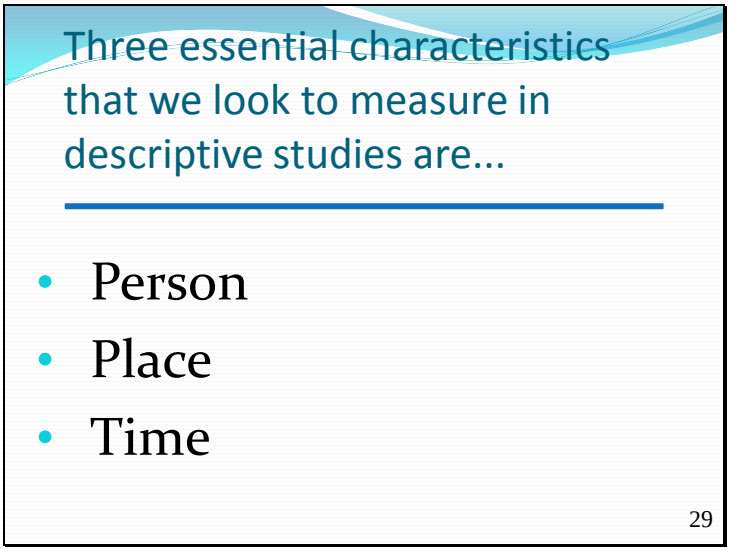
Three essential characteristics that we look to measure in descriptive studies are...
Person
Place
Time
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Person

Since disease not does occur at random:

What kinds of people tend to develop a particular disease?
Who tends to be spared?
What's unusual about those people?

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Person Factors

- Age, gender, race, ethnicity
- Genetic predisposition
- Concurrent disease
- Diet, exercise, smoking
- Risk taking behavior, education,
- occupation

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Place (Macro)

Again, Since disease not does occur at random:

Where is the disease especially common?
Or opposite where is it rare?
What is different about those places?

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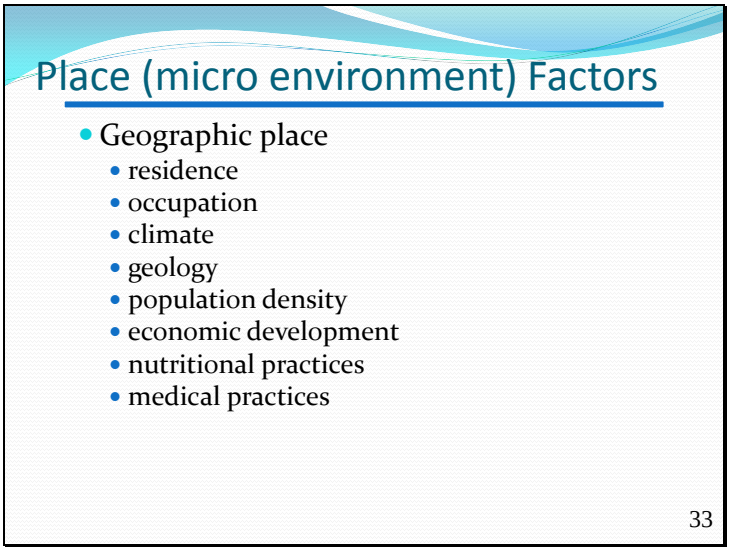
Place (micro environment) Factors
Geographic place
residence
occupation
climate
geology
population density
economic development
nutritional practices
medical practices
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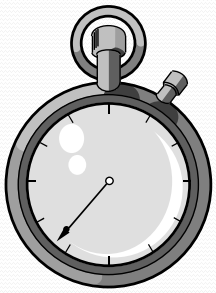
Time

How does disease frequency change over time?
What other factors are temporally associated with time changes?



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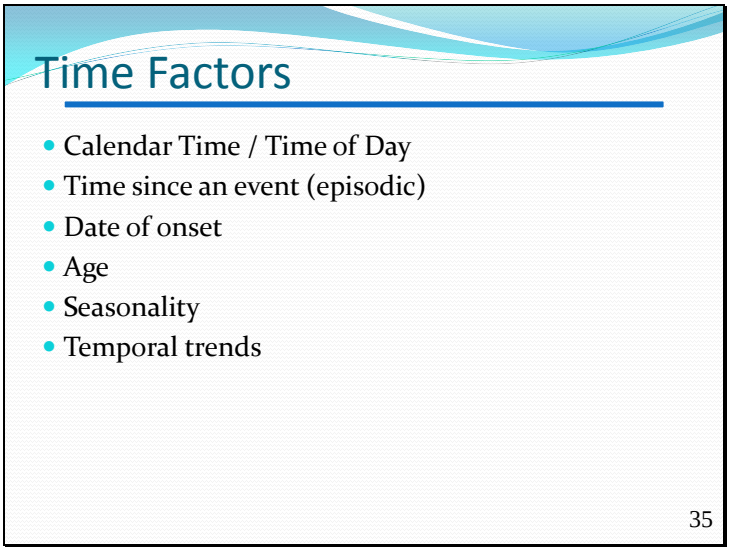
Time Factors
Calendar Time / Time of Day
Time since an event (episodic)
Date of onset
Age
Seasonality
Temporal trends
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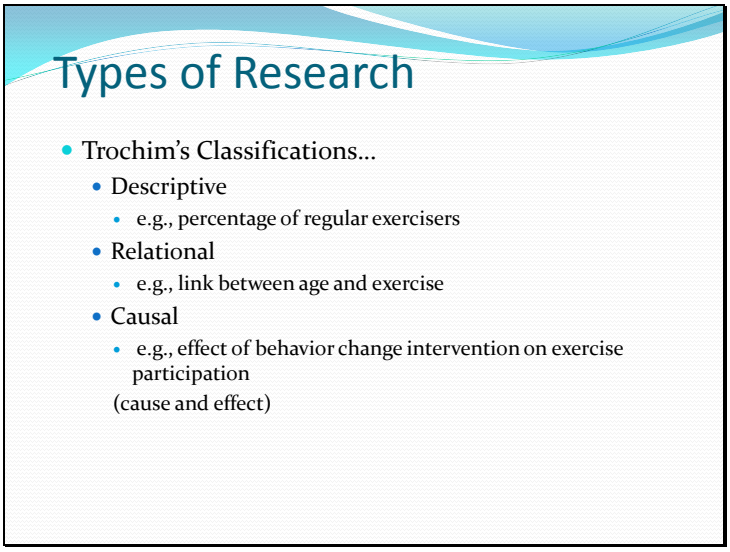
Types of Research
Trochim's Classifications...
Descriptive
e.g., percentage of regular exercisers
Relational
e.g., link between age and exercise
Causal
e.g., effect of behavior change intervention on exercise participation
(cause and effect)

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Relationships of the Variables

Correlational relationship

Causal relationship

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Correlational

A correlational relationship simply says that two things perform in a synchronized manner

For instance, there has often been talk of a relationship between ability in math and proficiency in music. In general people who are good in one may have a greater tendency to be good in the other; those who are poor in one may also tend to be poor in the other. If this relationship is true, then we can say that the two variables are correlated. But knowing that two variables are correlated does not tell us whether one *causes* the other.

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Causual Relationship

Even though the two variables are in correlation with each other sometime they are also in a Causual relation as well. Meaning when one does something (cause) it will directly (effect) the other.

More exposure to extreme cold will lead to frost bite.

Increase cold exposure = Increase risk frostbite

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Time is an important element of any research design, one of the most fundamental distinctions in research design nomenclature is ***cross-sectional*** versus ***longitudinal*** studies.

Cross-sectional study is one that takes place at a single point in time. In effect, we are taking a 'slice' or cross-section of whatever it is we're observing or measuring.

L*ongitudinal* study is one that takes place over time -- we have at least two (and often more) waves of measurement in a longitudinal design.

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Cross-sectional studies involve data collected at a defined time. They are often used to assess the prevalence of acute or chronic conditions, or to answer questions about the causes of disease or the results of intervention.

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Longitudinal Studies involving the repeated observation or examination of a set of subjects over time with respect to one or more study variables.

The 5 year study of heart transplant patients

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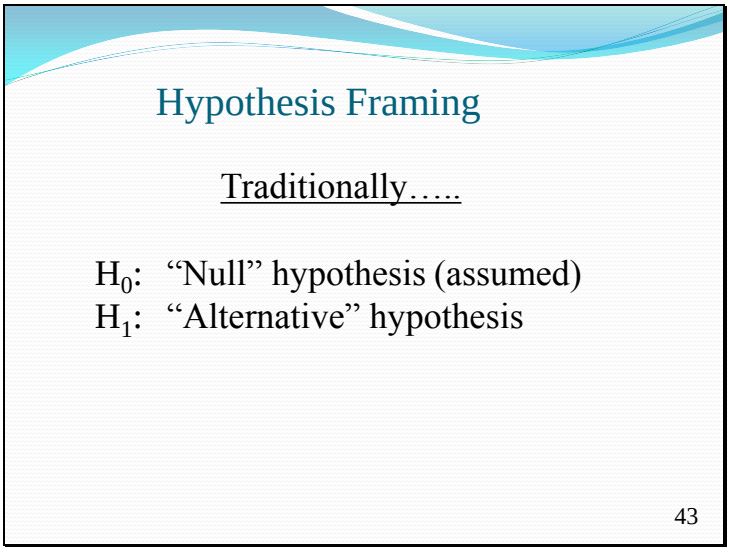
Hypothesis Framing
Traditionally…..
H_0: "Null" hypothesis (assumed)
H_1: "Alternative" hypothesis
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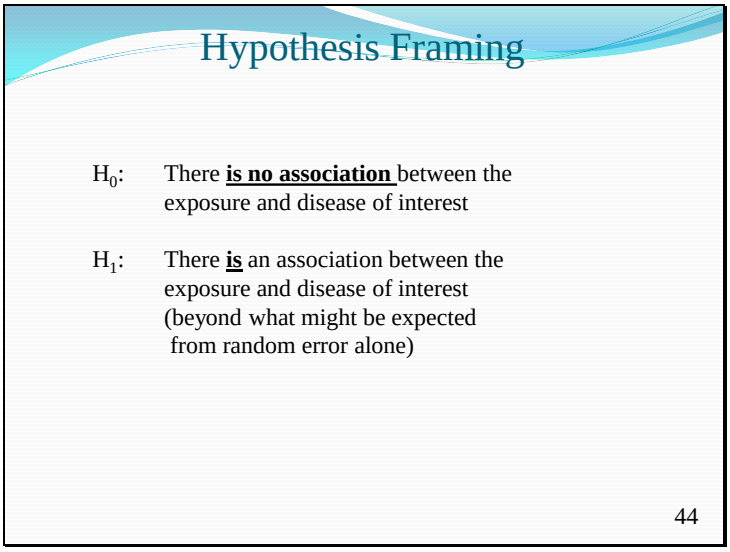
Hypothesis Framing
H_0: There **is no association** between the exposure and disease of interest
H_1: There **is** an association between the exposure and disease of interest (beyond what might be expected from random error alone)
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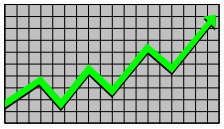
Hypothesis Framing

Ways to Express Hypotheses:

1. Suggest possible events…

   The rate of survival will increase after surgery.



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Hypothesis Framing

Ways to Express Hypotheses:

2. Suggest relationship between specific exposure and health-related event… (association)

A high cholesterol intake is associated with the development (risk) of coronary heart disease.

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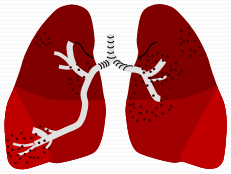
Hypothesis Framing

Ways to Express Hypotheses:

3. Suggest cause-effect relationship….

Cigarette smoking is a ***cause*** *of lung cancer*



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Hypothesis Framing

Ways to Express Hypotheses:

4. "One-sided" vs. "Two-sided"

One-sided example:
Helicobacter pylori bloom is associated with increased risk of stomach ulcer.
This is a one way example with few variables

Two-sided example:
Weight-lifting is associated with risk of lower back injury.
This has many variables age, lifting style, weight

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Hypothesis Framing

Guidelines for Framing Hypotheses:

1. State the exposure to be measured as specifically as possible.
2. State the health outcome as specifically as possible.

Strive to explain the smallest amount of ignorance

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Hypothesis Framing

Example Hypotheses:

POOR

Eating the wrong food is associated with the development of most all cancer.

GOOD

The human papilloma virus (HPV) subtype 16 is associated with the development of cervical cancer.

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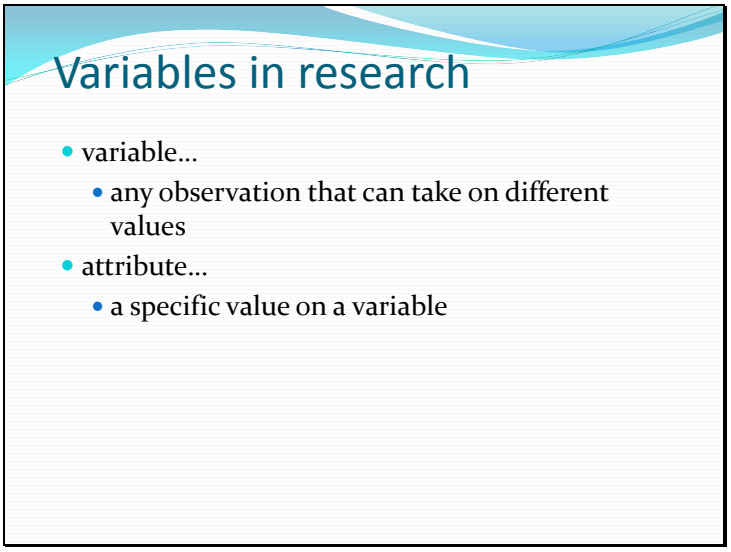
Variables in research
variable…
any observation that can take on different values
attribute…
a specific value on a variable

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Examples

Variable = Age, gender, color
Attributes = 18, 20, 60 male, female, blue, purple, white, orange

Scaled Variables

Variable	Attributes
satisfied	1 = very satisfied 2 = satisfied 3= somewhat satisfied 4 = not satisfied 5 = not satisfied at all

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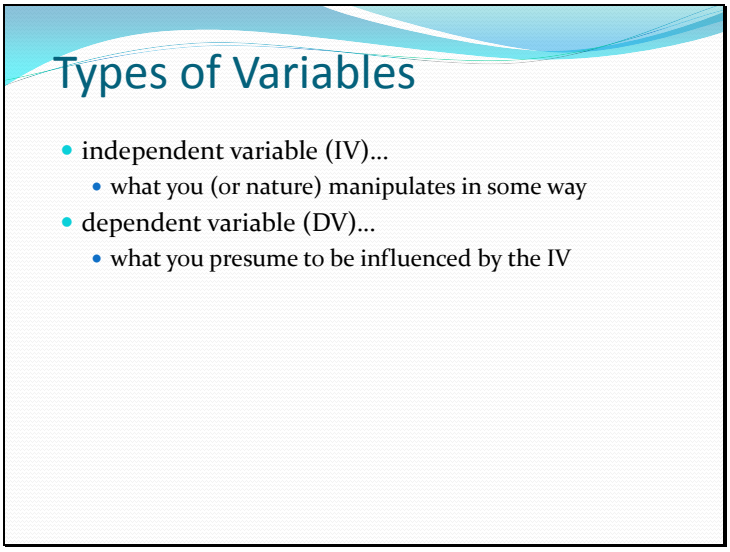
Types of Variables
independent variable (IV)...
what you (or nature) manipulates in some way
dependent variable (DV)...
what you presume to be influenced by the IV

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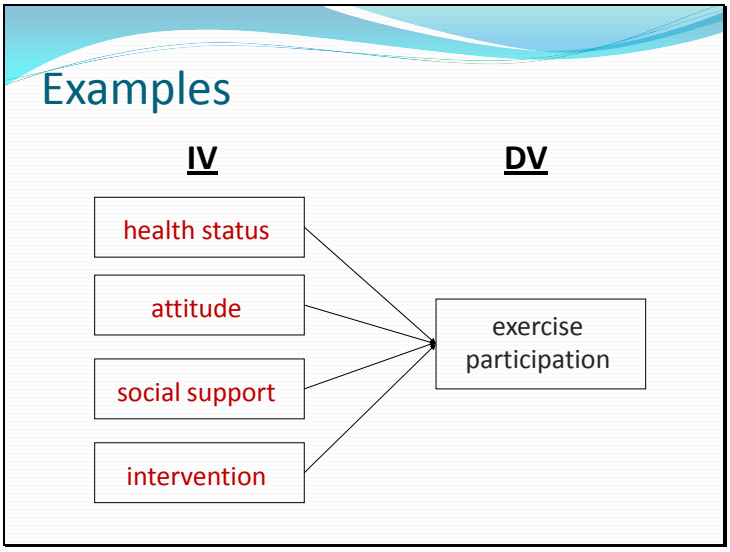
Examples
IV
DV
health status
attitude
social support
intervention
exercise participation

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Inductive vs Deductive Reasoning

Inductive Reasoning
Inductive reasoning works the opposite way, moving from specific observations to broader generalizations and theories. This is sometimes called a "bottom up" approach. The researcher begins with specific observations and measures, begins to then detect patterns and regularities, formulate some tentative hypotheses to explore, and finally ends up developing some general conclusions or theories.

An example of inductive reasoning can be seen in this set of statements: Today, I left for work at eight o'clock and I arrived on time. Therefore, every day that I leave the house at eight o'clock, I will arrive to work on time.

Deductive Reasoning
Deductive reasoning happens when a researcher works from the more general information to the more specific. Sometimes this is called the "top-down" approach because the researcher starts at the top with a very broad spectrum of information and they work their way down to a specific conclusion.

An example of deductive reasoning can be seen in this set of statements: Every day, I leave for work in my car at eight o'clock. Every day, the drive to work takes 45 minutes I arrive to work on time.

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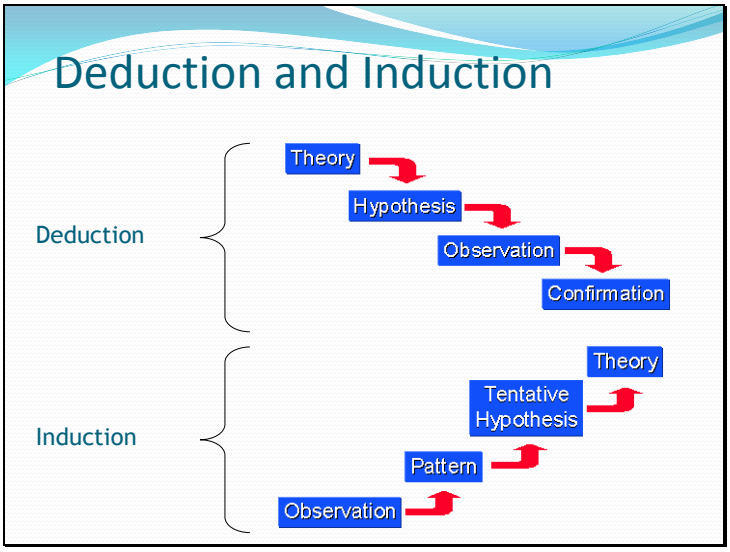
Deduction and Induction
Deduction
Theory
Hypothesis
Observation
Confirmation
Induction
Theory
Tentative Hypothesis
Pattern
Observation

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Ethics in Research

- keeping a balance between protecting participants vs. quest for knowledge
- **Ethical Decision Making in Research**
- Although codes, policies, and principals are very important and useful, like any set of rules, they do not cover every situation, they often conflict, and they require considerable interpretation. It is therefore important for researchers to learn how to interpret, assess, and apply various research rules and how to make decisions and to act in various situations. The vast majority of decisions involve the straightforward application of ethical rules.

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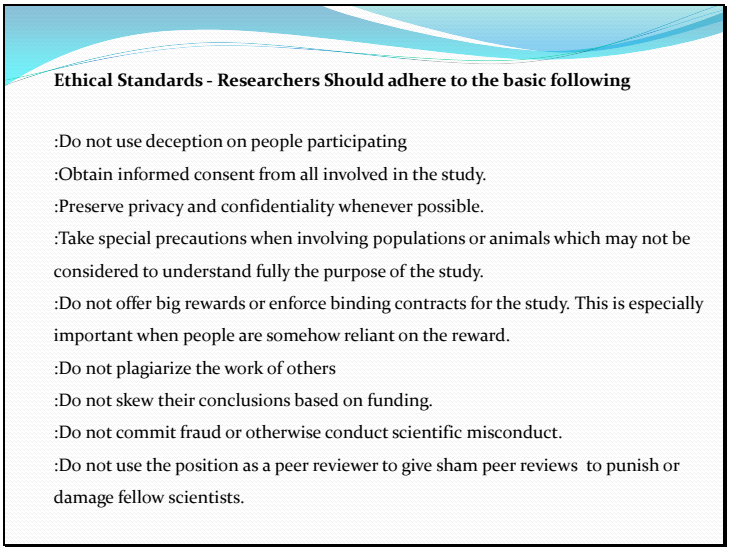
Ethical Standards - Researchers Should adhere to the basic following
:Do not use deception on people participating
:Obtain informed consent from all involved in the study.
:Preserve privacy and confidentiality whenever possible.
:Take special precautions when involving populations or animals which may not be considered to understand fully the purpose of the study.
:Do not offer big rewards or enforce binding contracts for the study. This is especially important when people are somehow reliant on the reward.
:Do not plagiarize the work of others
:Do not skew their conclusions based on funding.
:Do not commit fraud or otherwise conduct scientific misconduct.
:Do not use the position as a peer reviewer to give sham peer reviews to punish or damage fellow scientists.

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Ethics when using People

Voluntary participation requires that people not be coerced into participating in research. This is especially relevant where researchers had previously relied on captive audiences' for their subjects -- prisons, universities, and places like that.

Informed consent. Essentially, this means that prospective research participants must be fully informed about the procedures and risks involved in research and must give their consent to participate.

Do No Harm Ethical standards also require that researchers not put participants in a situation where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological.

Participants *confidentiality* -- they are assured that identifying information will not be made available to anyone who is not directly involved in the study

Right to service. Good research practice often requires the use of a no-treatment control group -- a group of participants who do *not* get the treatment or program that is being studied. But when that treatment or program may have beneficial effects, persons assigned to the no-treatment control may feel their rights to equal access to services are being curtailed

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Housekeeping

- Notes and recording will be sent out tomorrow
- Certificates will be emailed 1 week out
- Email (info@drbryanhawley.com)

- Next webinar Part 2 of research
- TUESDAY Dec 8th same time 10am PST