

# What is research?

**Systematic investigation into a problem or situation, where the intention is to identify facts and/or opinions that will assist in solving the problem or dealing with the situation.**



# **Good Research**

- 1. Serves a purpose and is relevant.**
- 2. Clearly focussed and scoped.**
- 3. Scientific (depends on context).**
- 4. Uses appropriate techniques & methods of data collection.**
- 5. Findings are presented as objectively as possible.**
- 6. Conclusions are based on the findings.**
- 7. Sources of information and ideas are clearly attributed.**

# Types of Reasoning

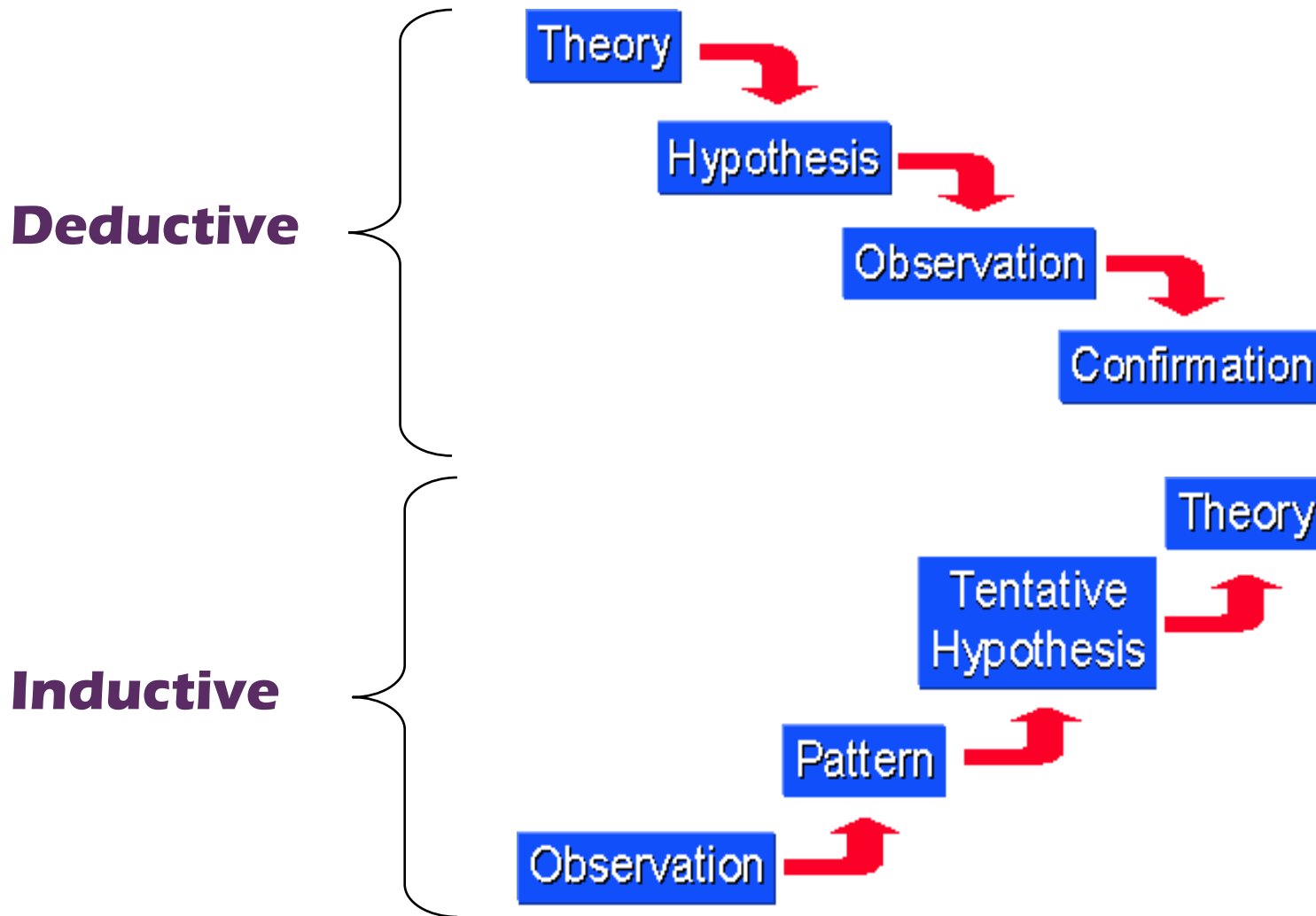
## **Hypothetico-deductive Research**

**A proposed description of scientific method. According to it, scientific inquiry proceeds by formulating a hypothesis in a form that could conceivably be falsified by a test on observable data.**

## **Inductive Research**

**The main difference between inductive and deductive approaches to research is that whilst a deductive approach is aimed at testing theory, an inductive approach is concerned with the generation of new theory emerging from the data.**

# Types of Reasoning



# **Key Concepts & Issues**

**Time in Research**

**Variables**

**Types of Relationships**

**Hypotheses**

**Types of Data**

**Fallacies**

**Structure or Research**

**Reasoning**

**Ethics**

**Validity**

# **Time in Research**

**Cross-sectional**

**Repeated  
measures**

**Longitudinal**

**Time  
series**

**The researcher has to decide on the best time to carry out the research.**



# Variables Pick

## Variable

Any observation that can take on different values.

Age

Gender or sex

Satisfaction

## Attribute

A specific value on a variable.

18, 19, 20, etc...

Male, female

1 = very satisfied

2 = satisfied

3 = not satisfied

# Types of Variables

**Independent Variable (IV)**

**Dependent Variable (DV)**

What you (or nature) manipulates in some way.

What you presume to be influenced by the IV.

**Health Status**

**Attitude**

**Exercise Participation**

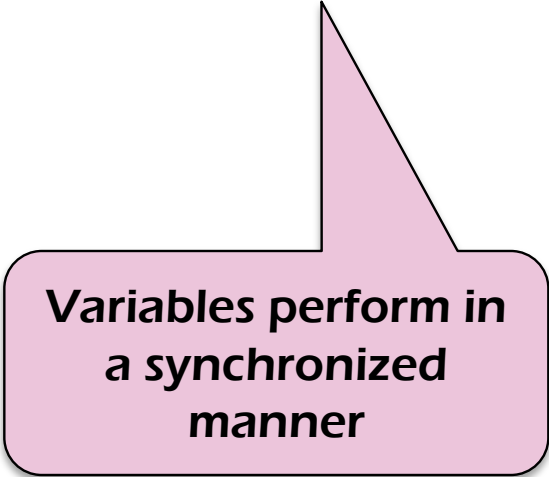


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graph LR; A[Exercise Participation] --> B[Health Status]; A --> C[Attitude]
```

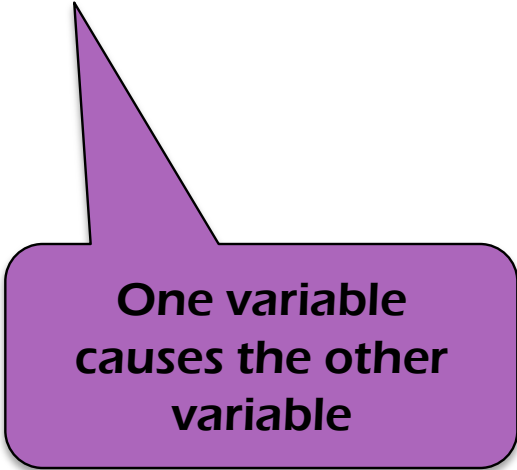


# Relationship Types

## Correlational vs. Causal Relationships



Variables perform in a synchronized manner



One variable causes the other variable

**Correlation is not imply causation!**  
**(it's necessary but not sufficient)**

# Patterns of Relationships

- No Relationship
- Positive Relationship
- Negative Relationship
- Curvilinear Relationship

# Hypotheses

**Hypothesis is a specific statement of prediction.**

## **Types of hypotheses:**

- **Alternative hypothesis**
- **Null hypothesis**
- **One-tailed vs. Two-tailed**

# Hypotheses

- ⦿ **Alternative Hypothesis (HA)**  
An effect (**that** you predict).....
- ⦿ **Null Hypothesis (HO)**  
Null effect.....

# Example Hypotheses

**Hypothesis** there is a relationship between age and exercise participation.

**H<sub>A</sub>** there is a relationship

**H<sub>0</sub>** there is not a relationship

**This is a two-tailed hypothesis as no direction is predicted.**

# Hypotheses

This is a one-tailed hypothesis as a specific direction is predicted

## Example Hypothesis

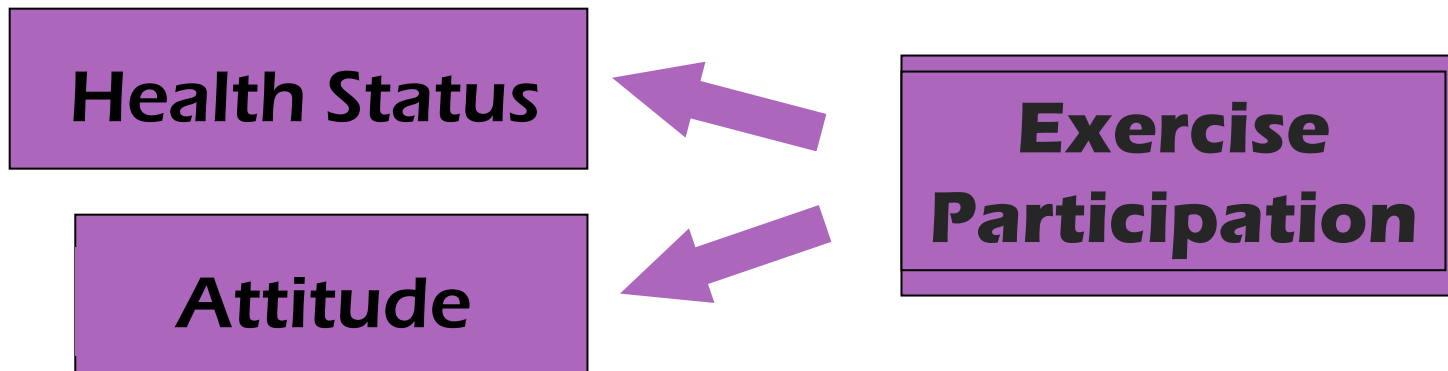
An incentive program will increase exercise participation.

$H_A$

Participation will increase.

$H_0$

Participation will not increase or will decrease.



# Hypotheses

**Shape and guide a research study:**

- **Identification of study sample size.**
- **What issues should be involved in data collection.**
- **The proper analysis of the data.**
- **Data interpretation.**

# **Hypothesis Formulation**

- 1. Formulate a hypothesis.**
- 2. Frame the hypothesis in a format that is testable.**
- 3. Test the hypothesis.**



# Hypothesis Formulation

## Observations from:

- ▣ **Literature**
- ▣ **Natural experiments**
- ▣ **Multi-national comparisons**
- ▣ **Descriptive studies**
- ▣ **Creativity**

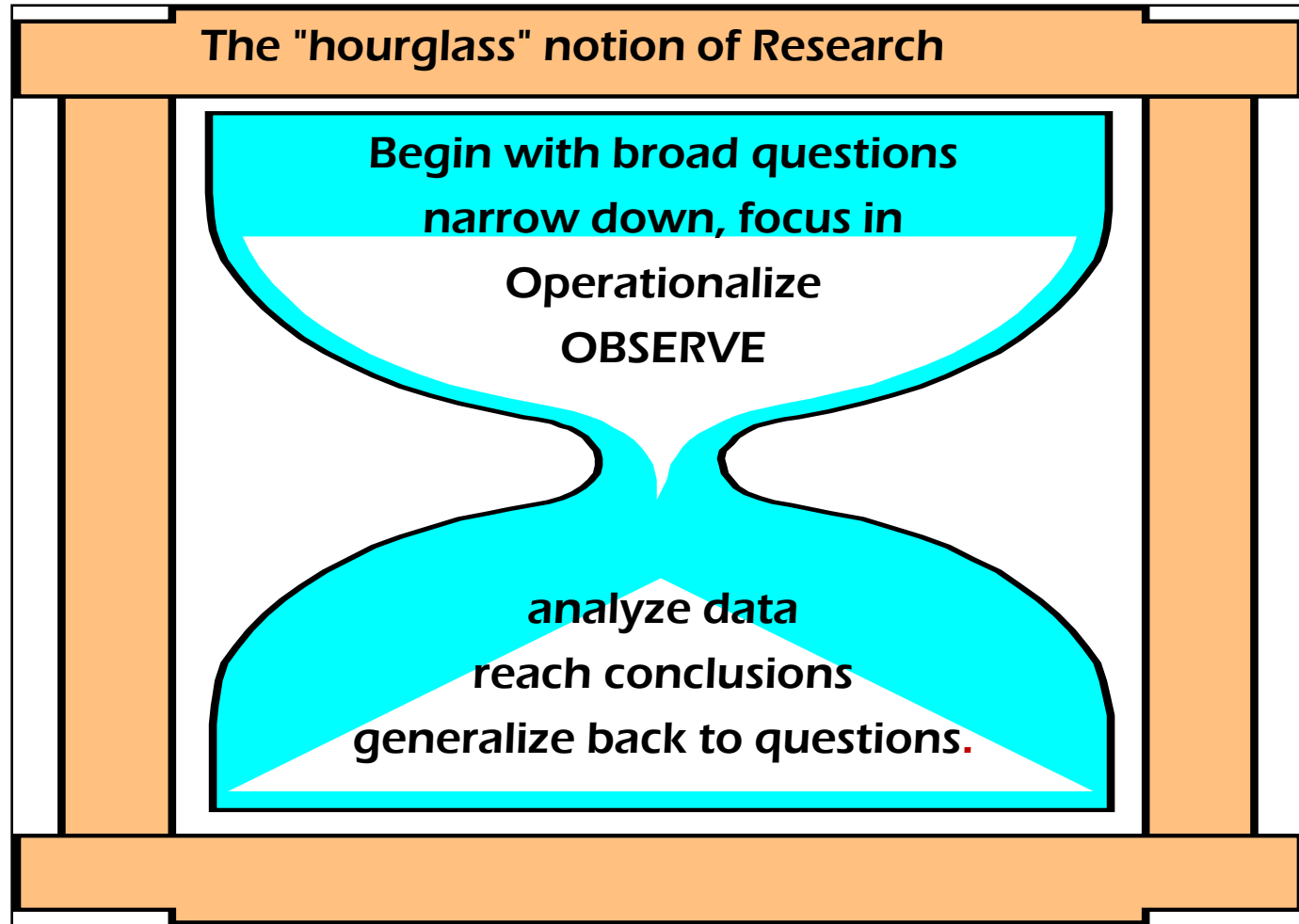
**Hypothesis**

# **Formulation**

**“Disappointment is when a beautiful hypothesis is destroyed by an ugly fact” - Newton**



# Research Structure



# Types of Data

- ◉ **Quantitative**

- ◉ **Qualitative**

# Research Fallacy

**An error in reasoning  
(logic or premise).**

- **Types of Fallacies described by “Trochim”**
  - **ecological**
  - **exception**

# Research Validity

**The best available approximation to the truth of a given proposition, inference, or conclusion.**

- **Types of validity...**

- 1) Conclusion**
- 2) Internal**
- 3) Construct**
- 4) External**

**Types of validity are cumulative**

## Types of validity:

1. conclusion
2. internal
3. construct
4. external

# Validity

## Validity

### External

Can we generalize to other persons, places, times?

### Construct

Can we generalize to the constructs?

### Internal

Is the relationship causal?

### Conclusion

Is there a relationship between the cause and effect?

# **Limitations of Scientific Research**

- 1) Can not be quantified or observed (lacking empirical evidence).**
- 2) Science can not make judgments about values, ethics or morality.**
- 3) Inability to capture full richness and complexities of the participants.**
- 4) Limitations of our measurement instruments.**
- 5) Legal responsibilities.**
- 6) Incomplete explanations.**



