

DATA MEASUREMENT SCALES

The scales of measurement describe the nature of information within the values assigned to variables.

4 Primary scales of measurement:

- 1) Nominal scale
- 2) Ordinal scale
- 3) Interval
- 4) Ratio

1) Nominal scale

Definition: This scale classifies data into distinct categories, that do not have an intrinsic order

Qualitative / Categorical data

Characteristics:

- i) Data is categorized based on labels, names or qualities.
- ii) Categories are mutually exclusive

Examples

Gender:

-> M

-> F

- iii) No logical order among categories [No Rank]

Examples

Colors:

Red Blue Green

50% 40% 10%

Types of cuisine

Italian Chinese Mexican

2) Ordinal scale

Definition: This scale classifies the data into categories that can be ranked or ordered.

Characteristics

- i) Data is categorized and ranked in a specific order
- ii) The interval between ranks are not necessarily equal

Examples:

Educational levels => Ranks

High School	Bachelor	Masters	Doctorate
1	2	3	4

Customer feedback => Ranks

Very Satisfied	Satisfied	Not Satisfied
2	1	0

Socio Economic status => Ranks

Low	Middle	High
2	1	0

3) Interval scale

Definition: The interval scale not only categorizes and orders but also specify the exact difference between intervals. It lacks a true zero point.

Characteristics

- i) Data is ordered with constant interval between values.
- ii) Allows for meaningful comparison of differences. (Ratio cannot be measured)
- iii) No true zero point (an interval scale of measurement, where the zero on the scale is arbitrary and does not represent a complete absence of the measured quantity).

Examples:

Temperature in fahrenheit: (Temperature in ranges)

10° F, 20° F, 30° F => 0° F "No temperature" not possible

Difference 20 - 10 = 10

Difference 20 - 30 = 10

IQ scores

90, 100, 110, 120

IQ = 0 not possible

Difference 100 - 90 = 10

Difference 110 - 100 = 10

Difference 120 - 110 = 10

Calendar years

2024, 2022, 2020 => 0 year not possible

Difference 2024 - 2022 = 2

Difference 2022 - 2020 = 2

4) Ratio scale

- i) The order matters.
- ii) Differences are measurable;
- iii) Contains a 0 starting point.

Examples

Students marks in a class

0, 90, 60, 30, 75, 45

ascendent = 0, 15, 30, 45, 60, 75, 90

↗

30 - 15 = 15

45 - 30 = 15

Ratio = 90 / 15 = 6 **6 : 1**

Ratio can be measure

Assignment:

- 1) Length of different rivers in the world?
- 2) Favorite food based on gender ?
- 3) Marital Status?
- 4) IQ Measurement

Data Measurement Scales Analysis

1) Length of different rivers in the world

• Scale Type: Ratio

• **Explanation:** River length is measured in units (kilometers/miles) with a true zero point (a river cannot have negative length). You can perform all mathematical operations - addition, subtraction, multiplication, and division. You can meaningfully say one river is twice as long as another.

2) Favorite food based on gender

• Scale Type: Nominal

• **Explanation:** This represents categories or names with no inherent order or ranking. Foods like "pizza," "sushi," or "tacos" are simply different categories. You cannot rank them numerically or perform mathematical operations on these categories.

3) Marital Status

• Scale Type: Nominal

• **Explanation:** Categories like "single," "married," "divorced," "widowed" are distinct groups with no natural ordering or hierarchy. These are qualitative categories that cannot be ranked or measured numerically.

4) IQ Measurement

• Scale Type: Interval

• **Explanation:** IQ scores have equal intervals between values (the difference between 100 and 110 is the same as between 110 and 120), but there's no true zero point. An IQ of 0 doesn't mean "no intelligence," and you cannot say someone with an IQ of 120 is "twice as intelligent" as someone with an IQ of 60.

Summary of Measurement Scales:

- **Nominal:** Categories with no order (Favorite food, Marital status)
- **Ordinal:** Ranked categories (not present in your examples)
- **Interval:** Equal intervals, no true zero (IQ scores)
- **Ratio:** Equal intervals with true zero (River lengths)