Three Meanings of Theory

- A set of interrelated conceptions or ideas that gives an account of intrinsic (aka, philosophical) values.
- A set of principles for practice.
- A set of interrelated conceptions or ideas that give an account of empirical phenomena. (This is the meaning of theory used in research).
Fact vs Theory

- Fact (ad. L. fact-um thing done, neut. pa. pple. of facere to do) is something that has occurred and so can be experienced directly.
- Facts can be observed.
- Theory, in contrast, is a conception or idea of a fact or an idea of something to be done.
- Facts can be experienced directly.
- Ideas refer to universals.

Fact vs Theory (continued)

- Ideas and conceptions refer to universals.
- Universals are expressed linguistically through statements of lawlike generalizations.
- Because theoretical statements are interrelated, they must be systematically related.
- Because theoretical statements describe phenomena, they must be related to observational statements (facts) through correspondence rules.
Theories as Models

- Theories are called models if:
  - Stated in terms of mathematical concepts
  - Are simplifications of facts or intrinsic values
  - Bear a substantive analogy to the facts or intrinsic values
  - Not fully established as a theory, or represents a radical departure from previous theory.

Models

- Visual representation of how something works
- Helps understanding of research question, but may over-simplify
- Shows elements linked by relationships
- Elements of models are either explicit or latent variables
Simple Model

- A. Victimization Hypothesis
  - Stressful Life Events → Adverse Health Change
  - Social Situations → Adverse Health Change

- B. Stress-Strain Hypothesis
  - Stressful Life Events → Psychological Strain
  - Social Situations → Adverse Health Change

- C. Vulnerability Hypothesis
  - Stressful Life Events → Adverse Health Change
  - Social Situations → Adverse Health Change

- D. Additive Burden Hypothesis
  - Stressful Life Events → Adverse Health Change
  - Personal Dispositions → Adverse Health Change

- E. Chronic Burden Hypothesis
  - Stressful Life Events → Adverse Health Change
  - Personal Dispositions → Adverse Health Change

- F. Event Preness Hypothesis
  - Stressful Life Events → Adverse Health Change
  - Personal Dispositions → Adverse Health Change


Complex Model

FIG. 8.4. Final model of burnout for calibration sample of elementary school teachers (Byrne, 1994).
Theory: Formal Structure, Empirical Base

- **Formal Structure**
  - Syntax
  - Semantics (Correspondence rules)

- **Empirical Base**
  - Theoretical Constructs
    - Empirical Constructs (data language)
  - Things (reduction language)

Variables

- Theoretical constructs in the formal structure are not directly observable and must be linked to corresponding empirical constructs, which in turn are linked to things (physical referents).
- Intelligence is a construct that cannot be directly observed or measured. Its existence is inferred from behavior and variables such as size of vocabulary and ability to recall strings of numbers.
Construct validity

Concept
which when refined, so that it acquires more specificity becomes a
Construct
resulting in the development of an instrument to become an
Operational Definition

Operational Definitions

- Conceptual definitions - Explain the concept (construct) the variable attempts to capture
- Operational definitions - State how the variable will be measured in practice
Variables

- Measurable characteristics of people or objects that can take on values.
- Hypothesis states presumed relationship between two or more variables in an empirically testable manner.
- Independent variable - manipulated by experimenter.
- Dependent variable - outcome or response variable.

Relationships Between Variables

- Linear
  - Positive - Both variables increase together or decrease together.
  - Negative - Values of variables change in opposite direction.
- Non-Linear
  - No easy way to describe how values of dep. var. are affected by changes in values of indep. var.
- No relationship
  - Changes in values of variables not due to influence of one upon another.
To Establish Causality between Variables

- Time order - The cause must exist before the effect
- Co-variation - A change in the cause produces a change in the effect
- Rationale - A reasonable explanation for the relationship must be stated
- Non-spuriousness - No rival cause for the effect can be found

Classifying variables

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Observed outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influences</td>
<td>Intervention variables</td>
</tr>
<tr>
<td>Independent variable</td>
<td>Manipulated or life experience</td>
</tr>
</tbody>
</table>
Non-causal relationships

Variable A
\[\text{(up arrow)}\]
Variable B
\[\text{(down arrow)}\]
Variable Z

Why do variables change together?