Organization and Planning of Scientific Research

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Lecture 4. Quantitative research methods

1. Survey as a research strategy
2. Questionnaire method
3. Analysis of quantitative data

The main **objective** of this lecture is to consider quantitative research methods and relevant examples.

Survey research as a strategy: characteristics

1. **Wide and inclusive coverage.** Implicit in the notion of 'survey' is the idea that the research should have a wide coverage – a breadth of view. A survey, in principle, should take a panoramic view and 'take it all in'.
2. **At a specific point in time.** Surveys provide a snapshot of how things are at a specific point in time. In most cases this is useful for 'bringing things up to date' and providing information about the current state of affairs. However, there are also occasions when researchers do an historical survey to show how things used to be at a particular point in the past, or even use a sequence of surveys as the basis for tracking changes over a period of time.
3. **Empirical research.** Because 'to survey' carries with it the meaning 'to look', survey work inevitably brings with it the idea of empirical research. It involves the idea of getting out of the chair, going out of the office and purposefully seeking the necessary information 'out there'.

These three characteristics of the survey approach involve no mention of specific research methods. It is important to recognize this point.

The survey approach is a research strategy, not a method.

Although there are certain methods which are popularly associated with the use of surveys there are actually a variety of methods including questionnaires, interviews, documents and observation that can be used as part of a survey approach

When are surveys useful?

- The first of these is that surveys are **good at getting information about a large number of people**: they are well suited to the collection of mass data.

- Second, the survey approach works best with clear and narrow targets in terms of information it is trying to gather. The approach lends itself to **dealing with specific issues** and is at its best when the researcher knows in advance precisely which factors are important and what kind of information is needed.

- Third, surveys are best suited to gathering data on relatively straightforward, **relatively uncomplicated** facts, thoughts, feelings or behaviours. The breadth of coverage of surveys means that it is hard to incorporate the depth of investigation needed for really complex issues.

- Fourth, surveys are particularly good when looking for patterns of activity **within groups or categories** of people (rather than individuals). They are very useful for linking findings with specific social classes, age-groups, genders, ethnic backgrounds, etc.

Types of survey

1. **Internet surveys** can take the form of

- an email questionnaire where the questions are sent as part of the email itself;

- a questionnaire sent as an attachment to an email;

- a web-based questionnaire where the questionnaire is a web page located on an Internet site waiting for people who visit the site to complete it.

The data supplied via webbased questionnaires, as a bonus, arrive in a format that is ready for analysis. Data from Internet questionnaires can be downloaded automatically into spreadsheets, databases or statistics packages. There are potentially no data entry costs (and no transcription errors).

Internet surveys also reduce the turnaround time between sending out a questionnaire and receiving a completed response. The researcher gets the replies more quickly because delivery of the questionnaire can become virtually instantaneous and also because people get round to answering the questions sooner than with conventional surveys

2. Telephone surveys, like Internet surveys, are in widespread use in social research. They provide an alternative to postal and Internet surveys as a means of collecting questionnaire data, and they can also be used for conducting interviews.

They can be relatively labour-intensive compared with Internet surveys. Phone interviews are unlikely to last beyond 20–30 minutes.

There can be problems ensuring that contact is made with the right person; it is not always easy to verify the identity of the person at the other end of the line.

Phone surveys can also target particular geographical areas. Researchers can select the area they wish to survey and identify the relevant dialling code for that area. They can then contact phone numbers at random within that area using random-digit dialling, where the final digits of the phone numbers are produced by computer technology which automatically generates numbers at random.

3. **Group-administered surveys** are conducted in person. They rely on the researcher undertaking the survey by being on site to distribute and collect the research instrument – normally a questionnaire. The groups generally already exist. Rather than get a group of people together specifically for the purpose, it is easier from the researcher's point of view to use naturally occurring groups.

For example, a survey of young people could involve the distribution of questionnaires in schools to whole classes – possibly 30 or more people at a time.

The same approach could be taken with work-groups, community meetings or any occasions where there will be a (naturally occurring) collection of people who are suitable for the purposes of the research.

For practical purposes the group-administered survey tends to involve fairly small numbers. It does not really lend itself to use with thousands of people in a sports arena. It is, though, particularly well suited to small-scale research.

Response rates

When conducting a survey there is a strong likelihood that some of those who are contacted with requests for information will not co-operate. The aim of a good survey is to keep such non-responses to a minimum and to achieve the highest response rate that is possible in relation to the kind of research being conducted. To do this, it is important for researchers to take into consideration five things that will have a bearing on the likely response rate achieved by the survey they have in mind:

1. Nature of respondents (age, gender, disability, literacy, employment status, etc.). Certain kinds of people are less inclined than others to spare the time and make the effort to comply with requests to help with surveys. Busy people can ill afford the time. Others with more time on their hands, those who are retired, for instance, might be more inclined to get involved. People with communication disadvantages, those with reading or hearing difficulties, are less likely than others to get involved unless special attention is devoted to their needs.

2. Subject of research (gender, race, religion, politics, income). Certain subjects are taboo and others are sensitive. If the investigation touches on intimate matters or embarrassing topics, there is every likelihood that the response rate will be low

3. **Researcher identity** (age, gender, social class, ethnicity, clothes, accent). Where the survey involves face-to-face contact between the researcher and the respondent, the researcher needs to avoid, as far as is possible, presenting himself or herself in a way that will be perceived as threatening or unwholesome by the potential respondent

4. **Nature of contact.** The way in which people are approached in connection with a survey has an influence on the response rate.

5. **Social climate** (free speech). The right to free speech is obviously a factor that will influence people's willingness to collaborate with research and to supply honest and full answers. But this is not simply a matter of legal rights in a democratic society. There are situations in organizations and other social settings where potential respondents may not feel free to speak their thoughts. A threatening climate, wherever it exists and whatever its cause, can reduce the response rate

Non-response bias

There are two types of non-response, both of which can lead to bias in the survey.

First, there is **non-response through refusal**. If there are grounds for believing that those who refuse to co-operate are consistently of a different type from those who tend to provide responses (e.g. in terms of age, gender, gender, social class, religion) and if this difference is relevant to the matter at hand for the research, then there is the likelihood of a bias in the survey findings. **The survey will systematically over-represent findings from the groups who are more likely to respond and, by the same token, systematically under-represent findings from those groups who are less likely to respond.**

Second, there is **non-response stemming from non-contact**. If the survey is conducted in a way that systematically favours the inclusion of some groups at the expense of others then, again, a bias will result. If, for example, the survey involves researchers calling at home addresses between 9 a.m. and 5 p.m., this will tend to miss contact with those who are at work. To avoid this they would need to make contact in the evenings as well as during the day.

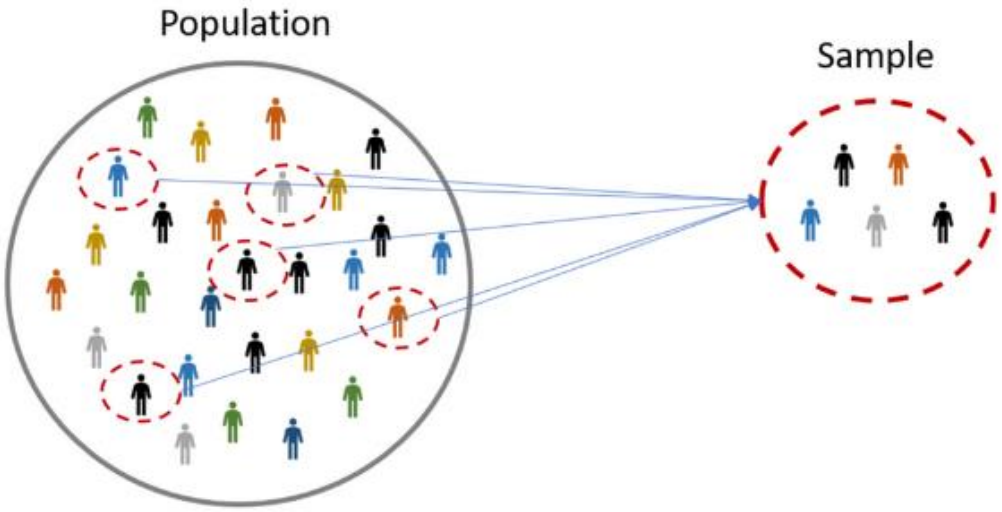
Acceptable response rates

There is no hard and fast rule about what constitutes an acceptable response rate. With large-scale postal questionnaire surveys, for instance, it will not be uncommon to get a response rate as low as 10 per cent. Face-to-face interviews, arranged by personal contact between the researcher and the interviewees, are the kind of approach at the other end of the spectrum where very high response rates can be expected – possibly even 100 per cent.

Rather than look for a figure above which a response rate is acceptable and below which the results become suspect, it is more productive to evaluate the response rate that is actually achieved in terms of the following questions.

1. Is the level of response reasonable and in line with comparable surveys?
2. Have appropriate measures been taken to minimize non-response rates?
3. Do the non-respondents differ in any systematic and relevant fashion from those who have responded?

Sampling



The basic principle of sampling is that it is possible to produce accurate findings without the need to collect data from each and every member of a survey 'population'.

For survey researchers this can be an attractive proposition. It means that they might be able to save time and money by reducing the amount of data they need to collect without, at the same time, reducing the accuracy of their findings.

With large surveys, in particular, the benefits of sampling are easy to imagine. If the survey includes a sample of 1,000 people instead of all 100,000 in the group being studied, it will clearly take far less time and cost far less money.

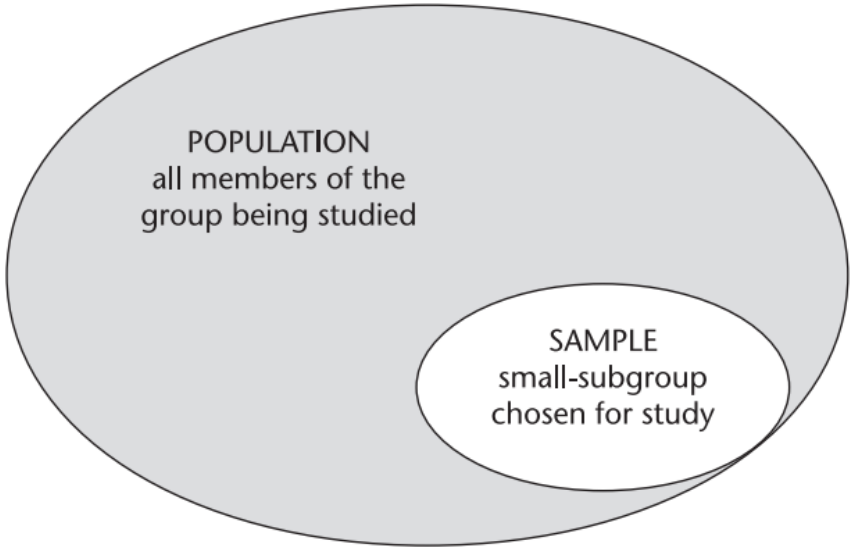
But the crucial point is that, in principle, **such savings can be achieved without sacrificing the accuracy of the findings.**

Populations and samples

Before looking at the approaches to sampling that a survey researcher can use, it is important to be clear about the terms ‘population’ and ‘sample’. **In the context of surveys and sampling, the term ‘population’ has a specific meaning.**

Rather than meaning everyone who lives in a country, **it refers to all the items in the category of things that are being researched. It means a research population.**

So, if a survey is used to study nurses in Scotland, then the survey population refers to all nurses working in Scotland (not all the people who populate the country) and the sample refers to those nurses who are selected to take part in the research.



Representative samples and exploratory samples

Representative samples tend to be associated with larger surveys and with the use of quantitative data. A representative sample involves a cross-section of the population. It matches the population in terms of its mix of ingredients, and relies on using a selection procedure that:

- includes all relevant factors/variables/events, and
- matches the proportions in the overall population.

Information gathered from a representative sample allows the researcher to draw valid conclusions about how things are in the overall research population.

Exploratory samples are often used in small-scale research and tend to lend themselves to the use of qualitative data. An exploratory sample is used as a way of probing relatively unexplored topics and as a route to the discovery of new ideas or theories. The point of the sample is to provide the researcher with a means for generating insights and information. For this purpose it is not always necessary to select people/items for the sample in terms of getting an accurate cross-section of the population. There are times when this might be the case, but selection to an exploratory sample is based principally on the need to gather new insights.

Probability sampling and non-probability sampling

There are two approaches to the selection of samples. Researchers can either choose probability sampling as the basis for selecting their sample from the research population, or they can use non-probability sampling.

Probability sampling relies on the use of random selection. It is known as probability sampling because it is based on statistical theory relating to the 'normal distribution' of events. The theory behind its use is that the best way to get a representative sample is to ensure that the researcher has absolutely no influence on the selection of people/items to be included in the sample.

Non-probability approaches to sampling do not operate on the principle of random selection to the sample and are used when researchers find it difficult or undesirable to choose their sample on the basis of pure chance. It involves an element of discretion or choice on the part of the researcher at some point in the selection process. Non-probability sampling can still retain the aim of generating a representative sample.

Probability sampling techniques

1. **Random sampling (Each person/item has an equal chance of being selected).** Random sampling is often portrayed as the ideal basis for generating a representative sample. This is because with random sampling the inclusion of a person/item in the sample is based entirely on chance. Random selection ensures that there is no scope for the researcher to influence the sample in some way that will introduce bias.

To get a random sample, there needs to be:

1 **A known population from which the sample is to be taken**. The researcher needs to know something about the make-up of the overall population from which the sample is to be extracted (such as the total number, who they are or where they exist).

2 a **sampling frame** that provides a list of all the items in the population and which allows them to be picked via some unique identifier (such as a name, an address, an employee number or a birth date).

3 **a process of random selection** which provides the basis for including specific units in the sample. For research purposes this can involve the use of a random number generator – a utility available free online or through appropriate computer software packages.

2. **Systematic sampling (Every *nth* case is included).** Systematic sampling adheres closely to the principle of random selection but, in this case, the researcher selects items in a systematic way – picking every nth item from an appropriate list. For a sample of 50 from a population of 250 it will be every 5th item, for a sample of 70 from a population of 490 it will be every 7th item – nth depending on the size of the required sample relative to the number in the research population. It should not matter where on the list the selection starts. The researcher, however, will want to feel sure that there is no order or pattern in the list that might be related to the topic being investigated because this could undermine the principle of random selection and cause some bias to creep into the sample as a result of the system of selection.

3. **Cluster sampling** uses random sampling to select specific clusters or groups. Within each of the clusters all people/items are included in the sample. The advantage of this sampling technique is that the clusters, as the name suggests, contain items that are closely grouped together – normally in one location or in one geographical area. By focusing on such clusters, the researcher can save a great deal of time and money that would otherwise have been spent on travelling to and for visiting research sites scattered throughout the length and breadth of the land. For this reason cluster sampling is often used by market researchers and others who need to conduct surveys on a limited budget.

There are, however, **two important conditions** that need to be met for the use of cluster sampling. **First,** the clusters must be pre-existing, naturally occurring groups**. Second**, each cluster should reflect the heterogeneity of the total population.

The idea is that within each cluster the researcher might expect to find a mini-version of the total population and that by including all members of the cluster within the sample the researcher will be able to get a representative sample that will produce findings that accurately match the situation in the total research population

4. **Stratified sampling (Sampling based on subgroups in the population).** Stratified sampling continues to adhere to the underlying principle of random selection. However, it introduces **some element of researcher influence into the selection process** and, to this extent, moves away slightly from pure random sampling.

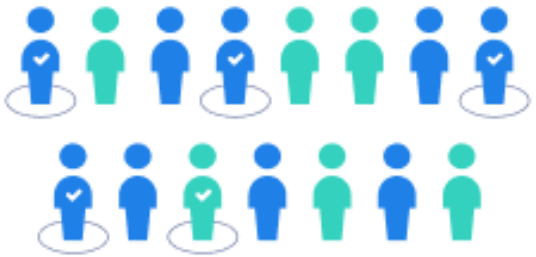
Stratified sampling subdivides the research population into different subgroups (strata) and then chooses the required number of items or people from within each subgroup using random sampling techniques.

The reason for introducing stratification into the selection process is to ensure that crucial parts of the population are appropriately represented in the overall sample. It allows the researcher to select a sample which he/she knows will include, for instance, equal number of men and women, or perhaps an appropriate balance of different age groups within the sample.

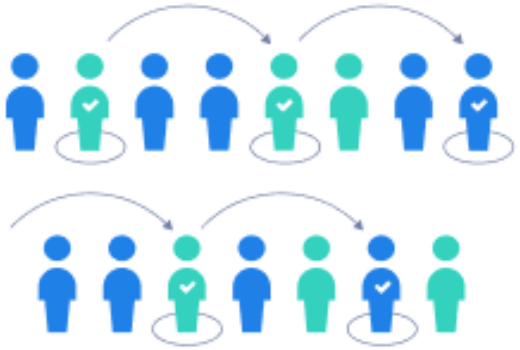
There are **two important conditions** that apply to the use of stratified sampling. First, the subgroups must be fairly homogenous in the sense that they share something in common which can be used to separate them into clearly identifiable subgroups. Second, this factor must be relevant and significant in terms of what is already known about the topic.

For example, when constructing the sample, the researcher could wisely choose to adopt a stratified sampling approach in which: • all relevant categories of gender and age are included; • the numbers included for each category are directly in proportion to those in the wider population.

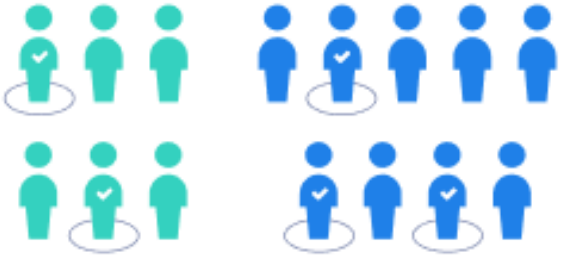
Simple random sample



Systematic sample



Stratified sample



Cluster sample

Non-probability sampling techniques

1. Quota sampling (Selected to meet specific criteria). Quota sampling is widely used in market research. It operates on very similar principles to stratified sampling. It establishes certain categories (or strata) which are considered to be vital for inclusion in the sample, and also seeks to fill these categories in proportion to their existence in the population. There is, though, one distinctive difference between stratified and quota sampling. With quota sampling, the method of choosing the people or events that make up the required number within each category is not a matter of strict random selection. In effect, it is left up to the researcher to choose who fills the quota. It might be on a 'first to hand' basis – as when market researchers stop people in the street. The people might be appropriate but were chosen because they just happened to be there, not as part of a random selection from a known population.

Example: quota sampling Stores in a shopping mall might want to know what their customers think about the facilities that are available (e.g. parking, toilets, restaurants) and whether there are any particular features of the mall that attract them to visit it. A quota sample for face-to-face interviews in the mall could be devised on the basis of including 200 males and 200 females, and within each group there could be quota of 40 in each of five age categories 12–18, 19–30, 31–45, 46–64, 65+. The quotas for interview, then, would be 40 males aged 12–18, 40 females aged 12–18, 40 males aged 19–30, 40 females aged 19–30, and so on. Interviewers would approach appropriate shoppers and continue to conduct interviews until they had filled the quota for each subgroup.

2. **Purposive sampling (Hand-picked for the topic).** Purposive sampling operates on the principle that we can get the best information through focusing on a relatively small number of instances deliberately selected on the basis of their known attributes (i.e. not through random selection).

With purposive sampling the sample is 'hand-picked' for the research on the basis of:

- **relevance:** to the issue/theory being investigated;
- **knowledge:** privileged knowledge or experience about the topic.

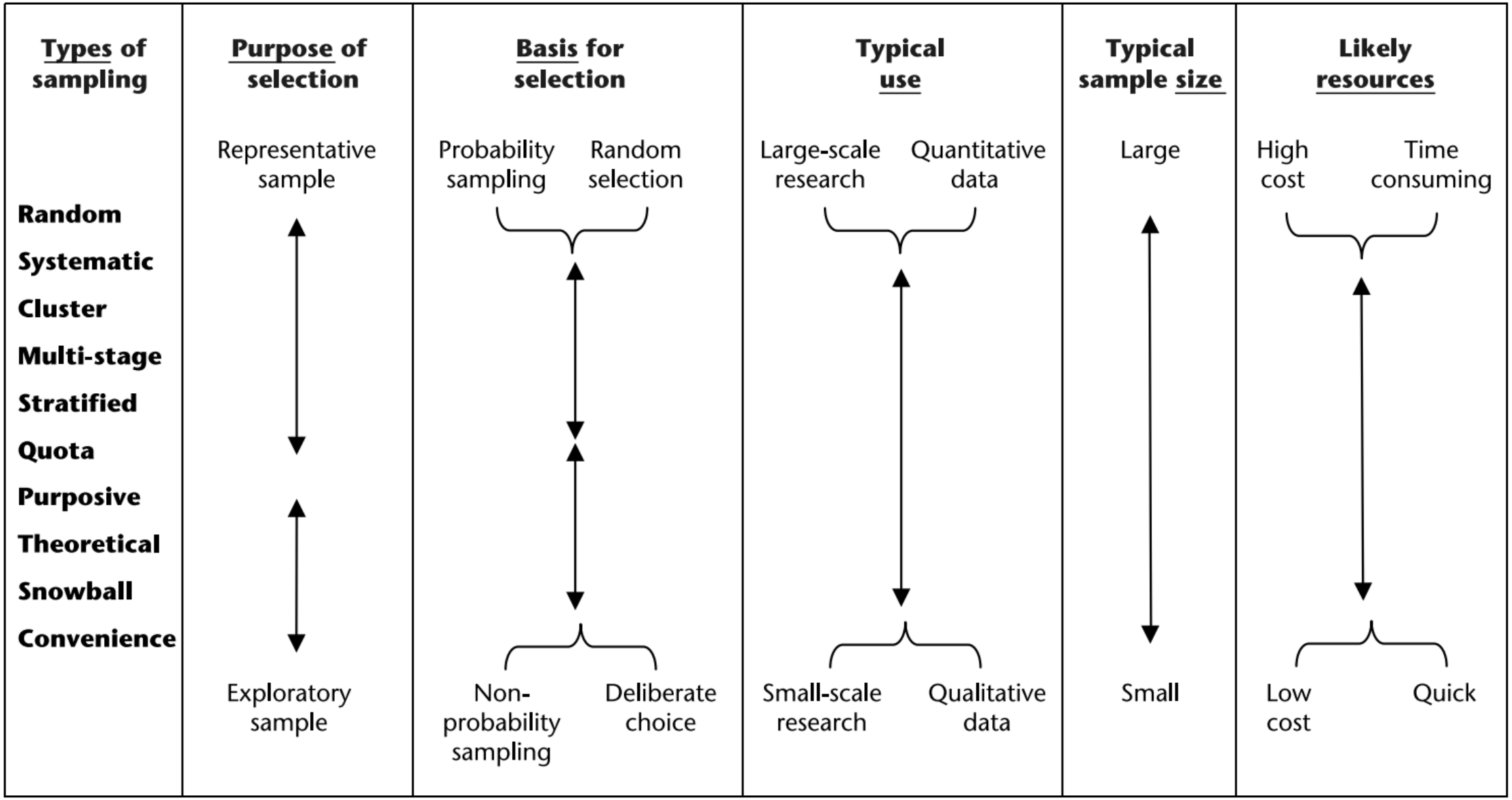
Purposive sampling works where the **researcher already knows something about the specific people or events and deliberately selects particular ones because they are seen as instances that are likely to produce the most valuable data.** They are selected with a specific purpose in mind, and that purpose reflects the particular qualities of the people or events chosen and their relevance to the topic of the investigation

Purposive sampling can also be used **as a way of getting the best information by selecting items or people most likely to have the experience or expertise to provide quality information and valuable insights on the research topic.** Used in this way, purposive sampling is particularly well suited for creating an 'exploratory sample'. The advantage of purposive sampling is that it allows the researcher to home in on people or events which there are good grounds for believing they will be critical for the research.

3. **Theoretical sampling.** With theoretical sampling, the selection of instances follows a route of discovery based on the development of a theory which is 'grounded' in evidence. At each stage, new evidence is used to modify or confirm a 'theory', which then points to an appropriate choice of instances for research in the next phase. The sample evolves, and it continues to grow until such time as the researcher has sufficient information in relation to the theory that is being developed.

4. **Snowball sampling (Participants refer the researcher on to other potential participants).** With snowball sampling the sample emerges through a process of reference from one person to the next. At the start, the research is likely to involve just one or a few people. Each can be asked to nominate some other people who would be relevant for the purposes of the research. These nominations are then contacted and, it is hoped, included in the sample. The sample thus snowballs in size as each of the nominees is asked, in turn, to nominate further persons who might be included in the sample.

5. **Convenience sampling (First to hand).** Convenience sampling is built upon selections which suit the convenience of the researcher and which are 'first to hand'. An element of convenience is likely to enter into sampling procedures of most research. Because researchers have limited money and limited time at their disposal, it is quite reasonable that where there is scope for choice between two or more equally valid possibilities for inclusion in the sample, the researcher should choose the most convenient.



When deciding which technique to use, the researcher needs to consider five core questions:

1 Is my purpose to produce a representative sample or an exploratory sample?

2 To what extent is this purpose better served by selecting the sample on this basis of random selection or deliberate choice?

3 Will qualitative data or quantitative data be more appropriate for addressing my research questions?

4 Does a suitable sampling frame exist and can I gain access to it?

5 In terms of the resources available for the research (time and money) which sampling technique is both feasible and likely to produce relevant information?

Size of the sample

There are basically three approaches to the calculation of the sample size: **statistical, pragmatic and cumulative.**

The **statistical approach** is usually presented as the proper approach. As we shall see, however, it is best suited to large-scale surveys and probability sampling techniques. It is the kind of approach that works well for things like opinion polls and government surveys which involve very large populations and which cost a lot of money.

Smaller scale surveys tend to use a more **pragmatic approach**. This is partly to do with the costs and partly to do with the difficulties in meeting all the conditions needed for the statistical approach to sample-size calculation. Market researchers often use a pragmatic approach, estimating the sample size on the basis of years of practical experience and on what works well enough within given resource constraints.

The third approach is normally associated with small-scale, qualitative research. The **cumulative approach** is one in which the researcher continues to add to the size of the sample until a point is reached where there is sufficient information and where no benefit is derived from adding any more to the sample.

The anticipated response rate

When thinking about sample size, **there is an important distinction to be made between the sample size that the researcher eventually has available to use for data analysis and the sample size that is initially contacted in the survey.**

A survey rarely achieves a response from every contact. Especially when using postal questionnaires and the like, the rate of response from those contacted is likely to be pretty low. As far as sample size is concerned, though, the important thing for the researcher to consider is that the number in the original sample may not equal the number of responses that are finally obtained which can be used in the research.

The researcher needs to predict the kind of response rate he or she is likely to achieve and build into the sample size an allowance for non-responses. If the researcher wants to use a sample of some 100 people for research and is using a postal questionnaire survey for which a response rate of 30 per cent is anticipated, the original sample size needs to be 334.

The statistical approach (large-scale surveys using probability sampling for a representative sample)

If the survey is large-scale and it uses probability sampling, there is a precise way of calculating the required sample size. This is based on statistical theory and the normal curve distribution of events. Without getting involved too heavily in statistical theory, the calculation of an appropriate sample size will depend on four things:

- The size of the research population
- The accuracy of the estimates
- Confidence level
- Variation in the population

Number in the population	*Required sample size*[1] *(at 95% confidence level)*		
	5% margin of error	*3% margin of error*	*1% margin of error*
50	44	48	50
100	80	92	99
250	152	203	244
500	217	341	475
1,000	278	516	906
5,000	357	879	3,288
10,000	370	964	4,899
100,000	383	1,056	8,763
1 million	384	1,066	9,513
10 million	384	1,067	9,595

https://www.surveymonkey.com/mp/sample-size-calculator/

https://www.calculator.net/sample-size-calculator.html

The pragmatic approach (smaller-scale surveys using non-probability sampling for a representative sample)

In practice, social research frequently involves surveys with relatively small numbers – between 30 and 250 – and when estimating the required sample size such surveys tend to depend on non-probability sampling techniques. **There are three pragmatic reasons for this**. First, there is the matter of resources. Second, there is the nature of research populations and the fact that many of the populations that social researchers might like to investigate are relatively small. Third, the pragmatic approach subscribes to the argument that, used properly, non-probability sampling techniques can produce data that are sufficiently accurate for the purposes of research.

The pragmatic approach takes the position that the level of accuracy needs to be weighed against the additional costs involved and that the aim is to get accuracy that is good enough for the purposes of research within the resources available for research.

There is a general tendency to choose the minimum sample size that is feasible with respect to the available resources and the level of accuracy demanded of the findings.

The cumulative approach (small-scale surveys using non-probability sampling for an exploratory sample)

There are some approaches to social research where the size of the sample cannot be stated with certainty at the start of the investigation. **The sample size grows during the course of the research and continues to grow until the researcher has accumulated sufficient information for the purposes of the research**. This cumulative approach relies on non-probability techniques such as purposive, theoretical or snowball sampling and is normally associated with research that:

- is relatively small-scale;
- uses qualitative data;
- cannot identify the research population in advance;
- aims to produce an exploratory sample, not a representative one.

Survey and sampling

Advantages

- A focus on empirical data.
- Can collect both quantitative data and qualitative data.
- Wide and inclusive coverage.
- Costs and time.

Disadvantages

- Tendency to focus on data more than theory.
- Detail and depth of the data.
- Easily ignored.

Questionnaire as a method

There are many types of questionnaires. They can vary enormously in terms of their purpose, their size and their appearance. To qualify as a research questionnaire, however, they should do the following:

- **Be designed to collect information which can be used subsequently as data for analysis**. As a research tool, questionnaires do not set out to change people's attitudes or provide them with information. Though questionnaires are sometimes used for this purpose – for instance, as a way of marketing a product – it is not strictly in keeping with the spirit of a research questionnaire, whose purpose is to discover things.

- **Consist of a written list of questions**. The important point here is that each person who answers the particular questionnaire reads an identical set of questions. This allows for consistency and precision in terms of the wording of the questions, and makes the processing of the answers easier. (Occasionally, pictures might be used instead of written questions.)

- **Gather information by asking people directly about the points concerned with the research**. Questionnaires work on the premise that if you want to find out something about people and their attitudes you simply go and ask them what it is you want to know, and get the information 'straight from the horse's mouth'.

When is it appropriate to use a questionnaire?

- when used with **large numbers of respondents** in many locations;
- when what is required tends to be **fairly straightforward information** – relatively brief and uncontroversial;
- when there is a need for **standardized data from identical questions** – without requiring personal, face-to-face interaction;
- when the respondents can be expected to **be able to read and understand** the questions – the implications of age, intellect, language, and eyesight need to be considered;
- when the **social climate is open** enough to allow full and honest answers.

What kinds of data are collected by questionnaires?

Factual information does not require much in the way of judgement or personal attitudes on the part of respondents. It just requires respondents to reveal straightforward information (such as their address, age, gender, marital status or number of children). An example of a 'fact' question might be 'Which TV programmes did you watch last night?'

Opinions, attitudes, views, beliefs, preferences, etc. can also be investigated using questionnaires. In this case, though, respondents are required to reveal information about feelings, to express values and to weigh up alternatives in a way that calls for a judgement about things rather than the mere reporting of facts. An example of an 'opinion' question might be 'Which is your favourite TV programme?'.

It is worth stressing that, in practice, questionnaires are very likely to include questions about both facts and opinions.

Planning the use of questionnaires

Costs

Preparation time

Organization

Schedule

Permission

Vital elements of a research questionnaire

1. Background information

• **The sponsor.** Under whose auspices is the research being undertaken? Is it individual research or does the research emanate from an institution? Headed notepaper is an obvious way to indicate the nature of the institution from which the questionnaire comes.

• **The purpose.** What is the questionnaire for, and how will the information be used? It is important here to reveal sufficient information to explain the purpose of the research without going too far and 'leading' the respondent into a line of answering. A brief paragraph should suffice.

• **Return address and date.** It is vital that the questionnaire contains in it somewhere quite visibly the name and contact address (postal or email) of the person(s) to whom the completed questionnaire is to be returned and the date by which it is required.

• **Confidentiality.** Assuming that the research is operating according to the normal code of ethics for social researchers, the information collected will not be made publicly available. Respondents should be reassured on this point.

• **Voluntary responses.** In the vast majority of cases, researchers collect information from respondents who volunteer to co-operate with the research. Rewards are not generally used (though in market research there may be some enticements offered), and people are not usually obliged to respond. Again, this point should be acknowledged on the cover page and respondents reassured that the questionnaire is to be completed voluntarily.

• **Thanks.** It follows from the fact that questionnaires are normally voluntarily completed that the researcher is beholden to those who co-operated. Courtesy suggests that some word of thanks from the researcher should appear either on the front cover or right at the end of the questionnaire.

2. **Instructions to the respondent**

It is very important that respondents are instructed on how to go about answering the questions. It is no good assuming that it is self-evident; experience will soon prove that wrong. Mistakes that occur can invalidate a whole questionnaire, so it is worth being meticulously careful in giving instructions on how to complete the answers:

- Example. It is useful to present an example at the start of the questionnaire. This can set the respondent's mind at rest and indicate exactly what is expected of him or her.

- Instructions. Specific instructions should be given for each question where the style of question varies throughout the questionnaire (e.g. put a tick in the appropriate box, circle the relevant number, delete as appropriate).

Google Forms

https://www.google.com/intl/ru/forms/about/

The length of the questionnaire

There is no hard and fast rule about the number of questions that can be included in a questionnaire. This will depend on factors such as the topic under investigation, how complex the questions are, the nature of the respondents who have been targeted and the time it takes to complete the questionnaire.

To accomplish this balancing act there are certain rules to **bear in mind:**

• **Only ask those questions which are absolutely vital for the research**. The better the research is planned, the easier it will be to identify the absolutely crucial questions and discard the 'just in case I need this information later' questions.

• **Be rigorous in weeding out any duplication of questions**. For example, if a questionnaire contains as separate questions, 'What is your date of birth?' and 'How old are you?' we need to ask just how vital it is that both are included. A moment's reflection might lead the researcher to the conclusion that one or other will supply adequate information for the particular purposes of the investigation – or that one can be deduced from the other.

• Make the task of responding to the questionnaire **as straightforward and speedy** as possible.

• **Pilot the questionnaire** to see how long it takes to answer and then consider whether it is reasonable to expect the specific target group to spare this amount of time supplying the answers

Devising the questions

- Make sure the wording is completely unambiguous.
- Avoid vague questions.
- Use only the minimum amount of technical jargon
- Use wording that is suited to the specific target group.
- Keep the questions as short and straightforward as possible.
- Avoid asking the same question twice in a different fashion.
- Avoid the use of ‘leading’ questions.
- Be sure to include sufficient options in the answer.
- Pay attention to the way the questions are numbered
- Avoid words or phrases which might cause offence.

Example: Nine types of question that can be used in a questionnaire

1 A statement

Example:

What do you think about the UK's membership of the European Union?

_____

_____

_____

2 A list

Example:

Please list the issues you feel are most important in relation to the UK's membership of the European Union:

_____

_____

_____

_____

3 A 'yes/no' answer

Example:

Have you travelled from the UK to another European Union country in the past 12 months? Yes/No

4 Agree/disagree with a statement

Example:

Would you agree or disagree with the following statement?

European unity carries economic advantages which outweigh the political disadvantages. Agree/Disagree

5 Choose from a list of options

Example:

Which ONE of the following list of European countries do you feel has the strongest economy?

Spain	UK	Belgium	Netherlands
Ireland	France	Germany	Italy

6 Rank order

Example:

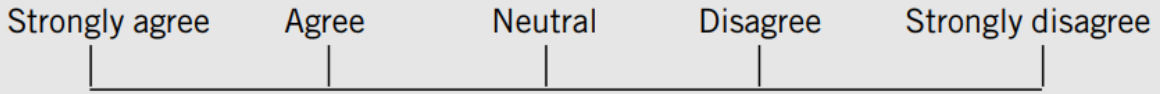
From the following list of European countries choose the THREE which you feel have the strongest economies and put them in rank order: 1 = strongest, 2 = second strongest, 3 = third strongest.

Spain	UK	Belgium	Netherlands
Ireland	France	Germany	Italy

7 Degree of agreement and disagreement: *the Likert Scale*

Example:

Membership of the European Union is a good thing for the UK.



8 Rate items

Example:

How significant would you rate the following factors in affecting further European integration?

	Not significant						Very significant
political sovereignty	1	2	3	4	5	6	7
national identities	1	2	3	4	5	6	7
past history	1	2	3	4	5	6	7
religiousdifferences	1	2	3	4	5	6	7
language barriers	1	2	3	4	5	6	7

9 Feelings about a topic: *the semantic differential*

Example:

Progress towards European unity is:

Important	1	2	3	4	5	Unimportant
Difficult	1	2	3	4	5	Easy
Risky	1	2	3	4	5	Safe
Unlikely	1	2	3	4	5	Likely
Boring	1	2	3	4	5	Interesting

Quantitative data

Quantitative data take the form of numbers. They are associated primarily with strategies of research such as surveys and experiments, and with research methods such as questionnaires and observation. These are not, however, the only sources of quantitative data.

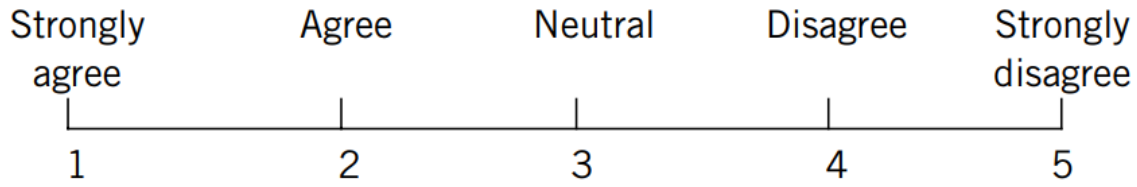
For example, the use of content analysis with texts (such as interview transcripts) can also produce numerical data. The kind of research method used, then, is not the crucial thing when it comes to defining quantitative data. It is the nature of the data that the method produces that is the key issue. It is important to bear this point in mind and to recognize that quantitative data can be produced by a variety of research methods

Numbers	*Research method*
Answers to closed-ended questions	Questionnaires
Content analysis of transcripts	Interviews
Measurements from experiments	Observation
Observation schedule used with events	
Official statistics (health, education, trade, etc.)	Documents
Business data (performance, employment, etc.)	
Content analysis of, for example, company reports	

Types of quantitative data

Nominal data come from counting things and placing them into a category. They are the lowest level of quantitative data, in the sense that they allow little by way of statistical manipulation compared with the other types. Typically, there is a head count of members of a particular category, such as male/female or White/South Asian/African Caribbean. These categories are based simply on names; there is no underlying order to the names.

Ordinal data. Like nominal data, ordinal data are based on counts of things assigned to specific categories, but, in this case, the categories stand in some clear, ordered, ranked relationship. The categories are 'in order'. This means that the data in each category can be compared with data in the other categories as being higher or lower than, more or less than, etc., those in the other categories. The most obvious example of ordinal data comes from the use of questionnaires in which respondents are asked to respond on a five-point scale such as:



Interval data are like ordinal data, but the categories are ranked on a scale. This means that the 'distance' between the categories is a known factor and that it is proportionate. This means that the researcher not only can deal with the data in terms of 'more than' or 'less than', but also say how much more or how much less.

Calendar years provide a suitable example of such data. Data collected for the years 1966, 1976, 1986, 1996 and 2006 not only differ in terms of being earlier or later than one another, they are also earlier or later by a known timespan interval. This allows the researcher to use addition and subtraction (but not multiplication or division) to contrast the difference between various periods: the difference between 1976 and 1986 can be directly compared with the difference between 1996 and 2006, and so on.

Ratio data. Ratio data are like interval data, except that the categories exist on a scale which has a 'true zero' or an absolute reference point. When the categories concern things like incomes, distances and weights, they give rise to ratio data because the scales have a zero point. Calendar years, in the previous example, do not exist on such a scale, because the year 0 does not denote the beginning of all time and history. The important thing about the scale having a true zero is that the researcher can compare and contrast the data for each category in terms of ratios, using multiplication and division, rather than being restricted to the use of addition and subtraction as is the case with interval data. Ratio data are the highest level of data in terms of how amenable they are to mathematical manipulation.

Discrete data. Certain data are based on phenomena which naturally come in whole units. Numbers of children per family, in reality, have to be whole numbers. We might aggregate the numbers to arrive at an average figure of 1.9 or whatever, but we do not suppose that there exists anywhere 0.9 of a child belonging to a family. In this example, our measurement of children per family can be exact for each and every household, with no need for approximations or results accurate to the nearest fraction. The discrete data come in chunks: 1, 2, 3, 4, and so on.

Continuous data. Contrasted with this there are certain kinds of data which, for practical purposes, are inevitably measured 'to the nearest unit' simply because they do not come in neat, discrete chunks. Such things are measured to the nearest small unit because, as a variable, they are continuous. People's height, age and weight are obvious examples here. In principle, there is no end to the precision with which we might try to measure these items.

Preparing quantitative data for analysis

1. Coding the data

2. Grouping the data

3. Grouping the data:

- The mean (the arithmetic average)

- The median (the middle point)

- The mode (the most common)

4. Describing the spread of data

5. Looking for patterns and relationships in the data

6. Statistical tests for association and difference

7. Presenting the data – tables and charts

8. Validating the data

Approaches to analysis: quantitative and qualitative research

Quantitative

- uses numbers as the unit of analysis
- tends to be associated with researcher detachment
- tends to be associated with large-scale studies
- tends to be associated with data analysis after data collection

Qualitative

- uses words or visual images as the unit of analysis
- tends to be associated with researcher involvement
- tends to be associated with small-scale studies
- tends to be associated with data analysis during data collection

The five main stages of data analysis

	Quantitative data	*Qualitative data*
1 Data preparation	Coding (which normally takes place before data collection) Categorizing the data Checking the data	Cataloguing the text or visual data Preparation of data and loading to software (if applicable) Transcribing the text
2 Initial exploration of the data	Look for obvious trends or correlations	Look for obvious recurrent themes or issues Add notes to the data. Write memos to capture ideas
3 Analysis of the data	Use of statistical tests (e.g. descriptive statistics, factor analysis, cluster analysis) Link to research questions or hypotheses	Code the data Group the codes into categories or themes Comparison of categories and themes Look for concepts (or fewer, more abstract categories) that encapsulate the categories
4 Presentation and display of the data	Tables Figures Written interpretation of the statistical findings	Written interpretation of the findings Illustration of points by quotes and pictures Use of visual models, figures and tables
5 Validation of the data	External benchmarks. Internal consistency. Comparison with alternative explanations	Data and method triangulation Member validation Comparison with alternative explanations

Source: Adapted from Creswell and Plano Clarke (2007: 129), Table 7.1.

What is the mixed methods approach?

- Use of qualitative and quantitative approaches within a single research project. At the heart of the approach is the idea that researchers can bring together within a single research project certain elements that have conventionally been treated as an 'either/or' option. In most cases, the distinction is drawn between 'qualitative' and 'quantitative' with researchers variously writing about using both qualitative and quantitative methods, qualitative and quantitative data or qualitative and quantitative research.

- Explicit focus on the link between approaches (triangulation). The mixed methods approach emphasizes the need to explain why the alternative approaches are beneficial and how the alternatives are to be brought together. Particular attention is given to the design of mixed methods research and especially the role of triangulation in justifying the use of the alternative approaches.

- Emphasis on practical approaches to research problems (pragmatism). The mixed methods approach is 'problem-driven' in the sense that it treats the research problem – more specifically answers to the research problem – as the overriding concern. Other approaches, of course, share a concern for practical solutions to real-world problems.

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Thank you for your attention!