

Research Methods

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- What is Research
- Gathering Information
- Analyzing Existing Work
- Presenting Literature

What is Research ?

- What is it?
- Should you be doing it?
- How do you do it?
 - ***Nothing is interesting if you're not interested***

Definition of Research

“Systematic investigation towards increasing the sum of knowledge”

(Chambers 20th Century Dictionary)

“An attempt to discover new or collate old facts by the scientific study of a subject or by a course of critical investigation.”

(The Concise Oxford Dictionary)

Research

- It is undertaken within most professions
- More than a set of skills
- It is a way of thinking
- Examining critically various aspects of your professional work.
- It is a habit of questioning what you do

Research Course

- Research can be one of the most interesting features of any degree course
 - It offers you a measure of control and autonomy over what you learn.
- It gives you an opportunity to
 - Confirm
 - Clarify
 - Pursue
 - Even discover – new aspects of a subject or topic you are interested in.

However!

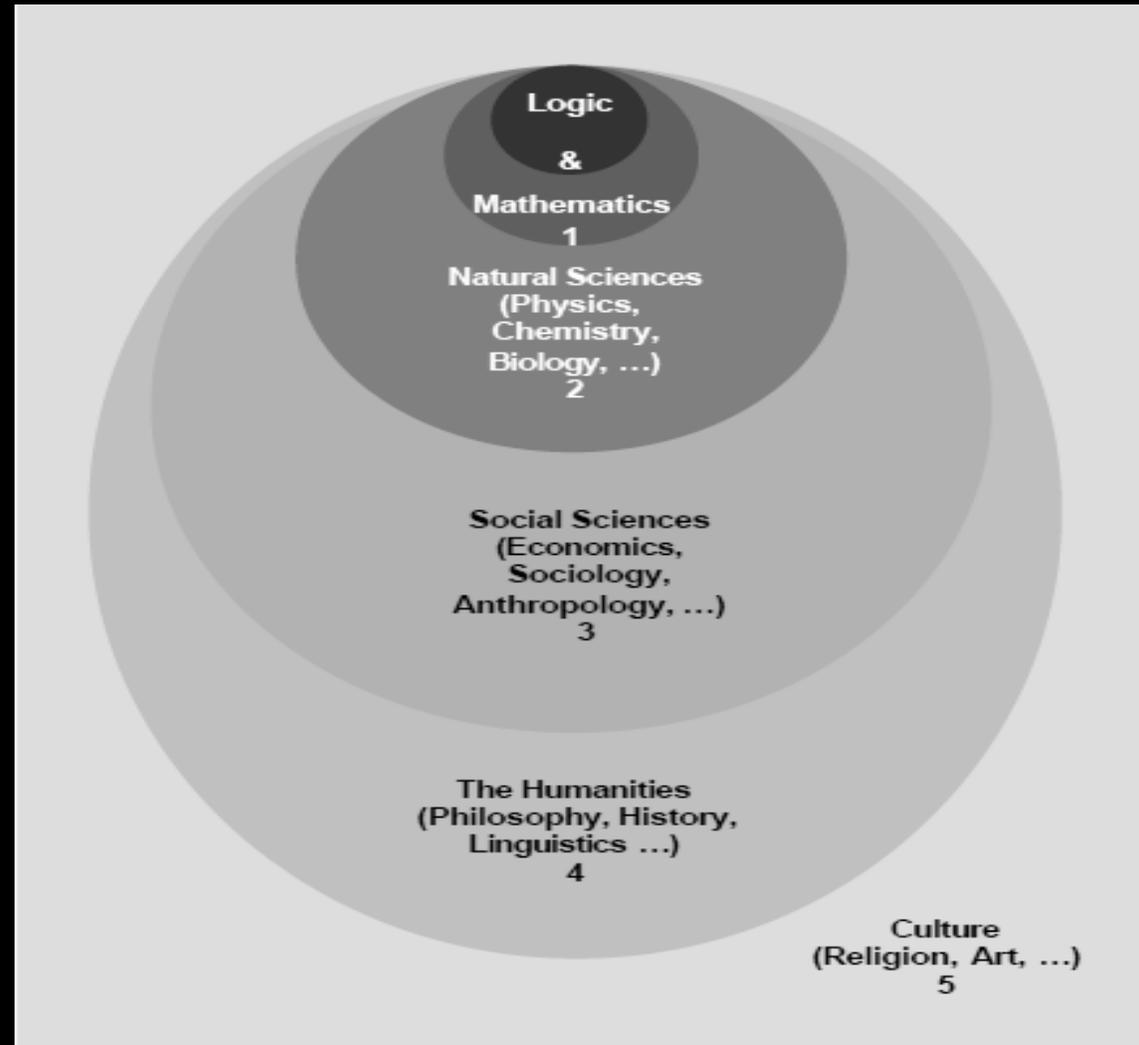
- The course contents can be a bit unexciting because
 - We are mostly interested in results but not in procedures
 - We learn about procedure here
 - Research methodologies are often abstract
 - Unless you pay particular attention on learning it

Science, Engineering and Technology

Difference between Science, Engineering and Technology

- Science: Acquisition of knowledge.
 - *Why does it happened, What?*
- Engineering: Application of knowledge gained via science to solve problem
 - *How does it work*
- Technology: Utilization of processes and products made via engineering
 - *What can it be used for*

What is Science ?



Is this Research ?

- To understand political decisions, a journalist finds out who contributed to election campaign fund
- To buy a laptop, a student compares various brands, configurations and prices
- To help companies stay competitive, a market researcher collects and interprets information
- To fix a computer, a technician finds out what procedure to use

Types of Research

Primary Research

- Scientist
- Social Scientist
- Historian

Secondary Research

- Journalist
- Industrial R&D

Types of Research

Basic Research

· The study of issues in order to seek knowledge.

· Different planets/stars etc.

· Addresses the theory of memory

Applied Research

· Study of issues that have practical significance and potential solutions.

· Faster machines/ efficient algorithms

· Effectiveness of a technique to improve memory

Sources of Knowledge

- Superstition
 - Based on subjective feeling, belief in chance or magical events.
 - Unlucky numbers etc.
- Problem?
 - Neither reliable not valid.

Sources of Knowledge

- Intuition
 - Gut feeling
 - Sometimes based on observations
 - More babies are born during full moon
- Problem?
 - Illusory correlation
 - The perception of a relationship that does not exist.

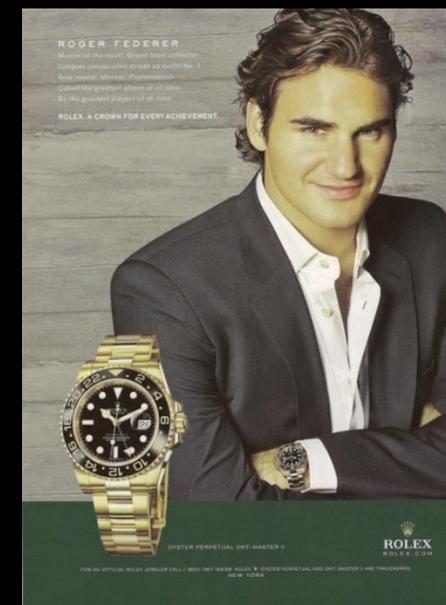
Sources of Knowledge

- Authority
 - Famous people sayings
 - Parents, teachers
 - You normally don't question them.
 - Primary source of knowledge
- Problem?

Problem ?



What if the authority is not knowledgeable in subject area?



Sources of Knowledge

- Tenacity
 - Hearing a piece of information so often that you begin to believe it is true.
 - Often used in political campaigns, advertisements etc.
 - Used to associate slogans with products.
- Problem?
 - May or may not be true



Sources of Knowledge

- Rationalism
 - Logical reasoning
 - Ideas are precisely stated and logical rules are applied to arrive at a sound conclusion.
 - All humans are mortal
 - Ali is a human
 - So, he is mortal
- Problem?

Problem ?



Sources of Knowledge

- Rationalism
- Problem?
 - If one of them is false, the conclusion will be false.
 - Attractive people are good
 - Ali is attractive
 - So, he is good.
 - Conclusion is logically valid but empirically false.
 - Logic only deals with the form of syllogism and not its contents.

Sources of Knowledge

- Empiricism
 - Objective observations
 - Experience of senses
 - Dates back to Aristotle, who made observations about world to know it better.
- Problem?
 - Leads to collection of facts.
 - For these facts to be useful, we need to
 - Organize them
 - Think over them
 - Draw meanings from them
 - Use them to make predictions
 - That is , use RATIONALISM together with EMPIRICISM to make observations logical.

Sources of knowledge

- Science
 - Merge rationalism and empiricism
 - Scientists collect data (empirical) and test hypotheses with those data (rationalism)
 - Hypothesis is a prediction regarding the outcome of a study.
 - Often the prediction concerns the relationship between two variables
 - Variable is an event or behavior that has at least two values

Sources of knowledge

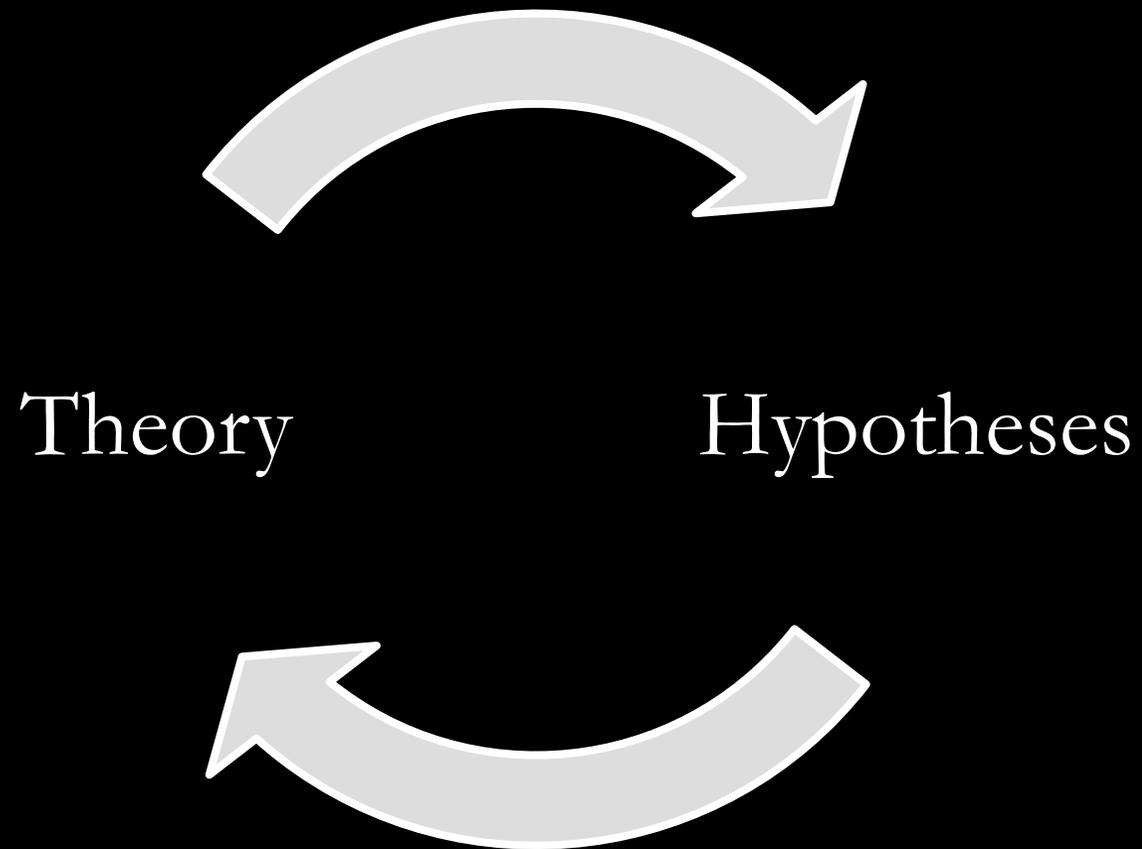
A prediction about the outcome of a study

Many hypothesis are tested before putting forth a theory.

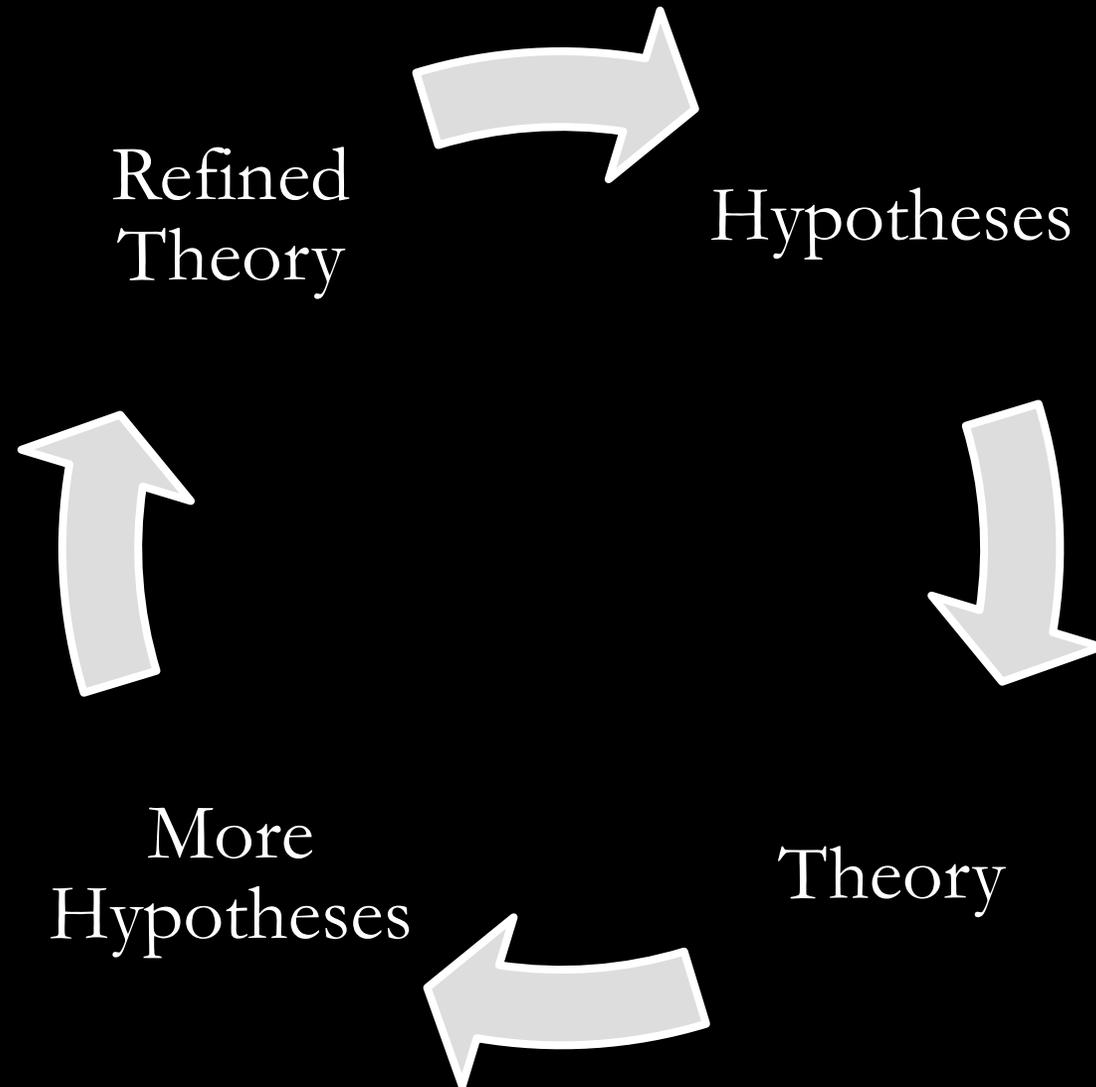
- Science

- By merging rationalism and empiricism
 - Logical argument based on observations.
- We test hypothesis to arrive at or test a theory
- Theory is an organized system of assumptions and principles that attempts to explain phenomena and how they are related.
- Theories allow us to develop framework regarding facts.

Scientific research



Scientific research



Research

- Going beyond personal
 - Experience
 - Thoughts
 - Feelings and
 - Opinions
- Research is undertaken to
 - Explore an idea
 - Probe an issue
 - Solve a problem

Research

- A process of enquiry and investigation
 - Systematic
 - Methodical and
 - Ethical
- Research can help to
 - Solve practical problems and
 - Increase knowledge

Class Participation

- Identify the source of knowledge in each of the following scenarios:
 - A celebrity is endorsing a new diet program, noting that she lost weight on the program and so will you.
 - **Knowledge via authority**

Class Participation

- Identify the source of knowledge in each of the following scenario:
 - Based on the several observations that Ali has made, he feels sure that cell phone use does not adversely affect driving ability.
 - **Knowledge via empiricism**

Class Participation

- Identify the source of knowledge in each of the following scenario:
 - A friend tells you that she has a feeling of dread, she thinks that you should not take the plane trip you were planning next week.
 - **Knowledge via intuition or superstition**

Research Process

- The researcher is implying that the process
 - Is within a framework of a set of **philosophies**
 - approaches e.g. qualitative, quantitative and the academic discipline
 - Uses
 - Procedures
 - Methods and
 - Techniques
 - Tested for their **validity** and **reliability**
 - Is designed to be **unbiased** and objective .
- Correct procedures have been applied to find answers to a question
- The quality of a measurement procedure that provides repeatability and accuracy
- Deliberate attempt to either conceal or highlight something
- Adherence to the three criteria enables the process to be called 'research'.

Purpose of Research

- Review or synthesize existing knowledge
- Investigate existing situations or problems
- Provide solutions to problems
- Explore and analyze more general issues
- Construct or create new procedures or systems
- Explain new phenomenon
- Generate new knowledge
- ...or a combination of any of the above !