

I cried because I had no shoes;
Till I saw a man with no feet.

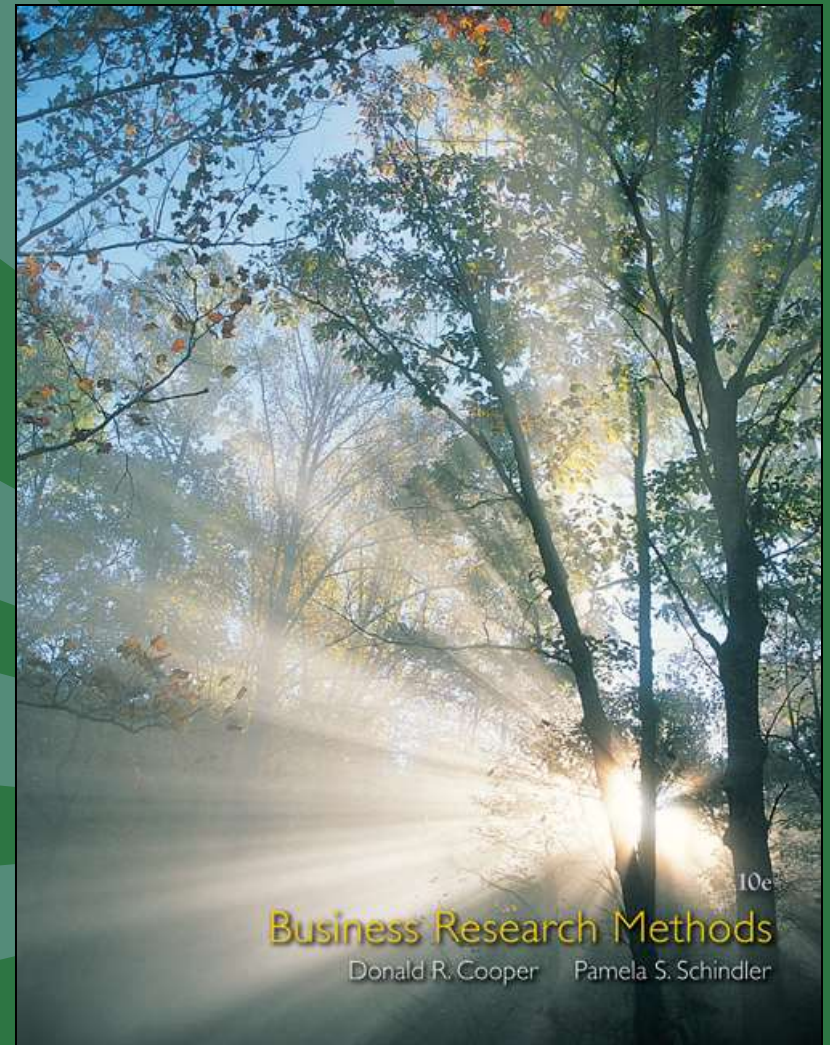
Life is full of blessings.
Sometimes we're just too blind to see them.




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Picture by Paloma Ramirez

Measurement



A vertical image of a waterfall cascading down rocks, located in the top-left corner of the slide.

Learning Objectives

Understand . . .

- The distinction between measuring objects, properties, and indicants of properties.
- The similarities and differences between the four scale types used in measurement and when each is used.
- The four major sources of measurement error.
- The criteria for evaluating good measurement.



Why Measurement Is Important

**“If you can’t measure it,
you can’t manage it.”**

*Bob Donath,
Consultant*

Measurement

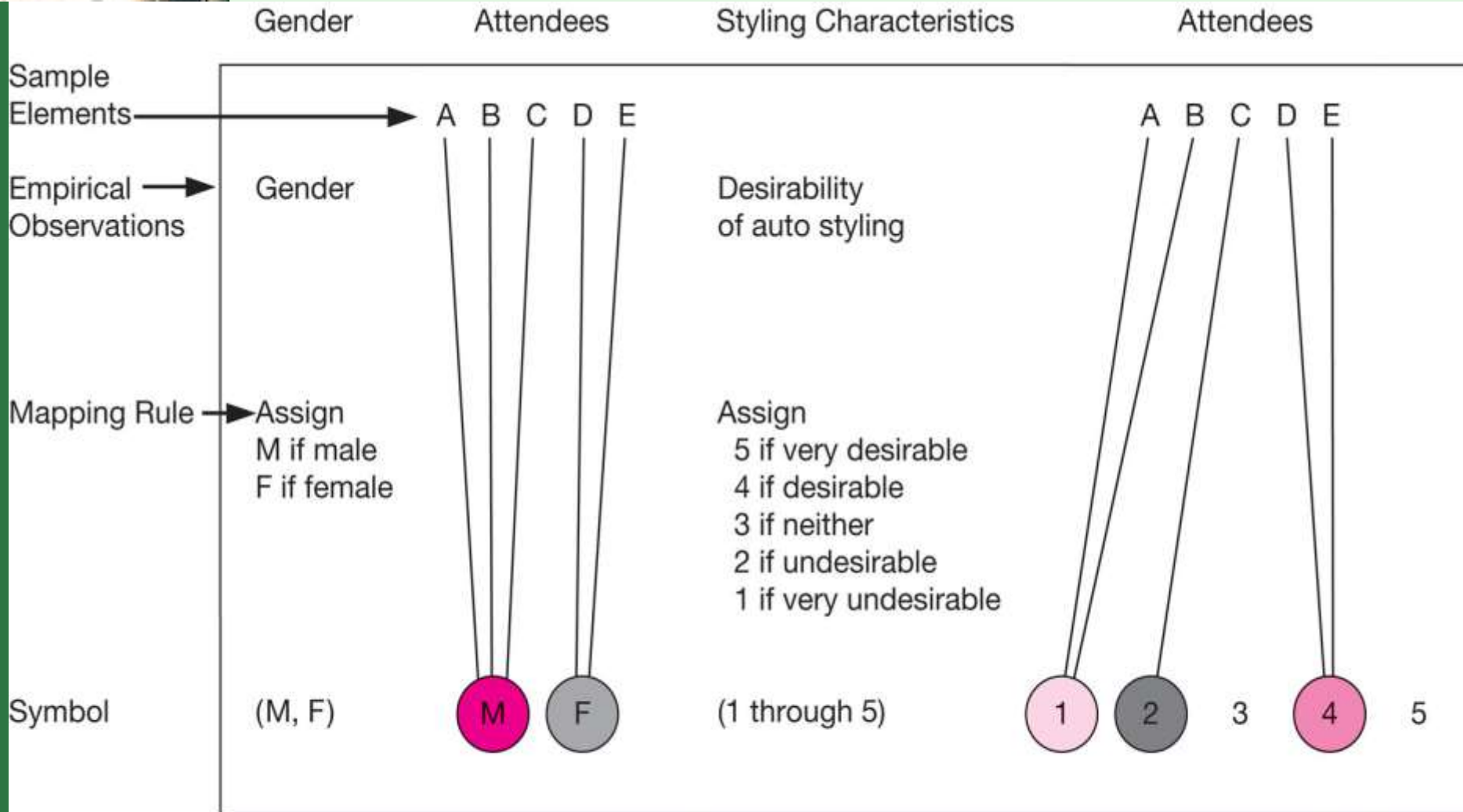
**Selecting
measurable phenomena**

**Developing a set of
mapping rules**

**Applying the mapping rule
to each phenomenon**



Characteristics of Measurement



Attendees A, B, and C are male, and find the auto's styling to be undesirable.
Attendees D and E are female and find the auto's styling desirable.



What is Measured?

- Object-things that is experienced and also those that are not very concrete
- Properties – Characteristics of the object
 - One lends itself to objective and precise measurement;
 - The other is more nebulous and does not lend itself to accurate measurement because of its abstract and subjective nature.

Levels of Measurement

Nominal

Classification

Ordinal

interval

Ratio

Types of Scales

Nominal

Ordinal

interval

Ratio

Nominal Scales

- **Mutually exclusive** and **collectively exhaustive** categories
- Exhibits the **classification** characteristic only



Levels of Measurement

Nominal

Classification

Ordinal

Classification

Order

interval

Ratio

Ordinal Scales



- Characteristics of nominal scale plus an indication of **order**
- Implies statement of greater than and less than

Levels of Measurement

Nominal

Classification

Ordinal

Classification

Order

interval

Classification

Distance

Order

Ratio

Interval Scales

- Characteristics of nominal and ordinal scales plus the concept of **equality of interval**.
- **Equal distance** exists between numbers



Levels of Measurement

Nominal

Classification

Ordinal

Classification

Order

interval

Classification

Distance

Order

Ratio

Classification

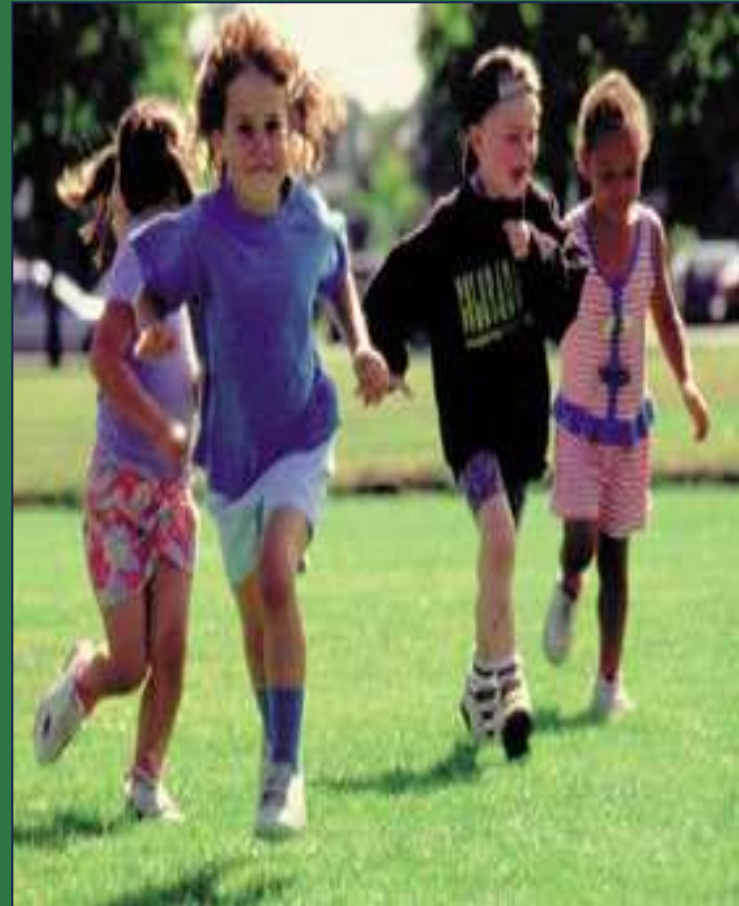
Distance

Order

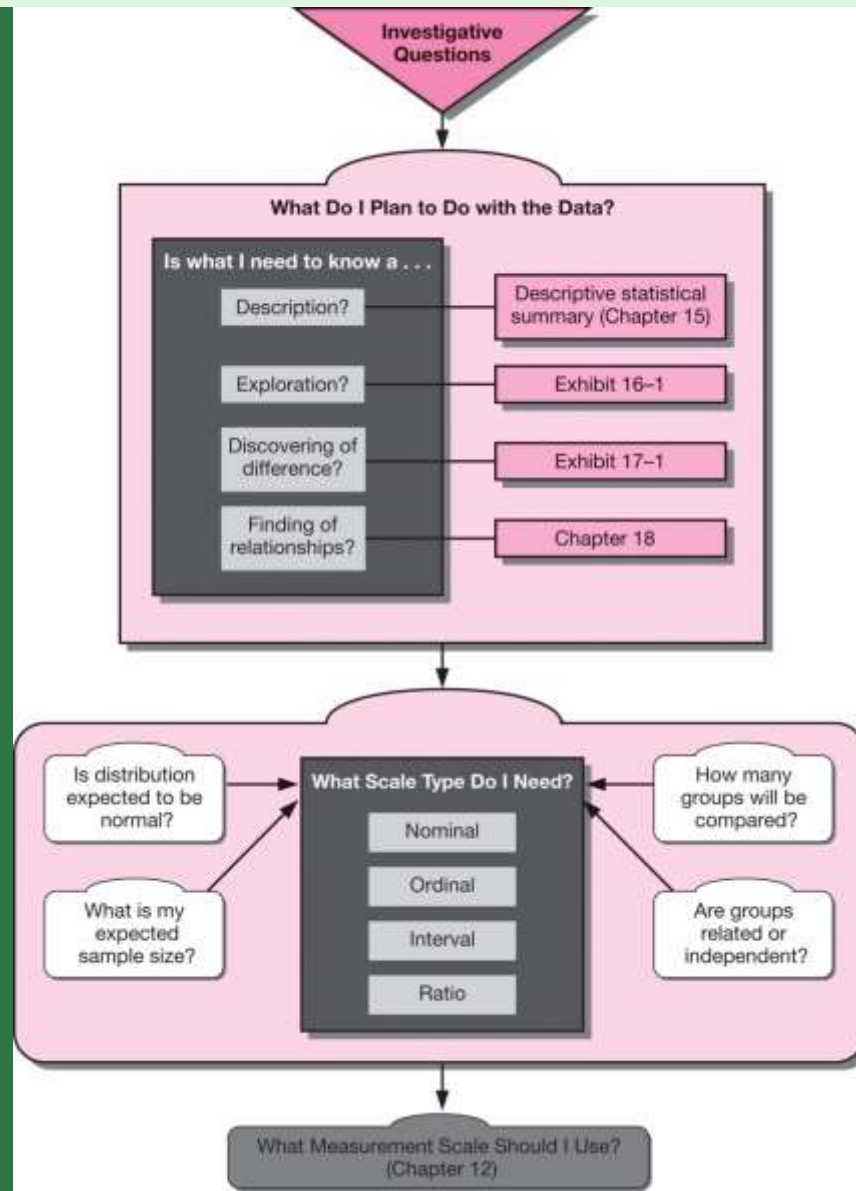
Natural Origin

Ratio Scales

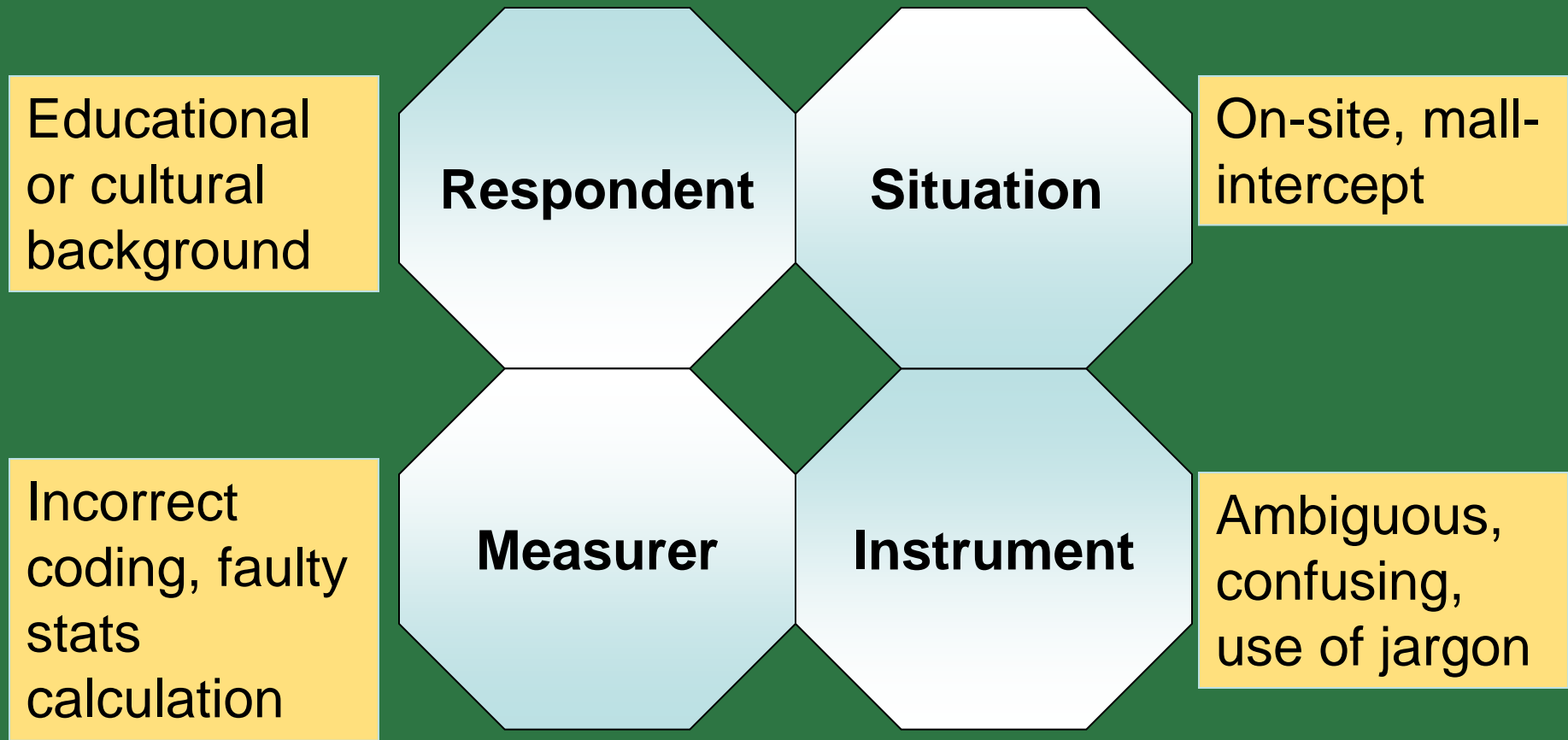
- Characteristics of previous scales plus an **absolute zero** point
- Examples
 - Weight
 - Height
 - Number of children



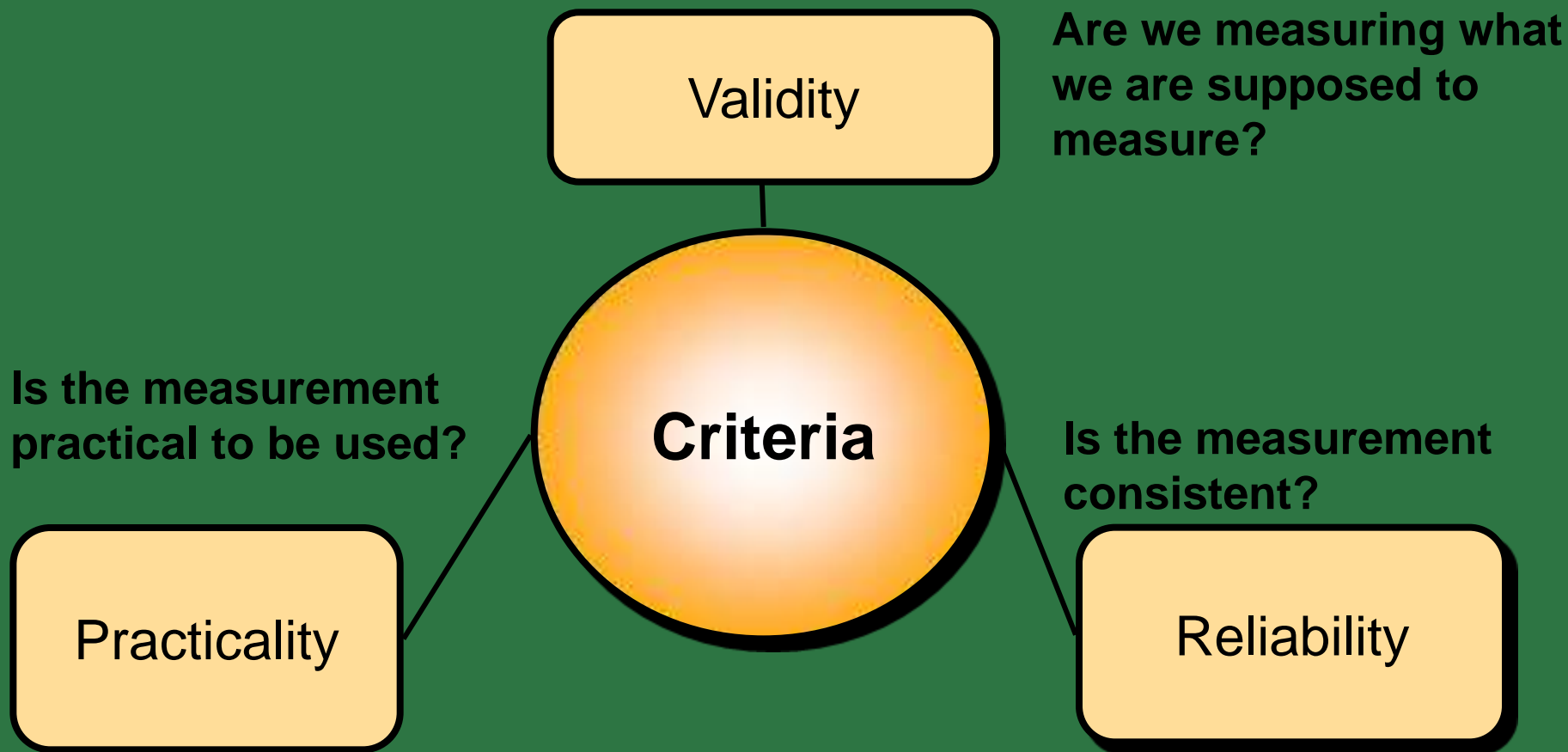
Moving from Investigative to Measurement Questions



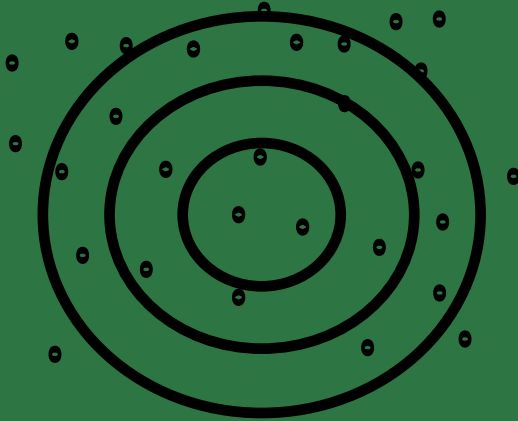
Sources of Error in Measurement



Evaluating Measurement Tools

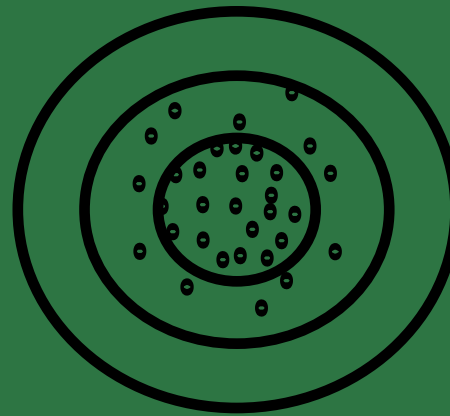


Reliability and Validity on Target



Old Rifle

Low Reliability
Low Validity
(Target A)



New Rifle

High Reliability
Validity ?
(Target B)



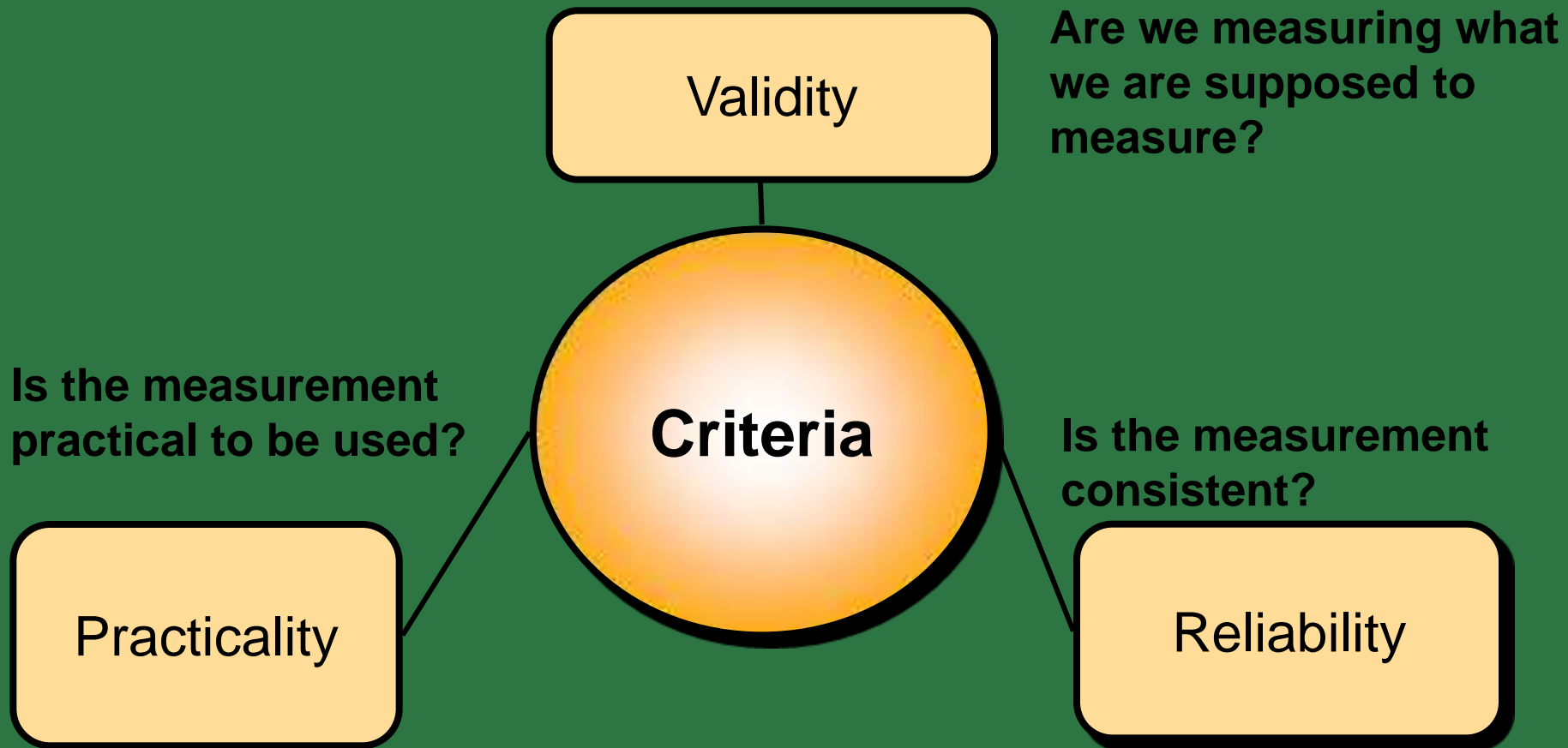
New Rifle
Sun glare

High Reliability
Low Validity
(Target C)

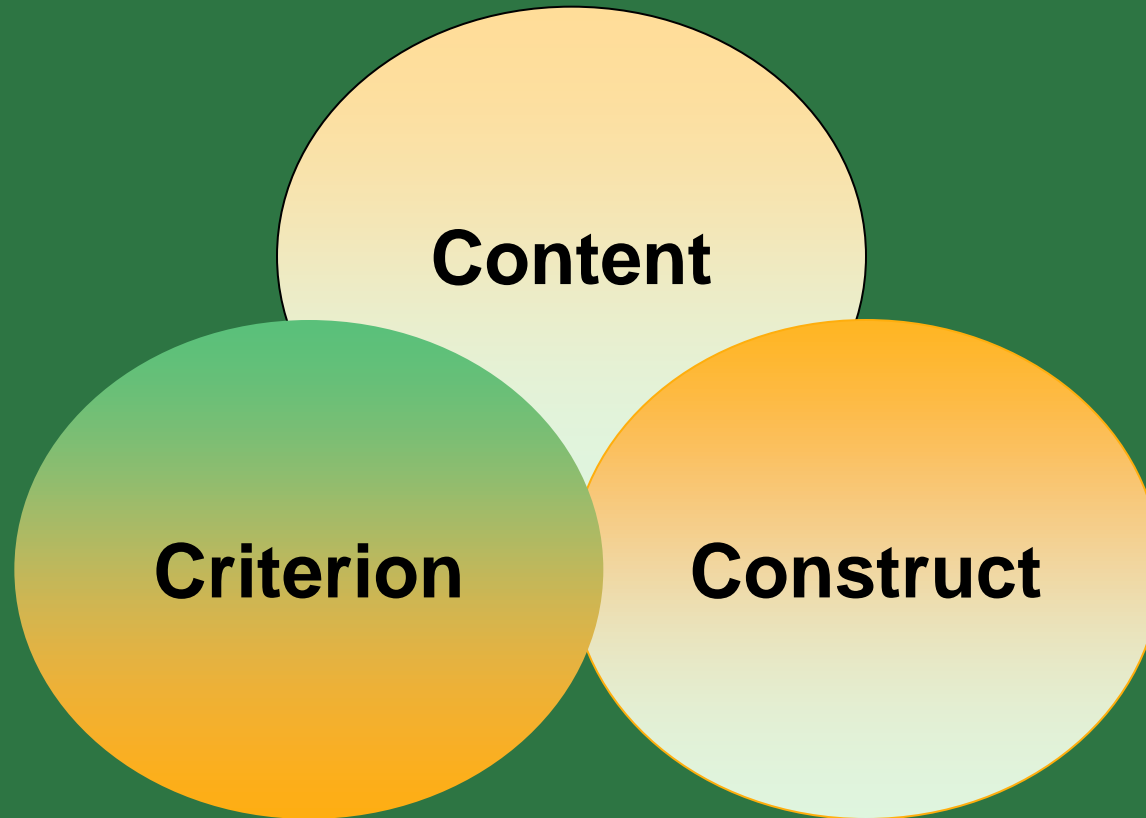
The Goal Of Measurement Validity



Evaluating Measurement Tools



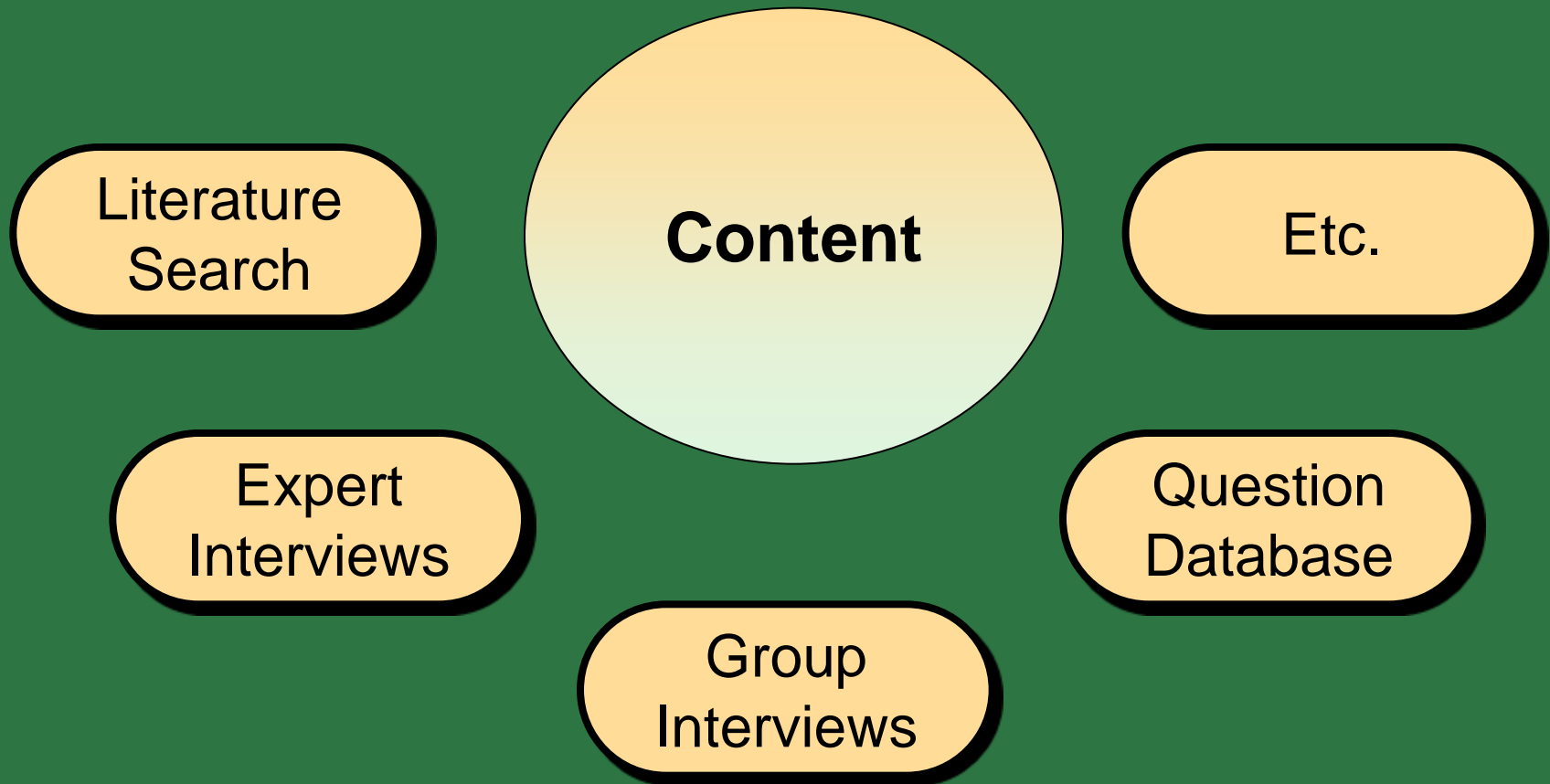
Validity Determinants



Content

Type	What is Measured	Method
Content	Does the measure adequately measure the concept?	Judgment Literature Review
Face	Do “experts” validate the instrument measures what its name suggest?	Panel Evaluation

Increasing Content Validity



Construct

Type	What is Measured	Method
Construct	Does the instrument tap the concept as theorized?	Factor analysis
Convergent	Do 2 instruments measuring the same concept correlate highly?	Correlation
Discriminant	Does the measure have a low correlation with a variable that is supposed to be unrelated to this variable?	Correlation

Increasing Construct Validity

New measure of trust

Known measure of trust

Empathy

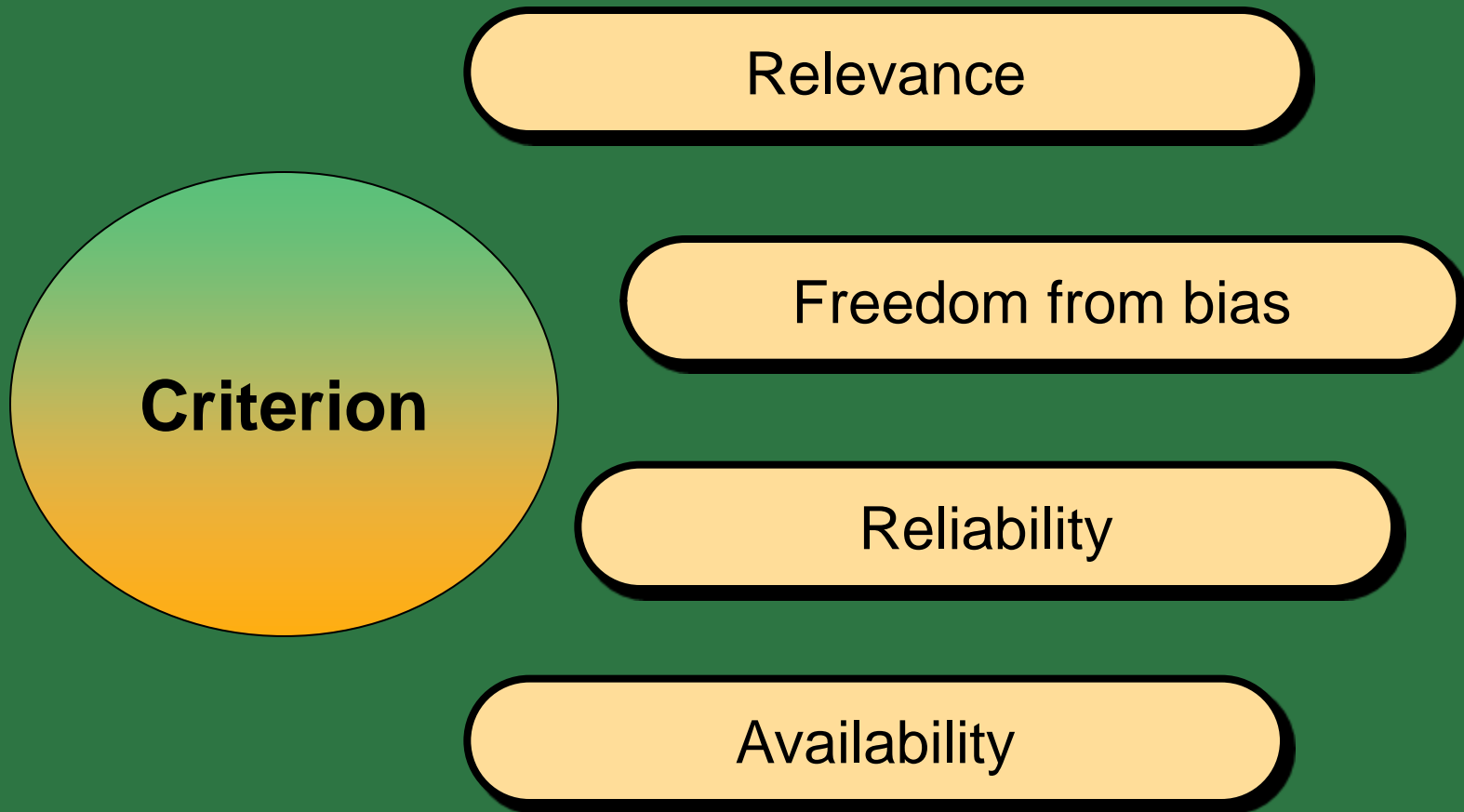
Credibility



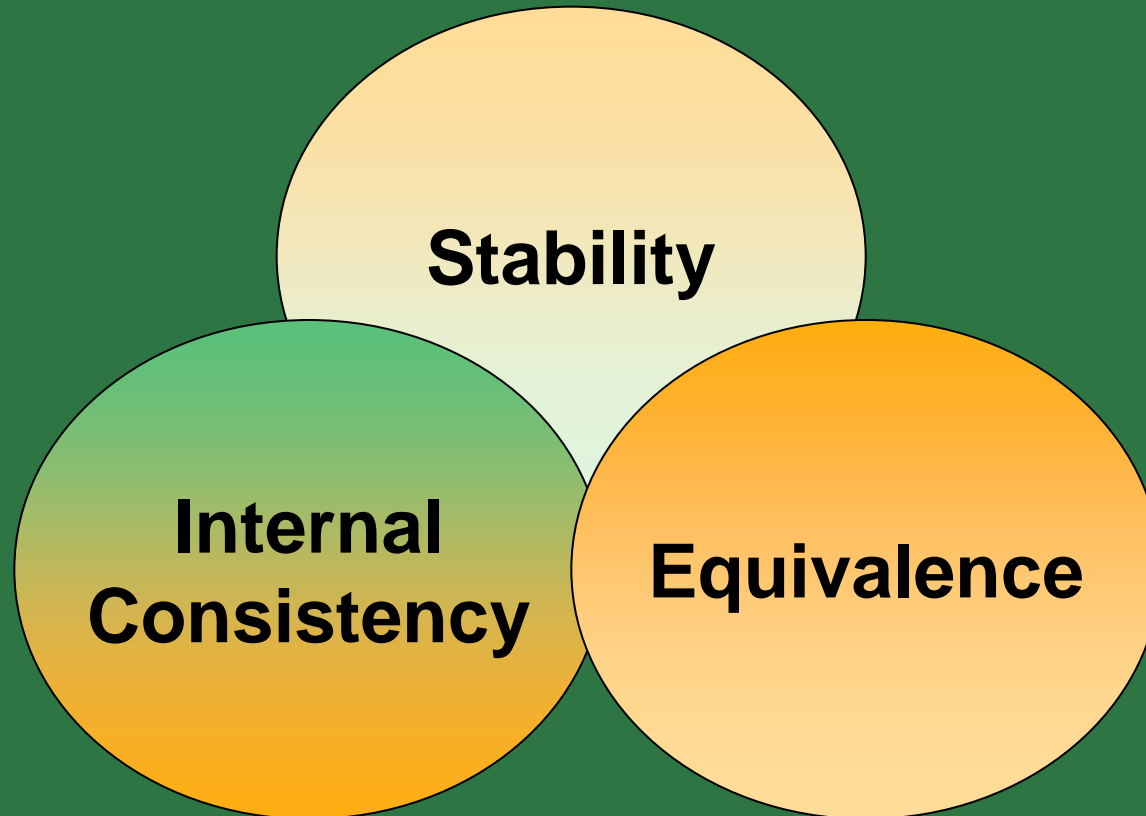
Criterion-related

Type	What is Measured	Method
Criterion related	Does the measure differentiate in a manner that helps to predict criterion variable?	Regression
Concurrent	Does the measure differentiate in a manner that helps to predict a criterion variable currently?	Regression
Predictive	Does the measure differentiate individuals in a manner as to help predict a future criterion?	Regression

Judging Criterion Validity



Reliability Estimates



Stability

Type	What is Measured	Method
Stability	The ability to maintain stability over time despite uncontrollable testing conditions and respondents state	Correlation
Test-retest	Repetition of identical measure over 2 point of time	

Equivalence

Type	What is Measured	Method
Equivalence	The extent to which an alternative form of measurement yields exactly the same or similar results.	Correlation
Parallel-form	Items and scale is the same only change in sequence	
Inter rater	The agreement of 2 or more raters	Concordance test (Value ranges 0 – 1)

Internal Consistency

Type	What is Measured	Method
Internal Consistency	The extent to which the items in the measure tap the same construct - homogeneity	Cronbach alpha
Inter-item consistency	Tests the consistency of the respondents responses of the same concept	Cronbach alpha
Split half	Splits the instrument to 2 halves	Split half Correlation

Practicality



Economy

Convenience

Interpretability

What is important in this chapter?

- Measurement
- Type of Data
- Sources of error in measurement
- Characteristics of a good measurement
 - Validity
 - Reliability
 - Practicality