Reliability and Validity

RELIABILITY:
Definition: To what extent does the indicator measure a meaningful construct (rather than random error)?
Issues: Test-retest correlation, split-half reliability, item-total correlation, Cronbach's alpha, homogeneity ratio
Increase: Increase the length of test, increase the variation among participants, avoid distractions and misunderstandings

CONSTRUCT VALIDITY:
Definition: To what extent does the indicator measure the construct under consideration (rather than systematic error)?
Issues: Multiple indicators, reverse-coded items, multi-trait-multi-method matrix, concerns both measured and manipulated variables
Increase: Use (multiple) indicators with high convergent and discriminant validity

INTERNAL VALIDITY:
Definition: To what extent does the study allow us to draw conclusions about a causal effect between two or more constructs?
Issues: Selection, maturation, history, mortality, testing, regression towards the mean, selection by maturation, treatment by mortality, treatment by testing, measured treatment variables
Increase: Eliminate the threats, above all do experimental manipulations, random assignment, and counterbalancing.

CONCLUSION VALIDITY:
Definition: To what extent does the study provide for the possibility to detect an effect if there is one?
Issues: Type II error, explained versus unexplained variance
Increase: Increase statistical power …
   1. have enough observations
   2. use indicators with high construct validity or use multiple indicators
   3. use extreme levels of the treatment variable
   4. decrease the heterogeneity of participants
5. conduct a pretest or measure constructs which are known to have an effect on the outcome variable (demographic variables, theoretically related constructs, blocking variables); then, include these variables as covariates
6. vary the treatment variable within participants rather than between participants
7. don't treat continuous variables as categorical variables (do regression analyses)
8. don't treat dependent observations as if they were independent (use "couple", "group", or "classroom" as the unit of analysis)
9. don't average across variables that have radically different means and variances (average across standardized scores)
10. transform skewed data and exclude outliers (especially when dealing with response latency data)

EXTERNAL VALIDITY:

Definition: To what extent can the results be generalized?

Issues: Populations, treatments (causes), outcomes (effects), settings

Increase: Random sampling, replication with different participants, different indicators, different stimuli, and in different settings

Typology of Psychological Studies

<table>
<thead>
<tr>
<th>ASSIGNMENT RULE</th>
<th>PLACE</th>
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</thead>
<tbody>
<tr>
<td>random</td>
<td>in the laboratory</td>
<td>&quot;laboratory experiment&quot;</td>
<td>&quot;field experiment&quot;</td>
</tr>
<tr>
<td>not random</td>
<td>&quot;laboratory study&quot;</td>
<td>&quot;field study&quot;</td>
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