III. MEASUREMENT ISSUES

A. Operationalization

- Proposal Assignment 2 is about operationally defining all the variables in your selected research study.

- **Operational Definition**: The definition of a variable in terms of operations needed to produce or measure that variable.

B. Measurement Validity

- **Measurement Validity**: A measurement is valid when it is measuring what it claims to be measuring (truthfulness).

C. Measurement Reliability

- **Operationalization**: The definition of a variable in terms of operations needed to produce or measure that variable.

- **Checklist of Shows**: A list of shows that will be used to assess the operationalization of the variable.

D. Measurement Truthfulness

- **Violent TV watching**: The variable being measured.

- **Truthfulness?**: A question about the validity of the measurement.
III. MEASUREMENT ISSUES

B. Measurement Validity

- Establishing the validity of a measure takes multiple studies examining different aspects of the measure.

1. **Criterion-Related (or Concurrent) Validity**: Does the measure correlate with an established measure of the phenomenon of interest?

2. **Predictive Validity**: Does the measure predict future behavior?

3. **Face Validity**: Does the measure look like one that does what it is supposed to do?

4. **Construct Validity**: Do the results from the measure fit with theoretical expectations?

III. MEASUREMENT ISSUES

C. Measurement Reliability

- **Measurement Reliability**: A measurement is reliable when it is consistent across experimenters and/or time.

<table>
<thead>
<tr>
<th>Concept or Term</th>
<th>Consistency?</th>
<th>Truthfulness?</th>
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<tr>
<td>Measurement</td>
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- Reliability is about whether the measurement device produces similar results when repeated measurements are made under identical conditions.
  - A reliable measurement is consistent over multiple observers (measures of **inter-rater reliability**)
  - A reliable measurement is consistent over time. (measures of **internal consistency**, **test-retest reliability**, or **split-half reliability**)

- Measures can be reliable but invalid:
  - The “Draw-A-Person” test is supposed to be a measure of IQ

- Measures can not be unreliable but valid:
  - How can an unreliable measure ever have validity?
    - Throw away a ruler that gives you a different score on each measurement of the same object.

- One critical issue in reading a research paper is the status of the measurement devices
  - Is there evidence that they are reliable and valid?
III. MEASUREMENT ISSUES
   D. Measurement Scales
   - Once variables are operationalized, their scaling properties can be identified
   - **Measurement Scales**: The type of information yielded by a measurement operation. The mathematical properties of the information yielded by the measurement device
     - There are 4 types of measurement scales (NOIR)
       - Nominal
       - Ordinal
       - Interval
       - Ratio

   Nominal: Information about whether two values are the same or different (X is different from Y but the same as Z):
   - Judgments of: **Same/Different**.
   - Sex, Blue/Not Blue Eye Color, Higher/Lower Achievers.

Ordinal: Information about whether two values are different and the direction of difference (better, higher, greater, etc.)
- e.g.: X is greater than y, but less than z:
- Judgments of: **Same/Different; Greater than/Less than**.
- Stages, Ranks, Multiple Categorical types

Interval: Information about the units that mark the distance between two values. (The difference between X and Y is 6 units, exactly the same as the difference between Y and Z)
- Judgments of: **Same/Different, Greater than/Less Than, Differences are the same/Differences are different**
- Temperature, IQ.
III. MEASUREMENT ISSUES
D. Measurement Scales

- **Ratio**: Information about the precise relation between two values by their distance from a fix zero-point. (X is exactly twice as much as y)
- **Judgments of**: Same/Different, Greater than/Less Than, Differences are the same/Differences are different, Quantification of the difference.
- **Weight, Length, Time**.

III. MEASUREMENT ISSUES
D. Measurement Scales

- The best scale to use depends on…
  - How much information is needed.
  - Statistical tests to be used.
    - Tests like ANOVA or T-Tests must use interval or ratio scales but Chi-Square might best be used on nominal and ordinal scales.
  - Ecological validity of the assessment.
    - Which scale corresponds to the real life situations of movie judgments: Nominal, Ordinal, Interval or Ratio?
  - Psychological reality of the scale.
    - Preferences for justification statements: Ordinal (rank order), Interval (rating).

III. MEASUREMENT ISSUES
E. Anticipating and Fixing Problems

- Even with a very good operational definition of a variable, measurement issues may pose a problem, reflecting inappropriate distinctions
  - **Innsensitivity**: Insensitive measurement devices produce range effects which reflect the fact that the limits of the measurement device are encountered too frequently.
    - Floor effects: Too many scores are at the lower limit
    - Ceiling effects: Too many scores are at the upper limit.
  - **Overunsensitivity**: An overly sensitive measuring device produce outliers.

III. MEASUREMENT ISSUES
E. Anticipating and Fixing Problems

- Even with a very good operational definition of a variable, the process of measuring may pose problems.
- **Reactivity**: The effect on measurement of the act of measuring.
  - **Demand characteristics**: Inadvertent cues to the purpose of the study.
    - Effect of guns on aggression is studied by placing a gun in the research room in one condition. The unusual sight of a gun in a research room will cause participants to think about the the purpose of the research.
III. MEASUREMENT ISSUES
E. Anticipating and Fixing Problems

- **Attitude of subjects**: Participants’ predispositions towards the research
  - Cooperative: Try to please; Negative: Participant is difficult or refuses to understand or play by the rules; Defensive: Participant presents self in the best possible light -- tries to smell like a rose.

- **Experimenter bias**: Experimenters’ behaviors that influence participants’ specific responses.
  - Nodding to correct answers by not to incorrect ones.

- **Expectancy effects**: Experimenters’ attitudes about the capabilities of participants affects their performance (Rosenthal)

III. MEASUREMENT ISSUES
E. Anticipating and Fixing Problems

- **Reducing measurement problems**
  - **Pilot studies**
    - Allows the researcher to check procedures and results
  - **Manipulation checks**
    - Interviews and other techniques to assess whether participants experience what they were supposed to.
  - **Reduce Bias**
    - Single Blind: Experimenter ignorant of the conditions
    - Double Blind: Experimenter and participant ignorant of the conditions.
  - **Automate procedures to reduce expectancy.**