

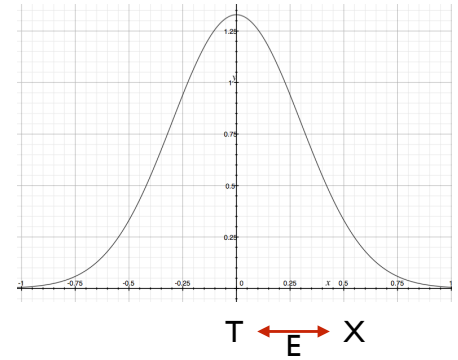
Review : Reliability

- History
- Classical Test Score Theory
 - Models of reliability
 - Sources of error
- Estimating Reliability
- Increasing Reliability
- SEM and Confidence Intervals

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Classical Test-Score Theory

- T = True Score
- X = Observed
- E = Error
- $X = T + E$
- $E = X - T$



Reliability: errors & methods

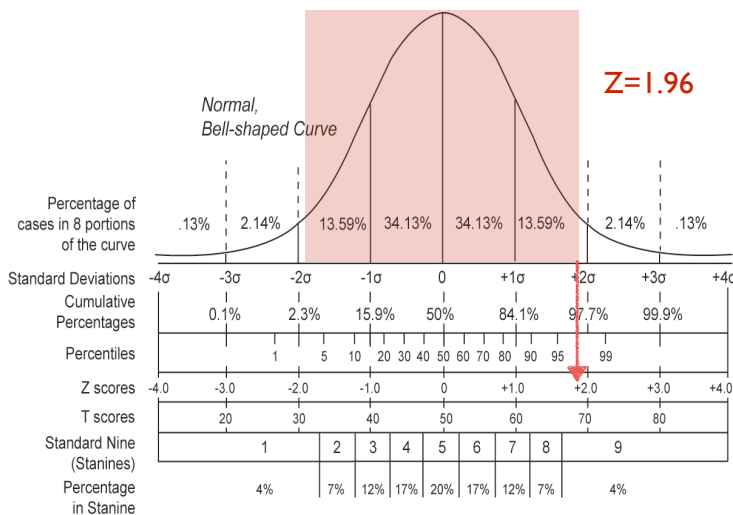
	Description	Name	Statistic
Time Sampling	1 test given two times	test-retest reliability	correlation between scores
Item Sampling	2 different tests given once	Alternate or Parallel forms	correlation between forms
Internal Consistency	One test, multiple items	Split Half or internal reliability	Cronbach's Alpha
Observer Differences	One test w/ 2+ observers	inter-observer reliability	Kappa

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Standard Error of Measurement

- $SEM = S\sqrt{1-r}$
- S = std dev of measured scores
- r = reliability coefficient of test
- SEM : 68% confidence interval (1 standard deviation, e.g. $Z = \pm 1.0$)

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Confidence Interval

- “How likely is a true score to fall within a range”
- Z = z-score associated with % range
- Confidence interval = $Z * SEM$
- Example:
 - 95% confidence interval : $Z = 1.96$
 - $SEM = 4.64$
 - $1.96 * 4.64 = 9.1$
 - 95% CI = ± 9.1 points
 - Range = $X \pm CI$
 - $106 \pm 9.1 = \text{range from } 96.9 \dots 115.1$

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Increasing Reliability

- **Increase N** (number of questions, items or tests)
- **Focus** on common characteristic
 - tests are more reliable if all items measure a single characteristic
- Use **Item Analysis** (“discriminability analysis”) to find items that best measure a single characteristic

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Reliability Summary

- Reliability: consistency of measurement
- Source of error → how to measure reliability
- Reliability coefficients ~ correlation
- Reliability is NOT Validity
- Reliability is a foundation

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