**Common issues with level of measurement in data analysis plan:**

Here are the common confusions that I noticed in the level of measurement.

**Nominal**

* It contains information only about the label/names.
* **Not on a continuum** (i.e., you cannot vary it by degree).
  + For example, Yes/No is a nominal level of measurement. But Definitely Yes | somewhat Yes | somewhat No | Definitely No is **NOT** a nominal level of measurement (This is interval).
* Discrete labels.
  + For example, what are the preferred retailers? Check all that applies.
    - Sears
    - Walmart
    - Target

**Ordinal two types:**

* Contains information about both names + order
* There are two types of ordinal scale:
  + **Explicit in the question instruction**: Rank the following retailers in terms of your preference 1 = most preferred, 3 = least preferred

𝥷Sears

𝥷Walmart

𝥷Target

* **Explicit in the response options** (i.e., Sears is better > Sears is about the same > Sears is worse):

Ex1. What is your preference between Walmart and sears in terms of customer service?

𝥷Sears is better than Walmart

𝥷Sears is about the same as Walmart

𝥷Sears is worse than Walmart

Ex2. How often do you visit Sears?  (i.e., once a week  > once a month > once a year):

𝥷Once a week

𝥷Once a month

𝥷Once a year

* **NOT** ordinal:
  + The ranking is implicit. (i.e., you rank the response option implicitly in your mind. But the manager cannot explicitly know the ranking.
    - For the example below, you **CANNOT** know order the response options by Sears > Walmart > Target)

Which retailer is your most preferred? Choose **only one**

𝥷Sears

𝥷Walmart

𝥷Target

**Interval two types:**

* Contains information about both names + order + equal interval
* **Physically verifiable variable**

For example:

How much money do you have in your pocket?

$1-2

$3-4

$5-6

$7-8

* **Mental variable**

For example:

How satisfied are you with Sears’ customer service?

Very unsatisfied 1 2 3 4 5 very satisfied

Or

Below is equivalent to a scale of 1-5 with two anchors. Mental variables cannot be very precisely cut into intervals. Thus, we assume they have roughly equal intervals.

Very unsatisfied |  somewhat unsatisfied| neither satisfied nor unsatisfied| somewhat satisfied | very satisfied

**Ratio:**

* Contains information of name + order + interval + real 0
* Must be physically verifiable. Thus, it can take true 0 (e.g., $0 in your pocket).
* It ALSO requires the most granular increment (i.e., breaks down the interval into the smallest unit).

For example,

How much money do you have in your pocket?  \_\_   (i.e., you can fill the blank with 0 , $1.5 , $3 …. Or any reasonable number with the most granular change).

If it is shown as an equal interval, then it is interval **NOT** Ratio.

For example:

How much money do you have in your pocket?  (This is **interval** scale)

$1-2

$3-4

$5-6

$7-8

**Conclusion:**

1. You need to understand the kind of information in the different measurement levels to correctly identify them. You **cannot just memorize** the format. For example, the open-ended question is always nominal. This is incorrect as it can also be Ratio based on what kinds of response options can be used to fill in the blank.
2. The higher level of measurement **can be transformed** into the lower level of measurement but not vice versa since the higher level of measurement contains the same information as the lower level of measurement and more. For example, the Ratio can be cut into an interval after you collect the data but not vice versa. See the above example in Ratio.
3. We use the level of measurement to judge the **most succinct descriptive statistics** that we can use. We only have two options so far. Nominal and Ordinal, we use percent. While interval and Ratio, we can use both percent and the average. But we prefer average as it is more succinct to show the insight to the manager.