

Indexes, Scales, and Typologies



Edgar Degas: The Absinthe Drinker (detail), 1875-76



Indexes versus Scales

1. Index

- A composite measure based upon multiple nominal-level indicators.
 - This composite might be the sum of responses to the indicator items or some other calculation, such as the mean.
 - Each indicator is given equal weight in measuring the construct.



Indexes versus Scales

1. Index (Continued)

- An “exercise” index, for example, might be the total score (0-5) of whether one participated in five different physical activities in the past week.
 - In this example, we want to know only whether one participated in the physical activity at all during the past week.



Indexes versus Scales

2. Scale

- A composite measure based upon multiple continuous-level indicators.
 - This composite might be the sum of responses to the indicator items or some other calculation, such as the mean.
 - Responses to each indicator vary in their strength and therefore in their contribution to the total score for the construct.



Indexes versus Scales

2. Scale (Continued)

- An “exercise” scale, for example, might be the total times (0-35) one engaged in five different physical activities last week.
 - In this example, we want to know how many times the person engaged in each of the five activities on each day of the week.



Indexes versus Scales

3. Weighting

- Both indexes and scales can be unweighted or weighted.
- In an unweighted index or scale, each item is treated equally in the calculation of the measure.
- In a weighted index or scale, some items are given more weight than are others.
- We might decide, for example, that “running” should be given more weight than “stretching” in our measure of “exercise.”



Index Construction

1. Item Selection

- Face Validity: The extent to which items seem to correspond to the definition of the construct (see also: content, logical).
- Dimensionality: Items intended to measure a construct should be exclusive to that construct.
 - There are special exceptions to this criterion, such as in multi-trait, multi-method models.
- Variance: Items should have a strong correlation with the construct being measured.



Index Construction

2. Examination of Empirical Relationships

- Bivariate Relationships: This direct relationship between the item and the construct indicates the extent to which the item measures the construct.
- Multivariate Relationships: Sometimes, once a bivariate relationship is calculated for one item and a construct, the relationship between a second item and the construct is seen as a weak one.



Index Construction

4. Handling Missing Data

- Missing data always present empirical, conceptual, and even ethical problems.
- There are no perfect solutions to the problem.
- One might:
 1. Omit cases with missing data on any items.
 2. Insert the mean of all cases to items with missing data.
 3. Use specialized statistical procedures to estimate a value for the missing data.



Index Construction

5. Index Validation

- Item Analysis: Examination of the empirical contribution of each item to measuring the construct (see also: internal validity).
- External Validation: Examination of the extent to which the construct is correlated with related constructs (see also: empirical validity).
- Bad Index or Bad Validators?: A lack of external validation might occur because the validating construct is not measured well.



Scale Construction

1. Similarities to Index Construction

- As with the construction of indexes, scale construction must address issues of item selection, examination of the data, scoring, weighting, missing data, and validation.
- Central to scale construction is the development of items with a range of responses that can accurately reflect different levels of correspondence with the construct being measured.



Types of Scales

2. Thurstone Scale

- This technique assesses the extent of agreement among a group of judges about the content validity of proposed items for a scale.
 - For example, one might ask a group of persons to judge how closely 25 different items come to measuring self-esteem. Then, one might select the 10 items that received the highest average scores for having content validity with self-esteem.



Types of Scales

2. Thurstone Scale (Continued)

- ❑ This technique can help find the best questions to ask to measure an abstract concept.
- ❑ The technique does not specify how a question or set of questions should be formatted on a questionnaire.



Types of Scales

3. Likert Scale

- This technique assesses the extent of the subject's agreement with items that have been judged (by some method) to have content validity with the construct being measured.
 - For example, the researcher might ask the respondent to 1) strongly disagree; 2) disagree; 3) neither agree nor disagree; 4) agree; or 5) strongly agree with the statement, "I am a person of worth" as a means of measuring self-esteem.



Types of Scales

2. Likert Scale (Continued)

- This technique can be used to ask many questions in a short amount of space (mailed survey) or time (telephone survey).
- The technique is intuitively appealing to most persons.
- The technique provides continuous-level data.
- The technique can become tiresome if used too extensively on a questionnaire.



Types of Scales

4. Semantic Differential Scale

- This technique assesses the extent of the subject's agreement with items, where the response for each item is shown on a continuum.

Example:

Skipping class in Sociology 202 is...

Good for me. 1 ___ 2 ___ 3 ___ 4 ___ 5 Bad for me.



Types of Scales

2. Semantic Differential (Continued)

- ❑ This technique can be used to ask many questions in a short amount of space (mailed survey) or time (telephone survey).
- ❑ The technique is intuitively appealing to most persons.
- ❑ The technique provides continuous-level data.
- ❑ The technique can become tiresome if used too extensively on a questionnaire.
- ❑ It sometimes can be difficult to label the endpoints of a semantic scale.



Types of Scales

5. Guttman Scale

- This technique assesses the extent of the subject's agreement with items, where the items are meant to represent a continuum. For example, one might ask these questions:
 1. Do you drink alcohol?
 2. Do you smoke marijuana?
 3. Do you use cocaine?

One might anticipate that all persons who answer “yes” to #3 would also answer “yes” to #1 and #2, and so forth.



Types of Scales

5. Guttman Scale (continued)

- A few years back, the results of the Big Eight Football schedule showed that the top team lost no games, the second place team lost just one game, to the first place team, the third place team lost just two games, to the first and second place teams, and so forth, forming a perfect Guttman scale.
- Knowing the season record of a team would also reveal its pattern of wins and losses to each of the other teams.



Types of Scales

2. Guttman Scale (Continued)

- ❑ This technique can be used to ask many questions in a short amount of space (mailed survey) or time (telephone survey).
- ❑ The technique is intuitively appealing to most persons.
- ❑ The technique provides continuous-level and ranked data.
- ❑ The items have to form a continuum that is accepted by respondents and the community of scholars.



Typologies

1. Definition

- A nominal-level variable that summarizes two or more variables.
- For example, one might create a typology of males:
 1. The “man’s man”: outdoor-type, strong, beer drinker.
 2. The “womanizer”: suave, good-looking, wine drinker.
 3. And so forth...



Typologies

2. Critique

- As with stereotypes, typologies do not accurately reflect anyone and provide oversimplifications of everyone.
- One should use typologies mainly to organize one's thinking as part of exploratory research.
- It is extremely difficult to analyze a typology as a dependent variable because too much variation exists within each category.



Validity and Reliability

1. Introduction

- Validity: The extent to which a measuring device measures what it is intended to measure.
- Reliability: The extent to which a measuring device provides consistent values for the same phenomenon being measured.
- These terms are described in detail at this accompanying web site: [Validity and Reliability](#).

Questions?