

Empirical Social Research

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Agenda

- Learning objectives
- Measurement and scaling concepts
- Q&A

Measurement

Students ...

- ✓ ... determine what needs to be measured to address a research question or hypothesis.
- ✓ ... distinguish levels of scale measurement.
- ✓ ... list the three criteria for good measurement.

What do I measure?

Measurement

- The process of describing some property of a phenomenon, usually by assigning numbers in a *reliable* and *valid* way (e.g. to attributes of an object or the characteristics of a situation).

Concept

- A generalized idea about a class of objects, attributes, occurrences, or processes.

How do I measure?

Reliability:

- Extent to which your data collection or analysis will generate consistent findings.
 - i. The extent to which the measures yield the same results on different occasions.
 - ii. The extent to which similar observations are reached by different observers.
 - iii. The extent to which there is transparency in the way the raw data was interpreted.

Validity:

- Extent to which findings are really about what they appear to be about: do we really measure what we want to measure?

Operational definitions

Operationalisation

- The process of identifying scales that correspond to variance in a concept involved in a research process.

Scales

- A device providing a range of values that correspond to different characteristics or amounts of a characteristic exhibited in observing a concept.

Operational definitions

Variable

- Anything that varies or changes from one instance to another; can exhibit differences in value, usually in magnitude or strength, or in direction.
- Capture different values of a concept.

Levels of scale measurement – categorical data

Nominal

- Assigns a value that cannot be measured numerically to an object for identification or classification purposes.
- Most elementary level of measurement.
- E.g. men – women; hatchback, saloon, estate car.

Ordinal

- Ranking scales allowing things to be arranged based on how much of some concept they possess.
- Have nominal properties.
- E.g. a scale from 1 to 5: how satisfied are you with this lecture.

Levels of scale measurement – quantifiable data

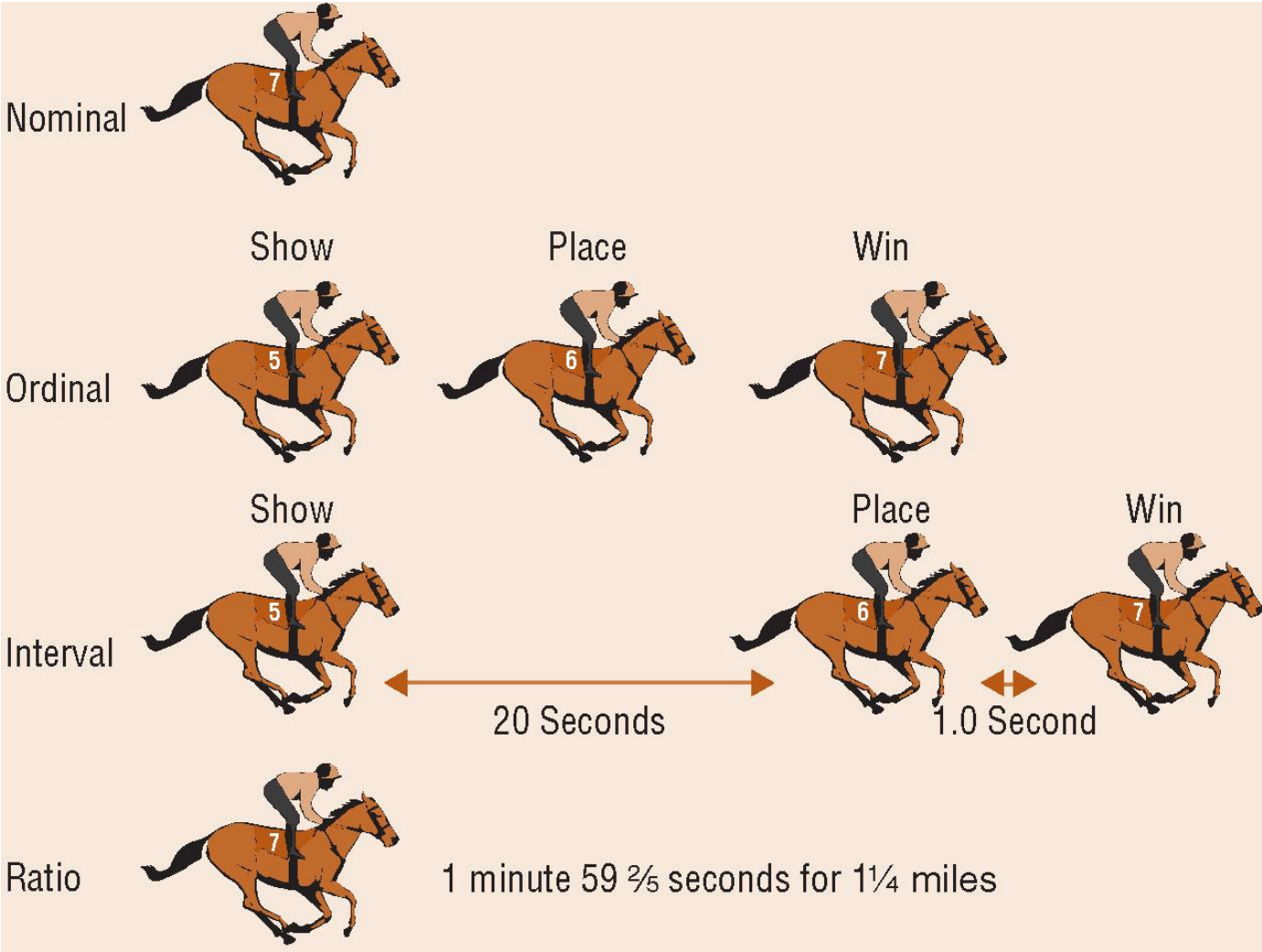
Interval

- Capture information about differences in quantities of a concept.
- You can state the difference between any two values, but not the relative difference.

Ratio

- Highest form of measurement.
- Have all the properties of interval scales with the additional attribute of representing absolute quantities.
- Absolute zero.

Levels of scale measurement



Levels of scale measurement

Level	Examples	Numerical Operations	Descriptive Statistics
Nominal	<p>Student ID number</p> <p>Yes – No</p> <p>Male – Female</p> <p>Buy – Did Not Buy</p> <p>East region</p> <p>Central region</p> <p>West region</p>	Counting	<ul style="list-style-type: none"> • Frequencies • Mode
Ordinal	<p>Student class rank</p> <p>Please rank your three favorite movies.</p> <p>Choose from the following:</p> <ul style="list-style-type: none"> • Dissatisfied • Satisfied • Very satisfied • Delighted <p>Indicate your level of education:</p> <ul style="list-style-type: none"> • Some high school • High school diploma • Some college • College degree • Graduate degree 	<p>Counting</p> <p>Ordering</p>	<ul style="list-style-type: none"> • Frequencies • Mode • Median • Range
Interval	<p>Student grade point average (GPA)</p> <p>Temperature (Celsius and Fahrenheit)</p> <p>Points given on an essay question</p> <p>100-point job performance rating provided by supervisor</p>	Common arithmetic operations	<ul style="list-style-type: none"> • Frequencies • Mode • Median • Range • Mean • Variance • Standard deviation
Ratio	<p>Amount spent on last purchase</p> <p>Salesperson sales volume</p> <p>Number of stores visited on a shopping trip</p> <p>Annual family income</p> <p>Time spent viewing a Web page</p>	All arithmetic operations	<ul style="list-style-type: none"> • Frequencies • Mode • Median • Range • Mean • Variance • Standard deviation

Mathematical and statistical analysis of scales

Discrete Measures

- Measures that can take on only one of a finite number of values.

Continuous Measures

- Measures that reflect the intensity of a concept by assigning values that can take on any value along some scale range.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I enjoy participating in online auctions	1	2	3	4	5

Levels of Measurement

Tips and skills

A completed and processed questionnaire

Questionnaire

1. Are you male or female (please tick)?

Male Female

Code

① 2

2. How old are you?

21 years

21

3. Which of the following best describes your *main* reason for going to the gym? (please tick *one* only)

Relaxation

Maintain or improve fitness

Lose weight

Meet others

Build strength

Other (please specify)

1

②

3

4

5

6

Levels of Measurement

4. When you go to the gym, how often do you use the cardiovascular equipment (jogger, step machine, bike, rower)? (please tick)

- | | | |
|---------|-------------------------------------|---|
| Always | <input checked="" type="checkbox"/> | ① |
| Usually | <input type="checkbox"/> | 2 |
| Rarely | <input type="checkbox"/> | 3 |
| Never | <input type="checkbox"/> | 4 |

5. When you go to the gym, how often do you use the weights machines (including free weights)? (please tick)

- | | | |
|---------|-------------------------------------|---|
| Always | <input checked="" type="checkbox"/> | ① |
| Usually | <input type="checkbox"/> | 2 |
| Rarely | <input type="checkbox"/> | 3 |
| Never | <input type="checkbox"/> | 4 |

6. How frequently do you usually go to the gym? (please tick)

- | | | |
|------------------------|-------------------------------------|---|
| Every day | <input type="checkbox"/> | 1 |
| 4-6 days a week | <input type="checkbox"/> | 2 |
| 2 or 3 days a week | <input checked="" type="checkbox"/> | ③ |
| Once a week | <input type="checkbox"/> | 4 |
| 2 or 3 times a month | <input type="checkbox"/> | 5 |
| Once a month | <input type="checkbox"/> | 6 |
| Less than once a month | <input type="checkbox"/> | 7 |

Levels of Measurement

10. During your last visit to the gym, how many minutes did you spend on the cardiovascular equipment (jogger, step machine, bike, rower)?
33 minutes 5
11. During your last visit to the gym, how many minutes did you spend on the weights machines (including free weights)?
17 minutes 33
12. During your last visit to the gym, how many minutes did you spend on other activities (e.g. stretching exercises)?
5 minutes 17
- 5

Wrap-up

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- ✓ ... distinguish levels of scale measurement.
- ✓ ... list the three criteria for good measurement.

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Thank you very much for your attention.

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