1. What is sampling?

The Advantages of Sampling

- It involves a smaller amount of subjects, which reduces investment in time and money.
- Sampling can actually be more accurate than studying an entire population, because it affords researchers a lot more control over the subjects. Large studies can bury interesting correlations amongst the 'noise.'
- Statistical manipulations are much easier with smaller data sets, and it is easier to avoid human error when inputting and analyzing the data.

2. Types of Sampling

In psychological research and other types of social research, experimenters typically rely on a few different sampling methods.

1. Probability Sampling

Probability sampling means that every individual in a population stands and equal chance of being selected. Because probability sampling involves random selection, it assures that different subset of the population have an equal chance of being represented in the sample. This makes probability samples more representative, and researchers are better able to generalize their results to the group as a whole.

There are a few different types of probability sampling:

- **Simple random sampling** is, as the name suggests, the simplest type of probability sampling. Researchers take every individual in a population and randomly select their sample, often using some type of computer program or random number generator.
- **Stratified random sampling** involves separating the population into subgroups and then taking a simple random sample from each of these subgroups. For example, a research might divide the population up into subgroups based on race, gender, or age and then take a simple random sample of each of these groups. Stratified random sampling often provides greater statistical accuracy than simple random sampling and helps ensure that certain groups are accurately represented in the sample.
- **Cluster sampling** involves dividing a population into smaller clusters, often based upon geographic location or boundaries. A random sample of these clusters is then selected and all of the subjects within in cluster are measured. For example, imagine that you are trying to do a study on school principals in your state. Collecting data from every single school principle would be cost-prohibitive and time-consuming. Using a cluster sampling method, you randomly select five counties from your state and then collect data from every subject in each of those five counties.

2. Nonprobability Sampling

Non-probability sampling, on the other hand, involves selecting participants using methods that do not give every individual in a population an equal chance of being chosen. One problem with this type of sample is that volunteers might be different on certain variables than non-volunteers, which might make it difficult to generalize the results to the entire population.

There are also a couple of different types of nonprobability sampling:

- **Convenience sampling** involves using participants in a study because they are convenient and available. If you have every volunteered for a psychology study conducted through your university's psychology department, then you have participated in a study that relied on a convenience sample. Studies that rely on asking for volunteers or by using clinical samples that are available to the researcher are also examples of convenience samples.
- **Purposive sampling** involves seeking out individuals that meet certain criteria. For example, marketers might be interested in learning how their products are perceived by women between the ages of 18 and 35. They might hire a market research firm to conduct telephone interviews that intentionally seek out and interview women that meet their age criteria.
- **Quota sampling** involves intentionally sampling a specific proportion of a subgroup within a population. For example, political pollsters might be interested in researching the opinions of a population on a certain political issue. If they use simple random sampling, they might miss certain subsets of the population by chance. Instead, they establish criteria that a certain percentage of the sample must include these subgroups. While the resulting sample may not actually be representative of the actual proportions that exist in the population, having a quota ensures that these smaller subgroups are represented

Systematic Sampling Advantages:

- It's extremely simple and convenient for the researchers to create, conduct, analyze samples.
- As there's no need to number each member of a sample, systematic sampling is better for representing a population in a faster and simpler manner.
- The samples created are based on precision in member selection and free from favoritism.
- In the other methods of probability sampling methods such as cluster sampling and stratified sampling or non-probability methods such as convenience sampling, there are chances of the clusters created to be highly biased which is avoided in systematic sampling as the members are at a fixed distance from one another.
- The factor of risk involved in this sampling method is extremely minimal.
- In case there are diverse members of a population, systematic sampling can be beneficial because of the even distribution of members to form a sample.

When to use Systematic Sampling?

Let's take an example where you want to form a sample of 500 individuals out of a population of 5000, you'd have to number each and every person in the population.

Once the numbering is done, the researcher can select a number randomly, for instance, 5. The 5th individual will be the first to be a part of the systematic sample. After that, the 10th member will be added into the sample, so on and so forth (15th, 25th, 35, 45th, and members till 4995).

Here are 4 other situations of when to use Systematic Sampling:

1. Budget restrictions: In comparison to other sampling methods like simple random sampling, this sampling technique is more suitable for situations where there are budget restrictions and also extremely uncomplicated accomplishment of the study.
2. Uncomplicated implementation: As systematic sampling depends on the defined sampling intervals to decide the sample, it becomes simple for the researchers and statisticians to manage samples with more respondents. This is because the time invested in creating samples is minimal and the cost invested is also restricted due to the periodic nature of systematic sampling.
3. Absence of data pattern: There are certain data that don't have an arrangement in place. This data can be analyzed in an unbiased manner using systematic sampling.
4. Low risk of data manipulation in research: Systematic sampling is highly productive while conducting research on a broad subject, especially when there's negligible risk of data manipulation.

3. Types of questionnaire

1. Structured questionnaire

a) Have definite and concrete questions.
b) Is prepared well in advance.
c) Initiates a formal inquiry.
d) Supplements and checks the data, previously accumulated.
e) Used in studies of the economics and the social problems, studies of the administrative policies and changes etc.

2. Unstructured questionnaire

a) Used at the time of the interview.
b) Acts as the guide for the interviewer.
c) Is very flexible in working.
d) Used in studies related to the group of families or those relating to the personal experiences, beliefs etc.

A questionnaire can also be divided as the follows depending on the nature of the questions therein

1. Open ended questionnaire

a) Respondent is free to express his views and the ideas.
b) Used in making intensive studies of the limited number of the cases.
c) Merely an issue is raised by such a questionnaire.
d) Do not provide any structure for the respondent's reply.
e) The questions and their orders are pre – determined in the nature.

2. Close ended questionnaire

a) Responses are limited to the stated alternatives.
b) One of the alternatives is simply YES or NO.
c) Respondent cannot express his own judgment.

3. Mixed questionnaire

a) Questions are both close and open ended.
b) Used in field of social research.

4. Pictorial questionnaire

a) Used very rarely.
b) Pictures are used to promote the interest in answering the questions.
c) Used in studies related to the social attitudes and the pre – judices in the children.

4. Techniques of data processing

5. Techniques of data analysis

6. Techniques of data interpretation

7. Comparison research problem, research question and hypothesis

A research question would set boundaries for the area to be explored and the answers that your research need to answer and hypothesis is a scientific way in which you assume an answer to the research question or its sub-components and then test if your assumption was correct. For instance, if you have a research done on causes of software project failures then your research question might be - What are the key causes of project failure in IT? based on this question, you may write answers and then develop hypotheses from them as follows:

Answer: Unclear Project scope, Lack of budget and Lack of Project management skills are reasons behind project failure. So your hypotheses would be:

- H0: Null Hypothesis - Unclear project scope causes project failure
  H1: Alternate Hypothesis - Unclear Project Scope does not cause project failure
  Prove that your null hypothesis is correct and the cause you identified becomes your answer otherwise alternate hypothesis is true and you can say that Unclear Project scope does not cause project failure. In similar way, you will have more hypotheses:
- H0: Null Hypothesis - Lack of budget causes project failure
  H1: Alternate Hypothesis - Lack of budget does not cause project failure
- H0: Null Hypothesis - Lack of Project management skills causes project failure
  H1: Alternate Hypothesis - Lack of Project management skills does not cause project failure

So research question actually asks a question and hypothesis proves the possible answers. At times research question can also present question in the form of answer itself and hypothesis proves them. For example, research question could be: Does unclear project scope causes project failure? and the hypothesis assumptions say yes or no to this answer which you can prove thereafter using statistical methods of hypothesis testing