OPERATIONALIZATION

**Constructs** are abstractions on aspects of the world. **Operationalization** is the translation of abstract concepts into observable, concrete instances in the world.

There is a one-to-many and many-to-one relationship between constructs and operations.
- One-to-many: A construct can be operationalized in multiple ways
- Many-to-one: Multiple constructs can be operationalized in the same way

CONSTRUCT VALIDITY

Construct validity is the extent to which one can generalize from particular operations to the constructs they were meant to represent.

THREATS to CONSTRUCT VALIDITY

1. **Unreliable measures**
   Reliability is about the consistency of a measure across time, observers, and observations. Types of reliability are:
   - Test-retest (measurements don’t change within time frames they are considered stationary)
   - Interobserver (observers agree on the value of the observation)
   - Internal consistency (items on a scale are related with one another)
   A measure cannot be more valid than it is reliable.

2. **Insensitive measures**
   Insensitive measures do not adequately pick up the variance associated with a construct. They thus cannot fully capture the construct of interest.

3. **Operational confounds**
   When an operation maps onto multiple theoretically plausible constructs, one cannot tell which construct is really producing an effect even when an effect is obtained.

Because each construct could be operationalized in multiple ways and each operation embodies multiple constructs, any single operation of a construct can always be challenged. The best strategy to deal with these challenges is to use multiple operations of a construct with non-overlapping sources of error.
EXPERIMENTS

Experiments specialize in detecting causality. No other method can get at causality as closely as experiments.

The ANATOMY of an EXPERIMENT

Each experiment has at least one Independent Variable (IV) and one Dependent Variable (DV). The experimenter is interested in the causal effect of the IV on the DV. What defines an experiment is the manipulation of the IV to measure the changes in the DV. Other than manipulating the IV, the experimenter controls whatever can be controlled and randomizes what cannot be controlled across conditions.

HOW TO DETECT EFFECTS

1) Make sure the manipulation is not too weak and there are no floor/ceiling effects
2) Reduce the variation that is not due to the IV:
   a. Measurement Variance. Use reliable measures
   b. Procedural Variance. Control for any aspects of the experiment to reduce random variation (standardize procedures, control the experimental situation)
   c. People Variance. Within-participant designs remove the variance associated with participants across groups. They are thus desirable when there won’t be significant carry-over effects from one level of the IV to the other.
3) Increase sample size

INTERNAL VALIDITY

Internal validity is the degree to which causality can be inferred from an experiment.

THREATS to INTERNAL VALIDITY

If conditions of a study differ on something other than the level of the IV, any obtained effect can be explained by this additional difference. Such differences are called confounds. A confound is something that systematically varies with the independent variable.

1) Person confounds. There are systematic differences between participants in different conditions that are not due to the manipulation (e.g., non-random assignment, selective attrition)
2) Procedural confounds. There are systematic differences in the experimental procedure on top of the difference on the level of the IV (e.g., non-blind procedures, experimental operations that diverge from the control condition on constructs other than the IV)
INTERACTIONS in FACTORIAL DESIGNS

When a study has more than one IV, the effect of one IV on the DV may depend on the level of another IV. This is called an interaction.

MODERATION and MEDIATION

A moderator variable influences the strength of the relationship between the IV and the DV. Moderator effects (also called interactions) specify when an effect will hold.

A mediator variable explicates the causal relationship between the IV and the DV. Changes in the IV create changes in the mediator variable which in turn create changes in the DV. The mediator variable tells us how or why an effect holds.

EXTERNAL VALIDITY

External validity refers to the generalizability of findings. It is used in two separate senses:

1) Robustness (i.e., can the finding be generalized to other people and settings?)
2) Ecological validity (i.e., is the finding representative of everyday life?)

There is generally a trade-off between internal and external validity. If a study has no internal validity, there is no causal finding to generalize. Research findings thus should have internal validity before external validity becomes an issue.