Conceptualization

- 1. Definition
- 2. Dimensions
- 3. Indicators
- 4. Comparison of Concept, Dimension, and Indicator
- 5. Example

Definition

- Conceptualization is the process of development and clarification of concepts.
- In other words, clarifying one's concepts with words and examples and arriving at precise verbal definitions.
- e.g., what is meant by education?
- “Amount of knowledge and training acquired in school."

Another Example

- What do we mean by "social status?”
  - Wealth (millionaire)
  - Prestige (Harvard professor)
  - Power (military general)
- These are called “dimensions” of social status.

Dimensions

- We classify different meanings into different groups. Such groups are called "dimensions."
- A concept may have more than one dimension (e.g., as in case of social status).
- At a practical level, we are usually more interested in dimensions than in concepts (which are more abstract, vague).

Indicators

- When a dimension is not directly observable, we use indicators.
- For example, to measure power, we may use
  - (1) number of people under your supervision
  - (2) extent of your supervision (work-related only, or sleep and food?)
  - (3) your annual budget
  - (4) amount of equipment under your control

Comparison of Concept, Dimension, and Indicator

- In practice, the three terms are often interchangeable (e.g., gender, race).
- One difference is the level of abstraction:

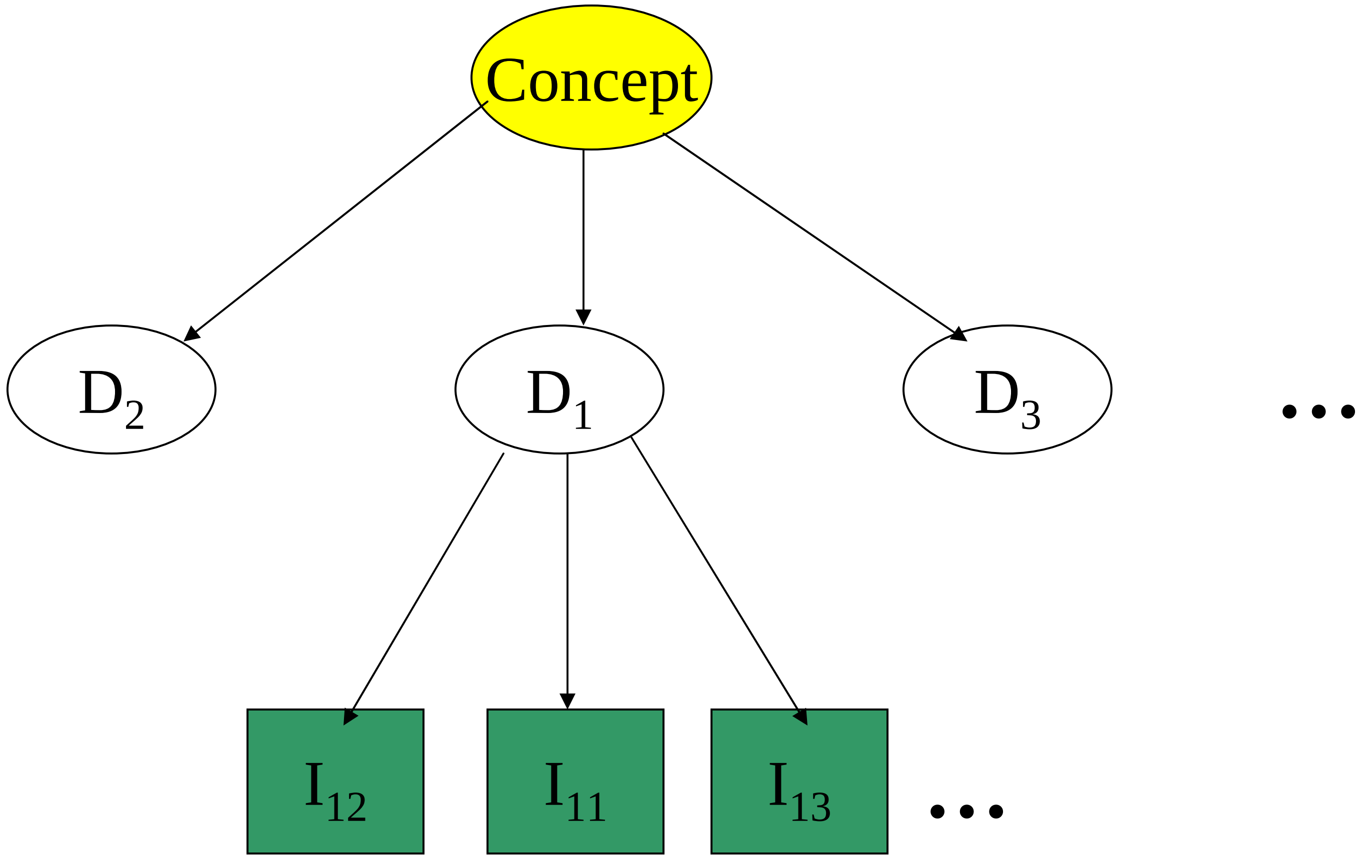
Concept	Dimension	Indicator
Highly abstract	Abstract	Concrete

- One concept may have multiple dimensions; and one dimension may have multiple indicators

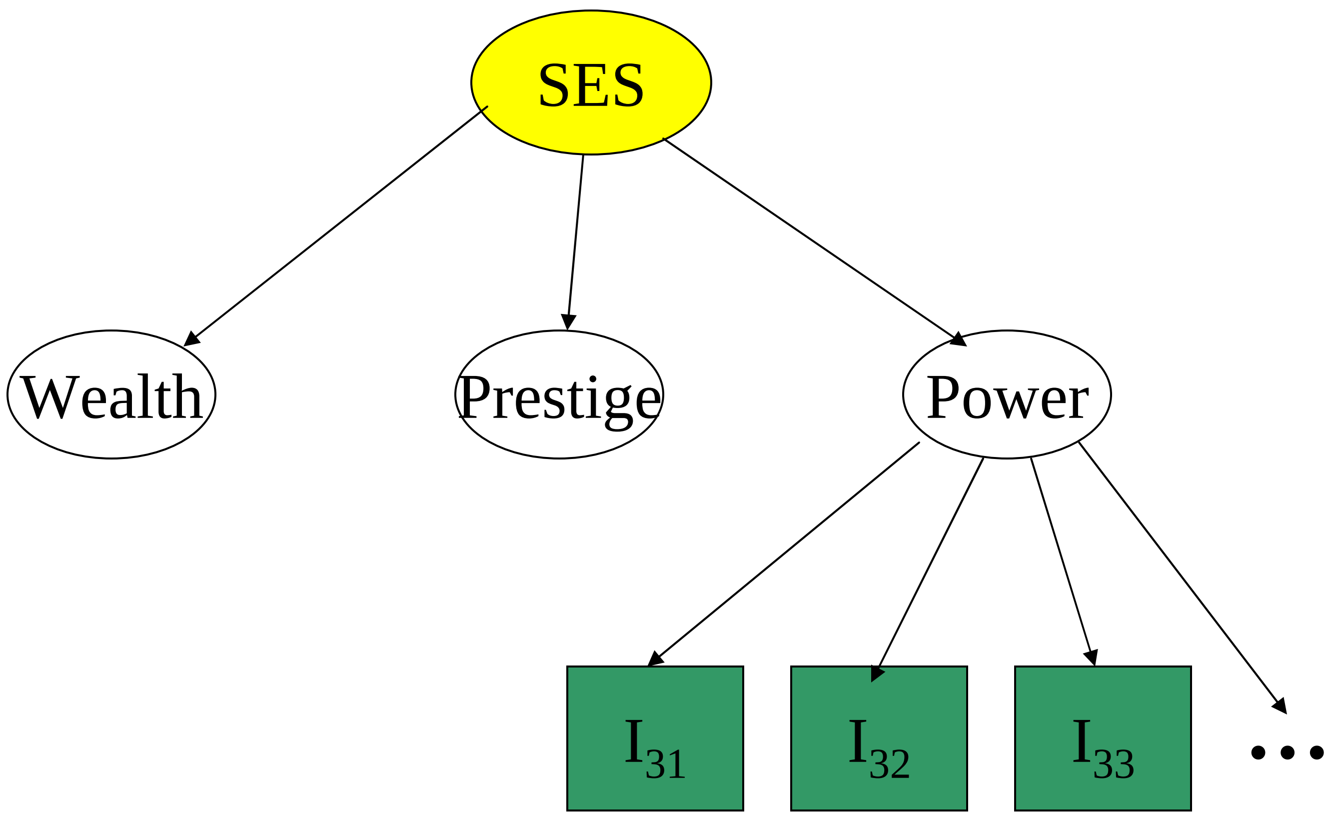
A Related term: Variables

- A variable is a statistical term, meaning a quantity that can take on different possible values.
- Both dimension and indicator can be variables.
- When a concept has only one dimension with one indicator, a concept is practically equivalent to a variable.

Summary



Example: SES



Measurement

- When it comes to measurement, we are talking about variables and indicators.
- Definition of measurement: "the assignment of numbers or labels to units of analysis to represent variable categories."
- Numbers mean different things under different circumstances.

Types of Measurement

- <u>Nominal</u> measurement
- <u>Ordinal</u> measurement
- <u>Interval</u> measurement
- <u>Ratio</u> measurement

Nominal Measurement

- Nominal measurement is a system in which cases are classified into two or more categories on some variable.
- Arbitrary numerical assignments. e.g.,
  Race = 1 for white, 2 for black, and 3 for Asian.
- Two criteria for classifications:
  - Exhaustiveness
  - Mutual exclusiveness

Ordinal Measurement

- In ordinal measurement, numbers indicate the ranking order on a dimension.
- e.g., for a typical attitude question on surveys,

Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
5	4	3	2	1

- There is no intrinsic scale – you only know relative rankings.
- Should not do arithmetic (such as averaging).

Interval Measurement

- Interval measurement assumes equal distances or intervals between "numbers."
- Numbers represent not only rankings but also “values.”
- e.g., (70, 90, 80) is the same as (80, 80, 80) for the test component of your Soc.357 final grade.

Ratio Measurement

- If an interval variable has an absolute zero, it becomes a ratio variable.
- E.g., weight, number of siblings, birth rate, etc.
- Compare three temperatures: C, F, and K.

A Comparison of the Four

Information Provided	Nominal	Ordinal	Interval	Ratio
Classification	X	X	X	X
Rank order		X	X	X
Equal intervals			X	X
Relative value				X

More general → More specific

Quality of measurement

- 1. Precision
  Precision is the extent to which numerically-detailed measurement remains meaningful (e.g., measuring annual income).
- 2. Accuracy
  Accuracy is the extent to which the measuring instrument measures what it is intended to measure. (Commonly gauged by <u>reliability</u> and <u>validity</u>).

Consequence of measurement error: descriptive versus explanatory studies

- In explanatory studies, we are interested in relationships between two concepts, or two variables. When a concept is poorly defined, the relationship is still there.
- e.g., gender and religiosity.
- Say the research interest lies in the <u>differential</u> between men and women. If we underestimate the absolute level by 30% for both, we still have an accurate measure of the relative value.

Gender and Religiosity Example

Gender	True	Measured
Men	50	35
Women	100	70

- i.e., explanatory analysis is <u>robust</u> to marginal changes of measurements.
- Reason: overestimation or underestimation for <u>all</u> units of analysis.
- Beware of <u>differential</u> under(over)estimation.

Methods for Assessing Reliability

- Test-retest method
  As in panel design, you measure the same quantity twice. Let us call the first measurement y_1, the second y_2.
  Reliability measure: correlation between y_1 and y_2.
- Low correlation means large random noise.

Methods for Assessing Reliability (Continued)

- Split-half method
  You may calculate correlations among different items on the same survey instrument, assuming equivalence of different items.
- High correlation: high reliability

Bias (Lack of Validity)

- In regression context,
  $y_i = \alpha + \beta x_i + \varepsilon_i$
  ε_i does not have a mean of zero. Rather, it could be that
  $\varepsilon_i = 4+\delta_i$, where δ_i is well behaved (i.e., has a mean of zero). Thus, 4 is the bias.

Methods for Assessing Validity

- A. Face validity
  See whether a measurement makes any sense to you and to others (also compare with similar independent measures – GSS)
- B. Criterion-related validity
  Does this measure predict other measures that can be measured more objectively.
- Use correlation <u>or</u> regression techniques.

Example: Predictability of SAT score of College Performance

- If SAT is a good measure of academic ability, why doesn’t it predict college performance well? <u>Problems:</u>
- (1) selection bias;
- (2) mediating factors between first measurement and criterion (e.g., instruction);
- (3) measurement problems for the criterion (e.g., grade inflation, differential grading, etc.).

Methods for Assessing Validity (Continued)

- C. Content validity
  The extent to which an empirical measurement reflects a specific domain of content.
- D. Construct validity
  Construct validity is concerned with the extent to which a particular measure relates to other measures in ways consistent with theoretically derived hypotheses.

A Graphic Model for Construct Validity