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How to design a questionnaire

Wai-Ching Leung has some practical advice on questionnaires

As discussed in a previous issue a survey involves directly collecting information from people (or sometimes organisations) whom we are interested in.¹ The types of information will take account of the people's or organisations' level of knowledge, attitude, personalities, beliefs, or preferences. Questionnaires are widely used to collect such information. Well designed questionnaires are highly structured to allow the same types of information to be collected from a large number of people in the same way and for data to be analysed quantitatively and systematically. Questionnaires are best used for collecting factual data and appropriate questionnaire design is essential to ensure that we obtain valid responses to our questions.



Objectives in designing questionnaires

There are two main objectives in designing a questionnaire:

- To maximise the proportion of subjects answering our questionnaire - that is, the response rate.
- To obtain accurate relevant information for our survey.

To maximise our response rate, we have to consider carefully how we administer the questionnaire, establish rapport, explain the purpose of the survey, and remind those who have not responded. The length of the questionnaire should be appropriate. In order to obtain accurate relevant information, we have to give some thought to what questions we ask, how we

ask them, the order we ask them in, and the general layout of the questionnaire.

Deciding what to ask

As discussed in last month's issue, there are three potential types of information:

- Information we are primarily interested in-that is, dependent variables.
- Information which might explain the dependent variables-that is, independent variables.
- Other factors related to both dependent and independent factors which may distort the results and have to be adjusted for - that is, confounding variables.

Let us take as an example a national survey to find out students' factors predicting the level of certain knowledge, skills, and attitudes at the end of their undergraduate medical course. The dependent factors include the students' level of relevant knowledge, skills, and attitudes. The independent factors might include students' learning styles, GCSE and A level grades, socioeconomic status, ethnicity, etc. Confounding variables might include the types and quality of teaching in each medical school.

Sometimes, additional questions are used to detect the consistency of the subject's responses. For example, there may be a tendency for some to tick either "agree" or "disagree" to all the questions. Additional contradictory statements may be used to detect such tendencies.

Box 1: Advantages of open or closed format

Open format

- Allows exploration of the range of possible themes arising from an issue
- Can be used even if a comprehensive range of alternative choices cannot be compiled

Closed-that is, forced choice-format

- Easy and quick to fill in
- Minimise discrimination against the less literate (in self administered

questionnaire) or the less articulate (in interview questionnaire)

- Easy to code, record, and analyse results quantitatively
- Easy to report results

Wording of individual questions

The way questions are phrased is important and there are some general rules for constructing good questions in a questionnaire.

Use short and simple sentences

Short, simple sentences are generally less confusing and ambiguous than long, complex ones. As a rule of thumb, most sentences should contain one or two clauses. Sentences with more than three clauses should be rephrased.

Ask for only one piece of information at a time

For example, "Please rate the lecture in terms of its content and presentation" asks for two pieces of information at the same time. It should be divided into two parts: "Please rate the lecture in terms of (a) its content, (b) its presentation."

Avoid negatives if possible

Negatives should be used only sparingly. For example, instead of asking students whether they agree with the statement, "Small group teaching should not be abolished," the statement should be rephrased as, "Small group teaching should continue." Double negatives should always be avoided.

Ask precise questions

Questions may be ambiguous because a word or term may have a different meaning. For example, if we ask students to rate their interest in "medicine," this term might mean "general medicine" (as opposed to general surgery) to some, but inclusive of all clinical specialties (as opposed to professions outside medicine) to others.

Another source of ambiguity is a failure to specify a frame of reference. For example, in the question, "How often did you borrow books from your library?" the time reference is missing. It might be rephrased as, "How many books have you borrowed from the library within the past six months altogether?"

Ensure those you ask have the necessary knowledge

For example, in a survey of university lecturers on recent changes in higher education, the question, "Do you agree with the recommendations in the Dearing report on higher education?" is unsatisfactory for several reasons. Not only does it ask for several pieces of information at the same time as there are several recommendations in the report, the question also assumes that all lecturers know about the relevant recommendations.

Level of details

It is important to ask for the exact level of details required. On the one hand, you might not be able to fulfil the purposes of the survey if you omit to ask essential details. On the other hand, it is important to avoid unnecessary details. People are less inclined to complete long questionnaires. This is particularly important for confidential sensitive information, such as personal financial matters or marital relationship issues.

Sensitive issues

It is often difficult to obtain truthful answers to sensitive questions. Clearly, the question, "Have you ever copied other students' answers in a degree exam?" is likely to produce either no response or negative responses. Less direct approaches have been suggested.² Firstly, the *casual approach*: "By the way, do you happen to have copied other students' answers in a degree exam?" may be used as a last part of another decoy question. Secondly, the *numbered card approach*: "Please tick one or more of the following items which correspond to how you have answered degree examination questions in the past." In the list of items, include "copy from other students" as one of many items. Thirdly, the *everybody approach*: "As we all know, most medical students have copied other students' answers in degree exams. Do you happen to be one of them?" Fourthly, *other people approach*. This approach was used in the recent medical student survey.³ In this survey, students were given the scenario, "John copies answers in a degree exam from Jean." They were then asked, "Do you feel John is wrong, what penalty should be imposed for John, and have you done or would you consider doing the above?"

Minimise bias

People tend to answer questions in a way they perceive to be socially desired or expected by the questioner and they often look for clues in the questions. Many apparently neutral questions can potentially lead to bias. For example, in the question, "Within the past month, how many lectures have you missed due to your evening job?" students may perceive the desired responses to be

"never" to the first question. This question could be rephrased as, "Within the past month, how many times did your evening job commitment clash with lectures? How many times did you give priority to your evening job?" Take another example. The question, "Please rate how useful the following text-books are. Please also state whether they are included in your lecturer's recommended reading list?" There is a risk that the students may perceive that they should rate books recommended by lecturers more favourably than those not recommended by their lecturers. This risk may be minimised by putting the second question later on in the questionnaire.

Format of responses

The responses can be in open or closed formats. In an open ended question, the respondents can formulate their own answers. In closed format, respondents are forced to choose between several given options. The advantages of each of these formats are shown in box 1. It is possible to use a mixture of the two formats - for example, give a list of options, with the final option of "other" followed by a space for respondents to fill in other alternatives.

There are several forced choice formats. These are shown in box 2. Out of these formats, ranking is probably least frequently used, as the responses are relatively difficult to record and analyse.

Box 2: Types of closed (forced choice) format

Choice of categories

For example, "What is your marital status?"

- Single
- Married
- Divorced
- Widowed

Likert style scale

For example, "Statistics is an interesting subject"

Strongly disagree Disagree Cannot decide Agree Strongly agree

Differential scales

For example, "How would you rate the presentation?"

Extremely interesting 1 2 3 4 5 6 7 8 9 10 Extremely dull

It may also be diagrammatic:



Checklists

For example, "Circle the clinical specialties you are particularly interested in"

- | | |
|------------------|----------------------------|
| General medicine | Obstetrics and gynaecology |
| General surgery | Orthopaedics |
| Ophthalmology | Accident and emergency |
| Paediatrics | General practice |

Ranking

For example, "Please rank your interests in the following specialties"
(1= most interesting, 8=least interesting)

- | | |
|------------------|----------------------------|
| General medicine | Obstetrics and gynaecology |
| General surgery | Orthopaedics |
| Ophthalmology | Accident and emergency |
| Paediatrics | General practice |

Length of questionnaire

There are no universal agreements about the optimal length of questionnaires. It probably depends on the type of respondents. However, short simple questionnaires usually attract higher response rates than long complex ones. In a BMJ survey of stroke survivors both the response rate and the proportion of completed forms were higher for a shorter questionnaire (six questions with

a visual analogue scale) compared with a longer and more complex questionnaire (with 34 questions).⁴

Arranging the questions

The order of the questions is also important. Some general rules are:

- Go from general to particular.
- Go from easy to difficult.
- Go from factual to abstract.
- Start with closed format questions.
- Start with questions relevant to the main subject.
- Do not start with demographic and personal questions.

It is useful to use a variety of question format as shown in box 2 to maintain the respondents' interest. When a series of semantic differential scales are used, it may be a good idea to mix positive negative - for example, interesting to dull - with negative positive - for example, useless to useful - scales. This might make the respondents think more and avoid the tendency to tick the same response for every question.

Filter questions are useful to ensure that respondents answer only relevant questions. However, avoid a highly complex filter regime. Make good use of arrows and boxes to clarify the filter regime.

Introduction, personalised letter, and ending

It seems a good idea to have either a personalised covering letter or at least an introduction explaining briefly the purpose of the survey, the importance of the respondents' participation, who is responsible for the survey, and a statement guaranteeing confidentiality.⁵ A personalised letter can be easily generated using mail-merge on a word processor. It is also important to thank the respondent at the end of the questionnaire.

How to administer the questionnaires

There are several ways of administering questionnaires. They may be self administered or read out by interviewers. Self administered questionnaires may be sent by post, email, or electronically online. Interview administered questionnaires may be by telephone or face to face.

Advantages of self administered questionnaires include:

- Cheap and easy to administer.

- Preserve confidentiality.
- Can be completed at respondent's convenience.
- Can be administered in a standard manner.

Advantages of interview administered questionnaires include:

- Allow participation by illiterate people.
- Allow clarification of ambiguity.

The exact method of administration also depends on who the respondents are. For example, university lecturers may be more appropriately surveyed by email; older people by telephone interviews; train passengers by face to face interviews.

Piloting and evaluation of questionnaires

Given the complexity of designing a questionnaire, it is impossible even for the experts to get it right the first time round. Questionnaires must be pretested - that is, piloted - on a small sample of people characteristic of those in the survey. In a small survey, there might be only pretesting of the drafted questionnaire. In a large survey, there may be three phases of piloting. In the first phase we might ask each respondent in great detail about a limited number of questions: effects of different wordings, what they have in mind when they give a particular answer, how they understand a particular word, etc. In the second phase the whole questionnaire is administered by interviewers. Analysis of the responses and the interviewers' comments are used to improve the questionnaire. Ideally, there should be sufficient variations in responses among respondents; each question should measure different qualities - that is, the responses between any two items should not be very strongly correlated - and the non-response rate should be low. In the third phase the pilot test is polished to improve the question order, filter questions, and layout.



Conclusions

Questionnaires must be carefully designed to yield valid information. Meticulous attention must be paid to ensure that individual questions are relevant, appropriate, intelligible, precise, and unbiased. The order of the questions must be carefully arranged, and the layout of the questionnaire must be clear. It is wise to draft a clear personalised covering letter. Questionnaires must first be piloted and evaluated before the actual survey.

Further reading:

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