

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). [Experimental and quasi-experimental designs for generalized causal inference](#). Boston: Houghton Mifflin. [[Link Google](#)]

We use the term **validity to refer to the approximate truth of an **inference**. (p. 34)**

We might use the terms **knowledge claim** or **proposition** in place of **inference** here, the former being observable embodiments of inferences. There are differences implied by each of these terms, but we treat them interchangeably for the present purposes. (p. 34, n. 1)

Table 2.1 – Four Types of Validity (p. 38)

Statistical Conclusion Validity The validity of inferences about the correlation (covariation) between treatment and outcome.

Internal Validity The validity of inferences about whether observed covariation between A (the presumed treatment) and B (the presumed outcome) reflects a causal relationship from A to B as those variables were manipulated or measured.

Construct Validity The validity of inferences about the higher order constructs that represent sampling particulars.

External Validity The validity of inferences about whether the cause-effect relationship holds over variation in persons, settings, treatment variables, and measurement variables.

Table 2.2 – Threats to Statistical Conclusion Validity: Reasons Why Inferences About Covariation Between Two Variables May Be Incorrect (p. 45)

S_01 Low Statistical Power: An insufficiently powered experiment may incorrectly conclude that the relationship between treatment and outcome is not significant.

S_02 Violated Assumptions of Statistical Tests: Violations of statistical test assumptions can lead to either overestimating or underestimating the size and significance of an effect.

S_03 Fishing and the Error Rate Problem: Repeated tests for significant relationships, if uncorrected for the number of tests, can artifactually inflate statistical significance.

S_04 Unreliability of Measures: Measurement error weakens the relationship between two variables and strengthens or weakens the relationships among three or more variables.

S_05 Restriction of Range: Reduced range on a variable usually weakens the relationship between it and another variable.

S_06 Unreliability of Treatment Implementation: If a treatment that is intended to be implemented in a standardized manner is implemented only partially for some respondents, effects may be underestimated compared with full implementation.

Table 2.2 – Threats to Statistical Conclusion Validity: Reasons Why Inferences About Covariation Between Two Variables May Be Incorrect (p. 45)

S_07 Extraneous Variance in the Experimental Setting: Some features of an experimental setting may inflate error, making detection of an effect more difficult.

S_08 Heterogeneity of Units: Increased variability on the outcome variable within conditions increases error variance, making detection of a relationship more difficult.

S_09 Inaccurate Effect Size Estimation: Some statistics systematically overestimate or underestimate the size of an effect.

Table 2.4 – Threats to Internal Validity: Reasons Why Inferences That the Relationship Between Two Variables Is Causal May Be Incorrect (p. 55)

I_01 Ambiguous Temporal Precedence: Lack of clarity about which variable occurred first may yield confusion about which variable is the cause and which is the effect.

I_02 Selection: Systematic differences over conditions in respondent characteristics that could also cause the observed effect.

I_03 History: Events occurring concurrently with treatment could cause the observed effect.

I_04 Maturation: Naturally occurring changes over time could be confused with a treatment effect.

I_05 Regression: When units are selected for their extreme scores, they will often have, less extreme scores on other variables, an occurrence that can be confused with a treatment effect.

I_06 Attrition: Loss of respondents to treatment or to measurement can produce artifactual effects if that loss is systematically correlated with conditions.

I_07 Testing: Exposure to a test can affect scores on subsequent exposures to that test, an occurrence that can be confused with a treatment effect.

I_08 Instrumentation: The nature of a measure may change over time or conditions in a way that could be confused with a treatment effect.

I_09 Additive and Interactive Effects of Threats to Internal Validity: The impact of a threat can be added to that of another threat or may depend on the level of another threat.

Table 3.1 – Threats to Construct Validity: Reasons Why Inferences About the Constructs That Characterize Study Operations May Be Incorrect (p. 73)

C_01 Inadequate Explication of Constructs: Failure to adequately explicate a construct may lead to incorrect inferences about the relationship between operation and construct.

C_02 Construct Confounding: Operations usually involve more than one construct, and failure to describe all the constructs may result in incomplete construct inferences.

C_03 Mono-Operation Bias: Any one operationalization of a construct both underrepresents the construct of interest and measures irrelevant constructs, complicating inference.

C_04 Mono-Method Bias: When all operationalizations use the same method (e.g., self-report), that method is part of the construct actually studied.

Table 3.1 – Threats to Construct Validity: Reasons Why Inferences About the Constructs That Characterize Study Operations May Be Incorrect (p. 73)

C_05 Confounding Constructs with Levels of Constructs: Inferences about the constructs that best represent study operations may fail to describe the limited levels of the construct that were actually studied.

C_06 Treatment Sensitive Factorial Structure: The structure of a measure may change as a result of treatment, change that may be hidden if the same scoring is always used.

C_07 Reactive Self-Report Changes: Self-reports can be affected by participant motivation to be in a treatment condition, motivation that can change after assignment is made.

C_08 Reactivity to the Experimental Situation: Participant responses reflect not just treatments and measures but also participants' perceptions of the experimental situation, and those perceptions are part of the treatment construct actually tested.

C_09 Experimenter Expectancies: The experimenter can influence participant responses by conveying expectations about desirable responses, and those expectations are part of the treatment construct as actually tested.

C_10 Novelty and Disruption Effects: Participants may respond unusually well to a novel innovation or unusually poorly to one that disrupts their routine, a response that must then be included as part of the treatment construct description.

C_11 Compensatory Equalization: When treatment provides desirable goods or services, administrators, staff, or constituents may provide compensatory goods or services to those not receiving treatment, and this action must then be included as part of the treatment construct description.

C_12 Compensatory Rivalry: Participants not receiving treatment may be motivated to show they can do as well as those receiving treatment, and this compensatory rivalry must then be included as part of the treatment construct description.

C_13 Resentful Demoralization: Participants not receiving a desirable treatment may be so resentful or demoralized that they may respond more negatively than otherwise, and this resentful demoralization must then be included as part of the treatment construct description.

C_14 Treatment Diffusion: Participants may receive services from a condition to which they were not assigned, making construct descriptions of both conditions more difficult.

Table 3.2 – Threats to External Validity: Reasons Why Inferences About How Study Results Would Hold Over Variations in Persons, Settings, Treatments, and Outcomes May Be Incorrect (p. 87)

E_01 Interaction of the Causal Relationship with Units: An effect found with certain kinds of units might not hold if other kinds of units had been studied.

E_02 Interaction of the Causal Relationship Over Treatment Variations: An effect found with one treatment variation might not hold with other variations of that treatment, or when that treatment is combined with other treatments, or when only part of that treatment is used.

E_03 Interaction of the Causal Relationship with Outcomes: An effect found on one kind of outcome observation may not hold if other outcome observations were used.

E_04 Interactions of the Causal Relationship with Settings: An effect found in one kind of setting may not hold if other kinds of settings were to be used.

E_05 Context-Dependent Mediation: An explanatory mediator of a causal relationship in one context may not mediate in another context.