Research & Statistics

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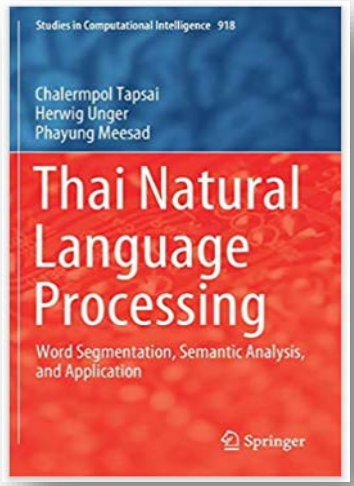

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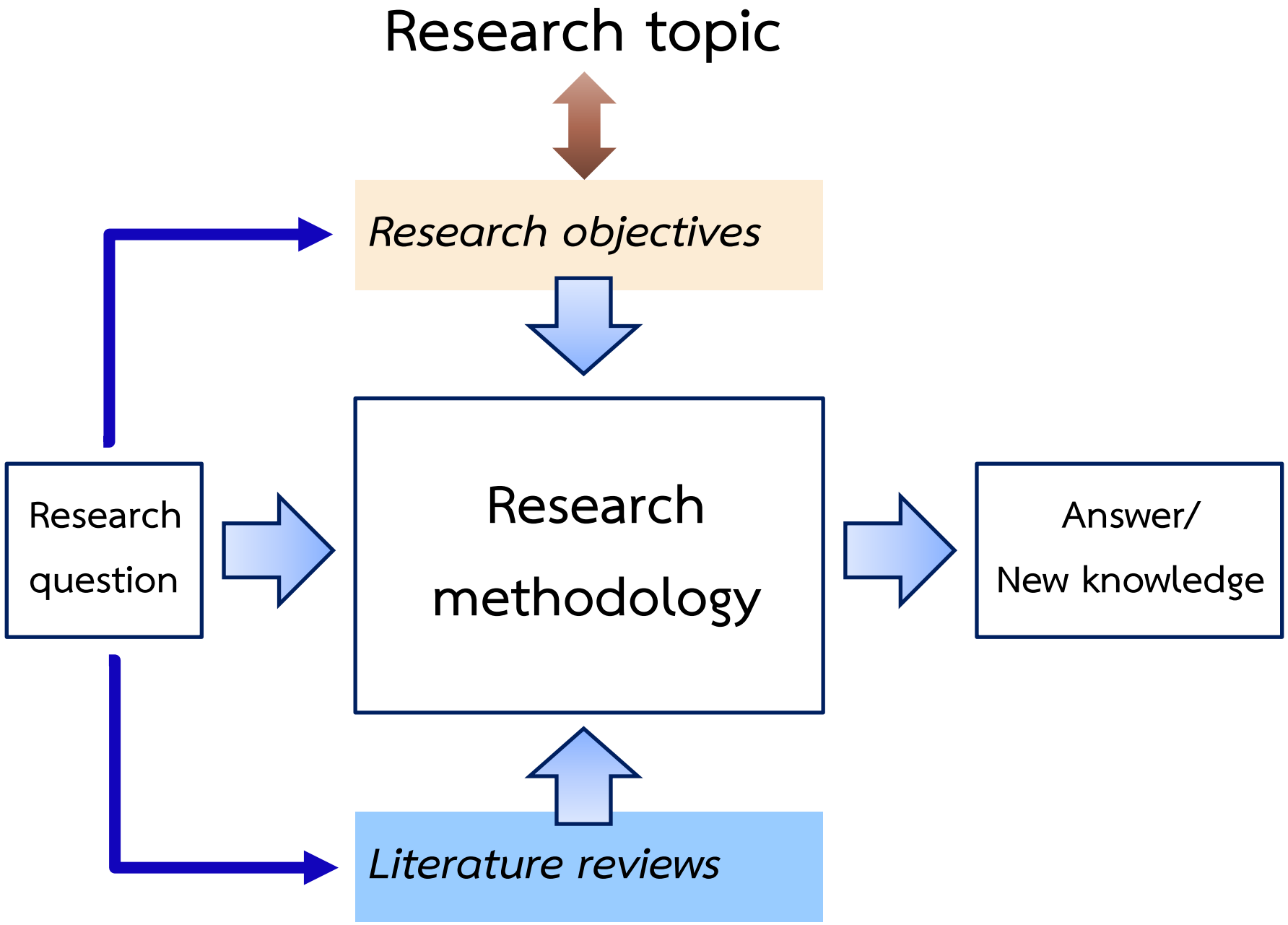
Research

- *systematic process and operations*
- *to find answers*
- *to explain new knowledge*
- *to create new knowledge (or invent new things)*


Research topic
Research objectives
Research question
Research methodology
Answer/ New knowledge
Literature reviews

Corona virus >> Education

Problem

Many people are unable to learn effectively during the coronavirus outbreak.

Research Question

- What will make learning effective?
- What innovations are suitable?
- Is the online learning suitable?

Population

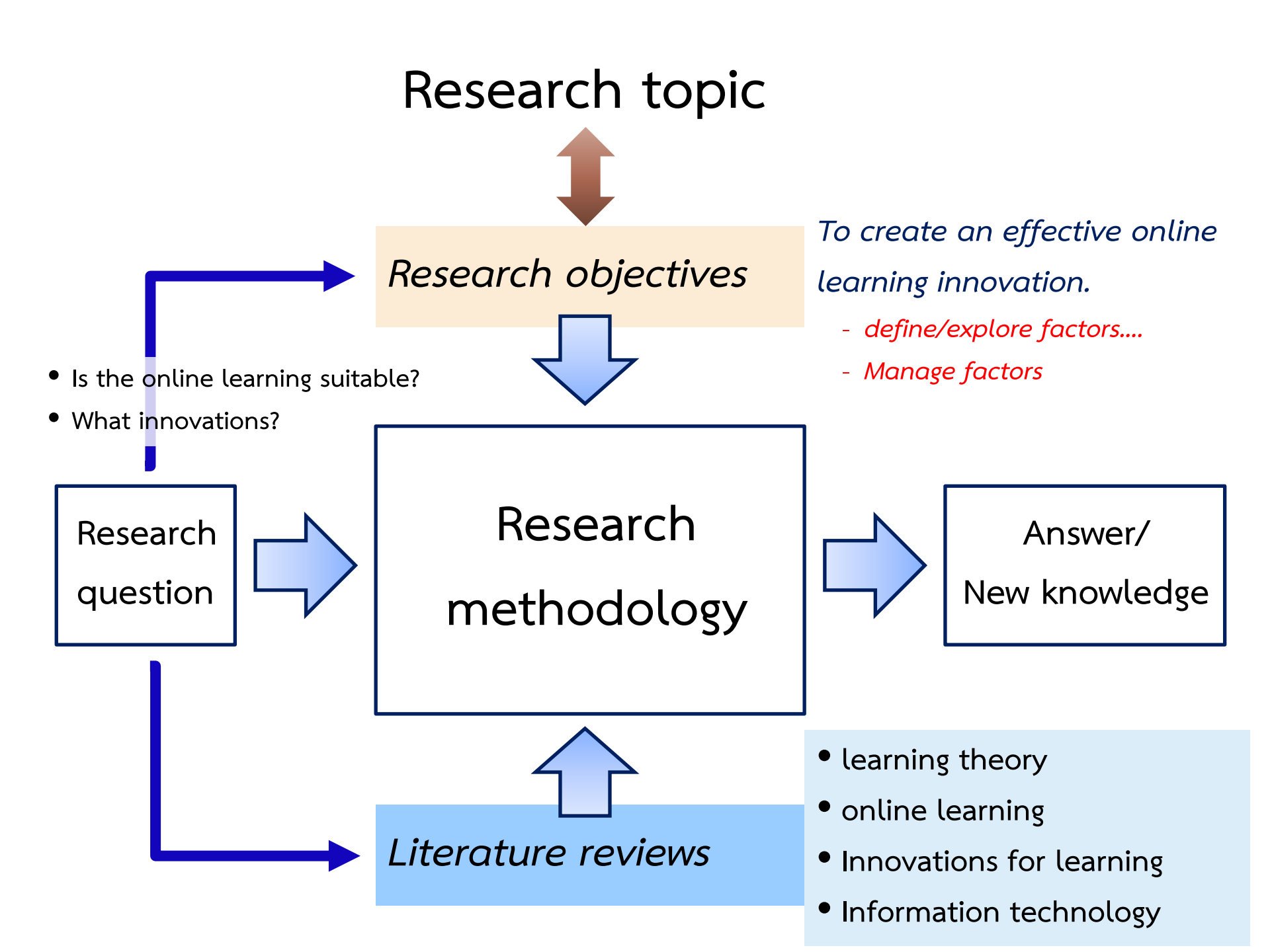
Graduate Student

Research objectives

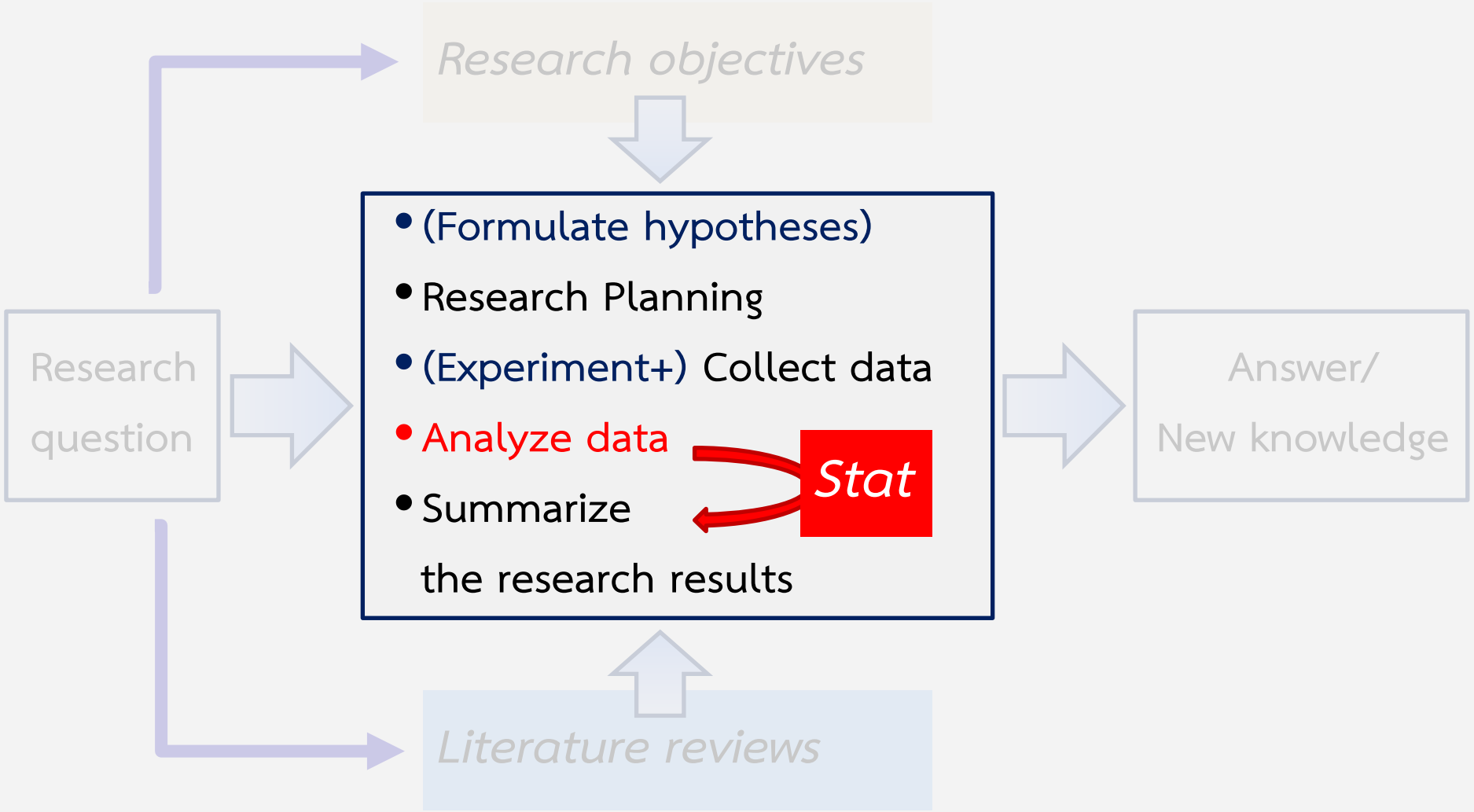
To create an innovative online learning for improving student achievement.

Research Topic

The Online Learning Innovations for Graduate Student in Beijing.


Research topic
Research objectives
To create an effective online learning innovation.
- define/explore factors....
- Manage factors
• Is the online learning suitable?
• What innovations?
Research question
Research methodology
Answer/ New knowledge
Literature reviews
• learning theory
• online learning
• Innovations for learning
• Information technology

Research


Research objectives
(Formulate hypotheses)
Research Planning
(Experiment+) Collect data
Analyze data
Summarize
the research results
Stat
Research question
Answer/
New knowledge
Literature reviews

Type of statistics

Descriptive Statistics

To describe or summarize the characteristics of data

- Measures of Central Tendency
- Measure of Dispersion

Inferential Statistics

Study samples >> infer the results to the population.

- Estimation
- Hypothesis testing

Descriptive Statistics

Frequencies Distribution

- Frequency
- Percentage
- Ratio
- Percentile
- Quartile

Measures of Central Tendency

- Mean or Average
- Mode
- Median

Measure of Dispersion

- Range
- Standard Deviation
- Variance

Descriptive Statistics

Used to explain data character

- Frequency
- Percentage
- Mean or Average
- Range
- Standard Deviation
- Variance

Inferential Statistics

Estimation

- population mean
- Population variance

Hypothesis testing

- Compare means
  - Independent t-test
  - Paired sample t-test
  - ANOVA
- Relation between variables
  - Correlation / Chi square
  - Regression

Stats must be carefully selected

consistence with

- *the desired answer*
- *the data collected*

Level of data measurement scales

Scale of data

- **Nominal** scale
  - *gender, occupation, study subject*
- **Ordinal** scale
  - *educational degree, level of satisfaction*

Text

- **Interval** scale
  - *temperature*
- **Ratio** scale
  - *age, height, salary, sales*

Numeral

Name	gender	Age	Age range	Height	Educational degree
Somchai	male	18	Teen	175.8	Secondary
Peter	male	9	Child	129	Primary
Sara	female	42	Adult	164.5	Master
John	male	50	Adult	173	Doctor
Amnart	male	17	Teen	174	Secondary
Malee	female	21	Adult	168.3	Bachelor
Dumrong	male	62	Senior	169	Bachelor

Descriptive Statistics

Frequencies Distribution

- Frequency
- Percentage
- Ratio
- Percentile
- Quartile

Measures of Central Tendency

- Mean or Average
- Mode
- Median

Measure of Dispersion

- Range
- Standard Deviation
- Variance

Descriptive statistics analysis

	Text		Numeral	
Scale=>	Nominal	Ordinal	Interval	Ratio
Example=>	gender	educational degree	temperature	salary
Frequency count	✓	✓	✓	✓
Mode	✓	✓	✓	✓
Median		✓	✓	✓
Mean			✓	✓
Standard deviation			✓	✓

Inferential Statistics

Estimation

- population mean
- Population variance

Hypothesis testing

- Compare means
  - Independent t-test
  - Paired sample t-test
  - ANOVA
- Relation between variables
  - Correlation / Chi square
  - Regression

Mean comparison

- One sample test

  compare a mean with a standard value

- Independent samples test

  compare means between two independent groups

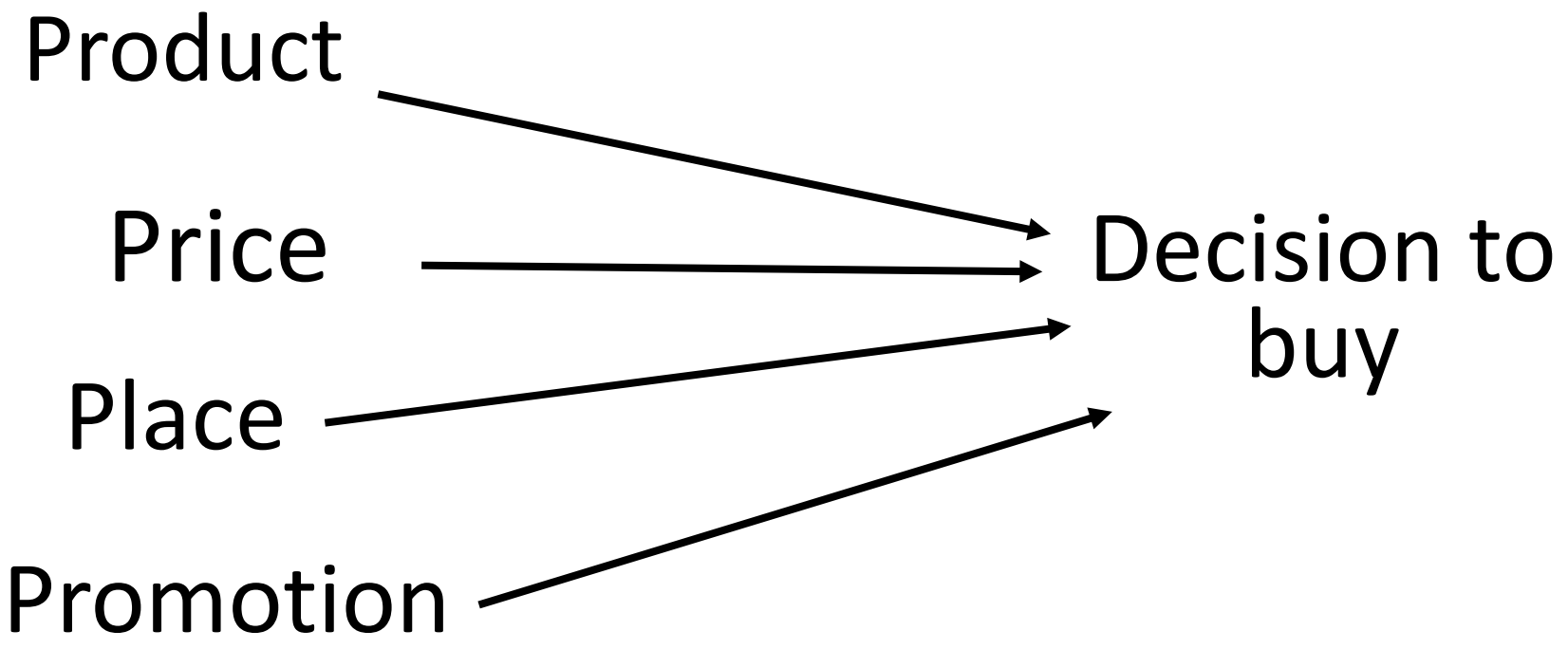
- Paired sample test

  compare two means of a sample group

- ANOVA (Analysis of variance)

  compare means between three or more independent groups

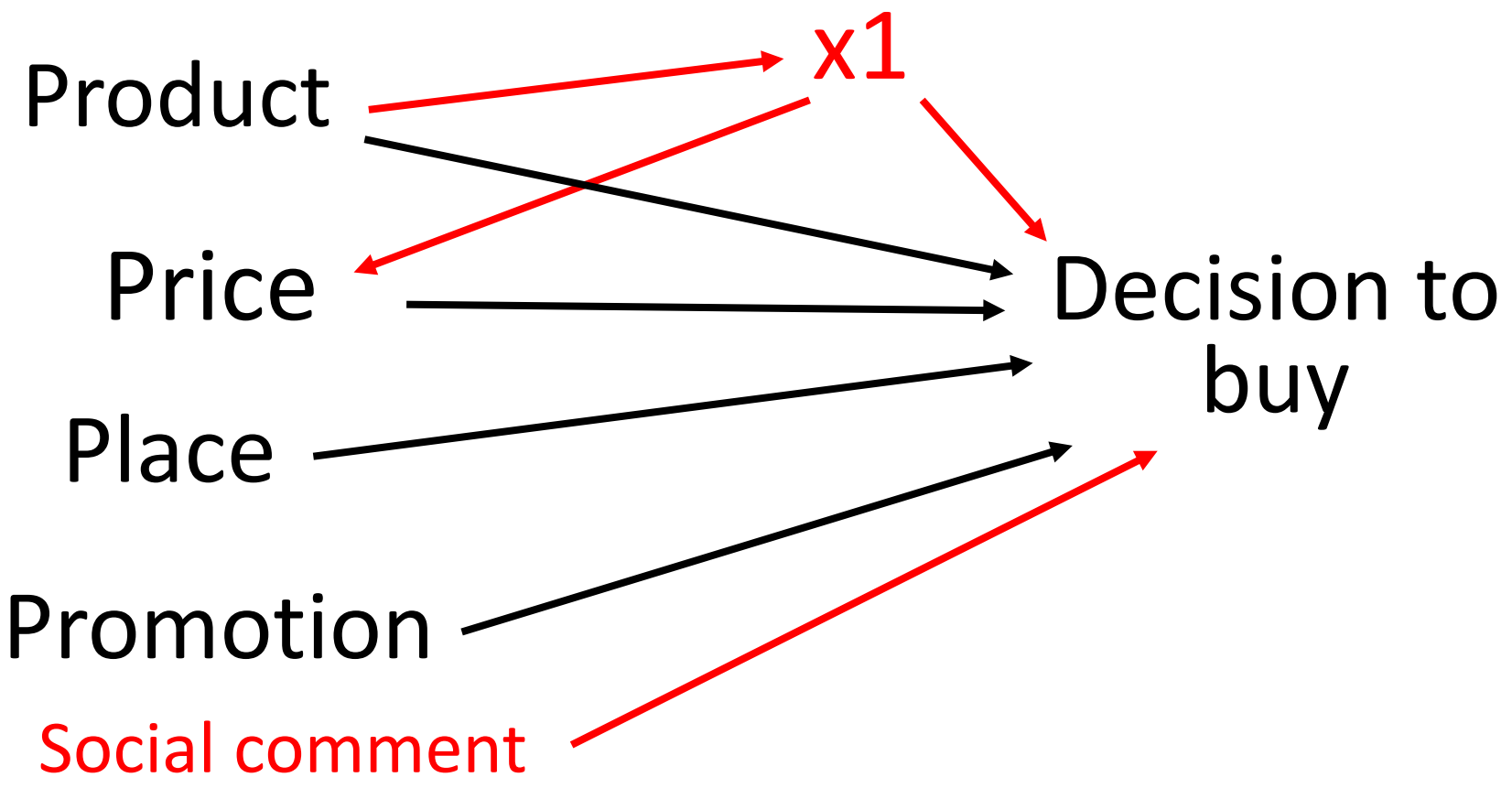
Regression



H: Product effects to the decision to buy

H_n: Product doesn't effects to the decision to buy

Regression



H: Product doesn't effects to the decision to buy

H_n: Product effects to the decision to buy ← Significant