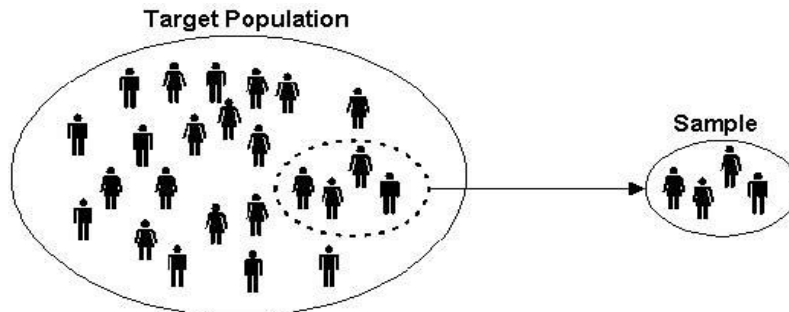


Lesson 7

Sampling



Learning Objectives

- All students **will** explore the different sampling techniques.
- All students **will** identify the strengths and weaknesses of different sampling techniques.
- All students **should** complete exam practice questions on sampling techniques.
- All students **could** discuss implications of sampling techniques, including bias and generalisation.

Key Terms

- Sampling technique
- Population
- Random sample
- Systematic sample
- Stratified sample
- Opportunity sample
- Volunteer sample

Extension activities: Check your learning using the following tutor2u multiple-choice quiz: <https://www.tutor2u.net/psychology/reference/sampling-revision-quiz>
Visit www.random.org and explore the resources about randomness.



Questions to guide your thinking ...

- Why do researchers use samples from populations in their studies?
- What are the different types of sampling technique used to select people from the target population?
- What are the strengths and weaknesses of each sampling technique?
- Why is a biased sample a problem for researchers?

Exam practice: Improve the answer

- Consider the answers that Morticia has given to the following questions (1a and 1b). Explain what's right/wrong with her answers and then have a go at improving on them.

Question 1:

A teacher was interested to know whether there was a gender difference in the time students at his college spent doing homework. The teacher selected a sample of 20 boys and 20 girls from the whole college and got them to record the time (in minutes) they spent doing homework at the end of each day. After four weeks the teacher compared the total time for boys and girls and found that there was very little difference in the time they spent doing homework.

- (a) This is an example of a quasi-experiment. Explain why this is a quasi-experiment. [2 marks]

Morticia's answer: *It is a quasi-experiment because it was done in a natural setting.*

Improve the answer:

- (b) Explain one limitation of a quasi-experiment. Refer to the experiment above in your answer. [3 marks]

Morticia's answer: *One limitation is that you can't draw cause and effect conclusions about boys and girls.*

Improve the answer:

Random technique 3: Random number generators:

Calculators have functions that generate random numbers as do computers and apps on phones. The website www.random.org offers a number of ways of generating random number.

1. Number every member of the population.
2. Using, for example, Microsoft Excel type '=RANDBETWEEN ([lowest number], [highest number])' in the A1 cell e.g. if you have a population between 1 and 100, you would type '=RANDBETWEEN (1,100).'
3. Press 'enter' and a random number in the specified range will be generated.
4. Extend the column/rows for further random numbers.



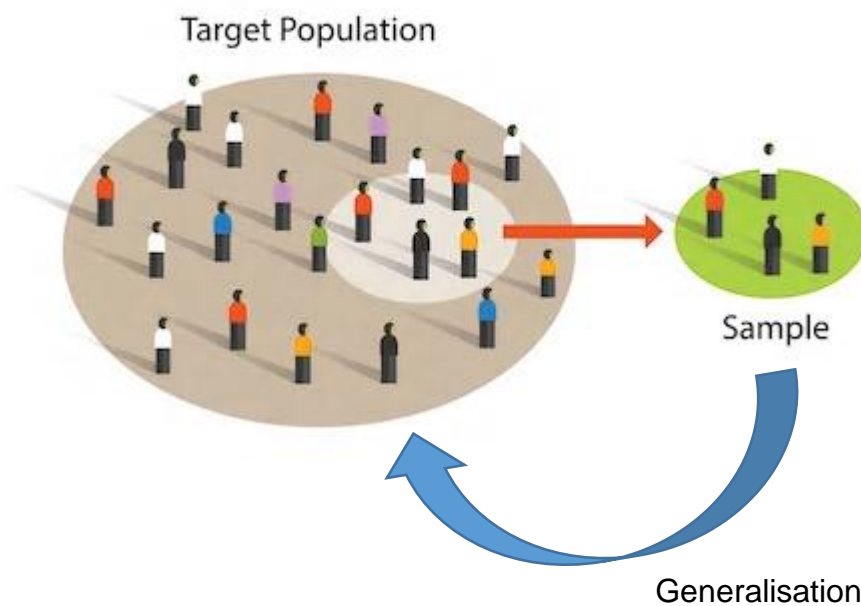
The image shows a screenshot of the 'True Random Number Generator' website. The interface has a light purple header with the text 'True Random Number Generator'. Below the header, there are two input fields: 'Min:' with the value '1' and 'Max:' with the value '23'. A 'Generate' button is positioned below these fields. Underneath the button, the text 'Result:' is followed by a large purple box containing the number '5'. At the bottom of the interface, it says 'Powered by RANDOM.ORG'.

Populations and samples

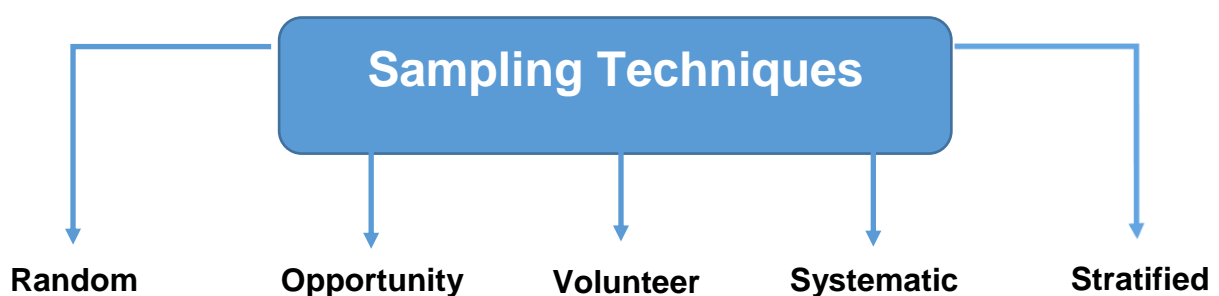
Psychologists investigate people and 'sampling' is the process by which people are selected to be participants in a research study.

The term 'population' is used to refer to the large group of people in which a researcher is interested (e.g. students attending further education colleges in East Sussex). This group is often referred to as the 'target population' as it is a subset of the general population.

For practical and economic reasons, it is not possible to study all members of the target population, so researchers select a smaller group of people or 'sample' from the target population. *Ideally*, this sample is **representative** (i.e. typical) of the target population. This allows the researcher to make **generalisations** – findings and conclusions drawn from research on the sample can be applied to the target population.



Note: In practice, it is often very difficult to obtain a representative sample due to the diverse nature of target populations. This means that the majority of samples contain some degree of **bias** – certain groups within the target population may be over- or under-represented (e.g. there might be too few older people or too many people of one particular ethnic group in the sample). Such **bias limits the extent to which generalisations can be made to the target population.**



Sampling with Skittles

TASK: Explore the different methods of sampling, using skittles as your participants.

You will create each of the types of sample, recording the number of each colour skittle you obtain in your sample and the percentage.



Target population

- Tip all the sweets out of the bag and record how many of each colour there are in the table below:

Colour	Number	%
Purple		
Orange		
Green		
Red		
Yellow		
Total		

To calculate percentages, divide the number of [purple/orange/green/red/yellow] sweets by the total number of sweets and then multiply by 100. Complete this for each colour.

Random sample

Every person in the target population has an equal chance of being selected.

How? Using random techniques, such as the lottery method - all members of the target population are given a number and placed in a hat or tombola. Numbers are then selected at random.

- Pick out 25 sweets at random and record how many of each colour you get in the table below:

Colour	Number	%
Purple		
Orange		
Green		
Red		
Yellow		

Opportunity sample

People who are simply the most available, i.e. the ones who are nearest/easiest to obtain. Also called a 'convenience' sample.

How? Ask people nearby, e.g. ask the students in your class or people who walk past you in a shopping centre.

- Tip out the first 25 sweets from the bag. These are the people who are available and willing to take part in your research. Record the results in the table below:

Colour	Number	%
Purple		
Orange		
Green		
Red		
Yellow		

Volunteer sample

A self-selecting sample – in volunteering, participants select themselves.

How? Advertise, e.g. place an ad in a newspaper or noticeboard and participants come to you.

- Imagine that you have placed a poster up in the college, asking for participants to self-select and take part in your research.

You'll have to imagine that 'green' skittles are the most helpful and willing to take part, followed by 'yellow'.

The 'orange', 'red' and 'purple' skittles, definitely won't want to take part! You are still looking to recruit 25 participants, but if you can't manage to get 25, you'll just have to run your experiment, with as many as you can. Record your results in the table below

Colour	Number	%
Purple		
Orange		
Green		
Red		
Yellow		

Systematic sampling

Participants are selected using a 'sampling frame' (i.e. a set pattern).

How? Every n th person is selected from a list of the target population.

- Tip all of the sweets out and place them in one line. Then select every 3rd sweet. Record your results in the table below:

Colour	Number	%
Purple		
Orange		
Green		
Red		
Yellow		

Stratified sample

Participants are selected according to their frequency in the target population.


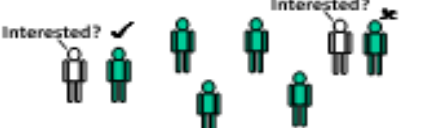



How? Subgroups (or 'strata') of the population are identified, such as gender or age groups. The relative percentages of these subgroups in the population are reflected in the sample. A random sampling technique is applied to obtain participants from each subgroup for the sample.

- You need to create a sample of 25 sweets that is similar to the target population in terms of the percentage of each colour.

For example, if 15% of the sweets in your target population are green, you need to ensure that your sample (of 25) only has 15% of green sweets: $15\% \text{ of } 25 = (15 \div 100) \times 25 = 3.75$. Therefore, you would need 4 sweets to represent your target population

Colour	% in target population Refer back to your first table	Number of sweets needed for sample
Purple		
Orange		
Green		
Red		
Yellow		

➤ Match the description, advantages and disadvantages with each sampling technique:

Sampling Technique	Description	Advantage	Disadvantage
<p>Random sampling</p> 	<p>Individuals who have chosen to be involved in a study. Also called self-selecting. E.g. people who responded to an advert for participants, or via a notice board.</p>	<p>It avoids the problem of misrepresentation sometimes caused by purely random sampling. A representative sample obtained, so generalisation of findings is possible.</p>	<p>Likely to lead to a biased sample - only people who see the ad have a chance to be in study. Participants may share certain traits (e.g. keen and curious). This volunteer bias means that generalisation is limited.</p>
<p>Opportunity sampling</p> 	<p>The composition of the sample reflects the proportions of people in certain sub-groups (strata) within the target population. Identify different strata, and their relative proportions, then randomly select that number from each sub-group.</p>	<p>Each member has the same probability of being selected, so there is a reasonable chance of achieving a representative sample. Potentially unbiased – the researcher has no influence over who is selected.</p>	<p>Unrepresentative samples as usually small, and often biased by the researcher who will likely choose people who are 'helpful'. Generalisation is therefore limited.</p>
<p>Volunteer sampling</p> 	<p>Every member of a population has an equal chance of being selected. E.g. pulling names out of a hat, or using a random number generator.</p>	<p>Quick, convenient and economical. The most common type of sampling in practice.</p>	<p>If the list has been assembled in any other way, bias may be present, e.g. if every fourth person in the list was male, you could have only males in your sample. Takes time and effort as a complete list of the population is required.</p>
<p>Systematic sampling</p> 	<p>Simply selecting those people that are available at the time. E.g. going up to people in cafés, or on the street, and asking them to be interviewed.</p>	<p>Assuming the list order has been randomised, this method offers an unbiased chance of gaining a representative sample.</p>	<p>The identified strata cannot reflect ALL the ways that people are different, so complete representation of the target population is not possible. Takes more time and resources to plan.</p>
<p>Stratified Sampling</p> 	<p>Every <i>n</i>th member of the target population is selected. e.g. every 5th student on the register. Use a sampling frame = list in alphabetical order, then randomly assign an interval = every 4th person etc.</p>	<p>Relatively convenient and ethical if it leads to informed consent. Often achieves a large sample size through reaching a wide audience, for example with online advertisements.</p>	<p>It can be impractical (or not possible) to use a completely random technique, e.g. the target group may be too large to assign numbers to. It is still possible that a random method may produce a biased sample.</p>

Exam Practice – Sampling Techniques

A Level Paper 2 (7182/2) Specimen Materials – First Set

Read the item and then answer the questions that follow.

A psychologist wanted to see if verbal fluency is affected by whether people think they are presenting information to a small group of people or to a large group of people.

The psychologist needed a stratified sample of 20 people. She obtained the sample from a company employing 60 men and 40 women.

The participants were told that they would be placed in a booth where they would read out an article about the life of a famous author to an audience. Participants were also told that the audience would not be present, but would only be able to hear them and would not be able to interact with them.

There were two conditions in the study, Condition A and Condition B.

Condition A: 10 participants were told the audience consisted of 5 listeners.

Condition B: the other 10 participants were told the audience consisted of 100 listeners.

Each participant completed the study individually. The psychologist recorded each presentation and then counted the number of verbal errors made by each participant.

15. Explain one advantage of using a stratified sample of participants in this study. [2 marks]

16. Explain how the psychologist would have obtained the male participants for her stratified sample. Show your calculations. [3 marks]

17. The psychologist wanted to randomly allocate the 20 people in her stratified sample to the two conditions. She needed an equal number of males in each condition and an equal number of females in each condition. Explain how she would have done this. [4 marks]

AQA Specification B Unit 1 June 2012

A psychologist wanted to investigate whether or not people are influenced by the opinions of others. The psychologist selected 100 pupils from a secondary school to be participants in the study. The psychologist showed participants a cake which weighed 350 grams. The task for the participants was to estimate the weight of the cake in grams. Participants were allocated randomly to one of two groups. In **Group A**, 50 participants were asked individually to estimate the weight of the cake. The

psychologist gave each participant a blank piece of paper on which to write his or her estimate. In **Group B**, the other 50 participants were asked individually to estimate the weight of the cake. This time, the psychologist gave each participant a piece of paper which contained a list of five weights (493 grams, 512 grams, 502 grams, 485 grams and 601 grams). The participants were told that these were the estimates given by five people and that they should write their own estimate below these other estimates.

The psychologist expected that participants in **Group B** would be influenced by the five other estimates. She expected that they would write down a weight similar to the five estimates on the piece of paper. The median estimates for the weight of the cake are shown in **Table 1** below.

Table 1: The median estimate for the weight of the cake (in grams) in Group A and Group B

	Group A Estimate written on a blank piece of paper	Group B Estimate written below the list of five other estimates
The median estimate of the weight of the cake (in grams)	348	510

3(c) Explain how stratified sampling might have been used to select the participants in this study. (3 marks)

3 (d) (i) The psychologist allocated the participants randomly to the two groups that were used in this study. Explain how the psychologist could have allocated the participants randomly to the two groups. (2 marks)

3 (d) (ii) Briefly explain **one** reason why random allocation of participants is important (2 marks)

AQA A Unit 1 January 2013

A psychologist used an independent groups design to investigate whether or not a cognitive interview was more effective than a standard interview, in recalling information. For this experiment, participants were recruited from an advertisement placed in a local paper. The advertisement informed the participants that they would be watching a film of a violent crime and that they would be interviewed about the content by a male police officer. The psychologist compared the mean number of items recalled in the cognitive interview with the mean number recalled in the standard interview.

3 (a) Name the sampling technique used in this experiment (1 mark)

3 (b) Suggest **one** limitation of using this sampling technique. (2 marks)