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Survival Statistics

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Designing and Using Questionnaires

This is the information age. More information has been published in the last decade than in all previous history. Everyone uses information to make decisions about the future. If our information is accurate, we have a high probability of making a good decision. If our information is inaccurate, our ability to make a correct decision is diminished. Better information usually leads to better decisions.

Ways to Get Information

There are six common ways to get information. These are: literature searches, talking with people, focus groups, personal interviews, telephone surveys, and mail surveys.

A literature search involves reviewing all readily available materials. These materials can include internal company information, relevant trade publications, newspapers, magazines, annual reports, company literature, on-line data bases, and any other published materials. It is a very inexpensive method of gathering information, although it generally does not yield timely information. Literature searches take between one and eight weeks.

Talking with people is a good way to get information during the initial stages of a research project. It can be used to gather information that is not publicly available, or that is too new to be found in the literature. Examples might include meetings with prospects, customers, suppliers, and other types of business conversations at trade shows, seminars, and association meetings. Although often valuable, the information has questionable validity because it is highly subjective and might not be representative of the population.

A focus group is used as a preliminary research technique to explore people's ideas and attitudes. It is often used to test new approaches (such as products or advertising), and to discover customer concerns. A group of 6 to 20 people meet in a conference-room-like setting with a trained moderator. The room usually contains a one-way mirror for viewing, including audio and video capabilities. The moderator leads the group's discussion and keeps the focus on the areas you want to explore. Focus groups can be conducted within a couple of weeks and cost between two and three thousand dollars. Their disadvantage is that the sample is small and may not be representative of the population in general.

Personal interviews are a way to get in-depth and comprehensive information. They involve one person interviewing another person for personal or detailed information. Personal interviews are very expensive because of the one-to-one nature of the interview (\$50+ per interview). Typically, an interviewer will ask questions from a written questionnaire and record the answers verbatim.

Sometimes, the questionnaire is simply a list of topics that the research wants to discuss with an industry expert. Personal interviews (because of their expense) are generally used only when subjects are not likely to respond to other survey methods.

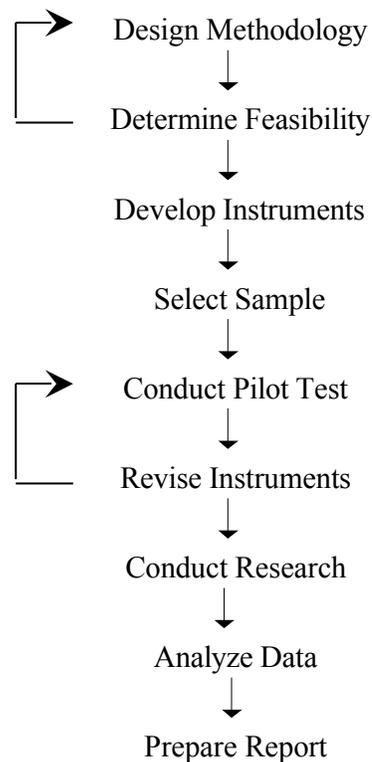
Telephone surveys are the fastest method of gathering information from a relatively large sample (100-400 respondents). The interviewer follows a prepared script that is essentially the same as a written questionnaire. However, unlike a mail survey, the telephone survey allows the opportunity for some opinion probing. Telephone surveys generally last less than ten minutes. Typical costs are between four and six thousand dollars and they can be completed in two to four weeks.

Mail surveys are a cost effective method of gathering information. They are ideal for large sample sizes, or when the sample comes from a wide geographic area. They cost a little less than telephone interviews, however, they take over twice as long to complete (eight to twelve weeks). Because there is no interviewer, there is no possibility of interviewer bias. The main disadvantage is the inability to probe respondents for more detailed information.

E-mail and internet surveys are relatively new and little is known about the effect of sampling bias in internet surveys. While it is clearly the most cost effective and fastest method of distributing a survey, the demographic profile of the internet user does not represent the general population, although this is changing. Before doing an e-mail or internet survey, carefully consider the effect that this bias might have on the results.

Questionnaire Research Flow Chart

Questionnaire research design proceeds in an orderly and specific manner. Each item in the flow chart depends upon the successful completion of all the previous items. Therefore, it is important not to skip a single step. Notice that there are two feedback loops in the flow chart to allow revisions to the methodology and instruments.



Time Considerations

Many researchers underestimate the time required to complete a research project. The following form may be used as an initial checklist in developing time estimates. The best advice is to be generous with your time estimates. Things almost always take longer than we think they should.

This checklist contains two time estimates for each task. The first one (Hours) is your best estimate of the actual number of hours required to complete the task. The second one (Duration) is the amount of time that will pass until the task is completed. Sometimes these are the same and sometimes they are different. Most researchers and business-people have to divide their time among many projects. They simply cannot give all their time to any one project. For example, my estimate of goal clarification may be four hours, but other commitments allow me to spend only two hours a day on this study. My "hours" estimate is four hours, and my "duration" estimate is two days.

To arrive at your final time estimates, add the individual estimates. The hours estimate is used for budget planning and the duration estimate is used to develop a project time line.

| | <u>Hours</u> | <u>Duration</u> |
|---|--------------|-----------------|
| 1. Goal clarification | _____ | _____ |
| 2. Overall study design | _____ | _____ |
| 3. Selecting the sample | _____ | _____ |
| 4. Designing the questionnaire and cover letter | _____ | _____ |
| 5. Conduct pilot test | _____ | _____ |
| 6. Revise questionnaire (if necessary) | _____ | _____ |
| 7. Printing time | _____ | _____ |
| 8. Locating the sample (if necessary) | _____ | _____ |
| 9. Time in the mail & response time | _____ | _____ |
| 10. Attempts to get non-respondents | _____ | _____ |
| 11. Editing the data and coding open-ended questions | _____ | _____ |
| 12. Data entry and verification | _____ | _____ |
| 13. Analyzing the data | _____ | _____ |
| 14. Preparing the report | _____ | _____ |
| 15. Printing & distribution of the report | _____ | _____ |

Cost Considerations

Both beginning and experienced researchers often underestimate the cost of doing questionnaire research. Some of the most common costs are:

| | |
|---|-------|
| Proposal typing and editing. | _____ |
| Cover letter and questionnaire typing. | _____ |
| Addressing mailing envelopes. | _____ |
| Following up on non-respondents. | _____ |
| Mailing list cost (if necessary). | _____ |
| Artwork and keylining. | _____ |
| Cover letter and survey printing costs. | _____ |
| Envelope costs (both ways + more). | _____ |
| Postage costs (both ways + more). | _____ |
| Incentives. | _____ |
| Data entry and verification. | _____ |
| Statistical analysis programmer. | _____ |
| Distribution of the final report. | _____ |

Advantages of Written Questionnaires

Questionnaires are very cost effective when compared to face-to-face interviews. This is especially true for studies involving large sample sizes and large geographic areas. Written questionnaires become even more cost effective as the number of research questions increases.

Questionnaires are easy to analyze. Data entry and tabulation for nearly all surveys can be easily done with many computer software packages.

Questionnaires are familiar to most people. Nearly everyone has had some experience completing questionnaires and they generally do not make people apprehensive.

Questionnaires reduce bias. There is uniform question presentation and no middle-man bias. The researcher's own opinions will not influence the respondent to answer questions in a certain manner. There are no verbal or visual clues to influence the respondent.

Questionnaires are less intrusive than telephone or face-to-face surveys. When a respondent receives a questionnaire in the mail, he is free to complete the questionnaire on his own time-table. Unlike other research methods, the respondent is not interrupted by the research instrument.

Disadvantages Of Written Questionnaires

One major disadvantage of written questionnaires is the possibility of low response rates. Low response is the curse of statistical analysis. It can dramatically lower our confidence in the results. Response rates vary widely from one questionnaire to another (10% - 90%), however, well-designed studies consistently produce high response rates.

Another disadvantage of questionnaires is the inability to probe responses. Questionnaires are structured instruments. They allow little flexibility to the respondent with respect to response format. In essence, they often lose the "flavor of the response" (i.e., respondents often want to qualify their answers). By allowing frequent space for comments, the researcher can partially overcome this disadvantage. Comments are among the most helpful of all the information on the questionnaire, and they usually provide insightful information that would have otherwise been lost.

Nearly ninety percent of all communication is visual. Gestures and other visual cues are not available with written questionnaires. The lack of personal contact will have different effects depending on the type of information being requested. A questionnaire requesting factual

information will probably not be affected by the lack of personal contact. A questionnaire probing sensitive issues or attitudes may be severely affected.

When returned questionnaires arrive in the mail, it's natural to assume that the respondent is the same person you sent the questionnaire to. This may not actually be the case. Many times business questionnaires get handed to other employees for completion. Housewives sometimes respond for their husbands. Kids respond as a prank. For a variety of reasons, the respondent may not be who you think it is. It is a confounding error inherent in questionnaires.

Finally, questionnaires are simply not suited for some people. For example, a written survey to a group of poorly educated people might not work because of reading skill problems. More frequently, people are turned off by written questionnaires because of misuse.

Questionnaire Design - General Considerations

Most problems with questionnaire analysis can be traced back to the design phase of the project. Well-defined goals are the best way to assure a good questionnaire design. When the goals of a study can be expressed in a few clear and concise sentences, the design of the questionnaire becomes considerably easier. The questionnaire is developed to directly address the goals of the study.

One of the best ways to clarify your study goals is to decide how you intend to use the information. Do this before you begin designing the study. This sounds obvious, but many researchers neglect this task. Why do research if the results will not be used?

Be sure to commit the study goals to writing. Whenever you are unsure of a question, refer to the study goals and a solution will become clear. Ask only questions that directly address the study goals. Avoid the temptation to ask questions because it would be "interesting to know".

As a general rule, with only a few exceptions, long questionnaires get less response than short questionnaires. Keep your questionnaire short. In fact, the shorter the better. Response rate is the single most important indicator of how much confidence you can place in the results. A low response rate can be devastating to a study. Therefore, you must do everything possible to maximize the response rate. One of the most effective methods of maximizing response is to shorten the questionnaire.

If your survey is over a few pages, try to eliminate questions. Many people have difficulty knowing which questions could be eliminated. For the elimination round, read each question and ask, "How am I going to use this

information?" If the information will be used in a decision-making process, then keep the question... it's important. If not, throw it out.

One important way to assure a successful survey is to include other experts and relevant decision-makers in the questionnaire design process. Their suggestions will improve the questionnaire and they will subsequently have more confidence in the results.

Formulate a plan for doing the statistical analysis during the design stage of the project. Know how every question will be analyzed and be prepared to handle missing data. If you cannot specify how you intend to analyze a question or use the information, do not use it in the survey.

Make the envelope unique. We all know how important first impressions are. The same holds true for questionnaires. The respondent's first impression of the study usually comes from the envelope containing the survey. The best envelopes (i.e., the ones that make you want to see what's inside) are colored, hand-addressed and use a commemorative postage stamp. Envelopes with bulk mail permits or gummed labels are perceived as unimportant. This will generally be reflected in a lower response rate.

Provide a well-written cover letter. The respondent's next impression comes from the cover letter. The importance of the cover letter should not be underestimated. It provides your best chance to persuade the respondent to complete the survey.

Give your questionnaire a title that is short and meaningful to the respondent. A questionnaire with a title is generally perceived to be more credible than one without.

Include clear and concise instructions on how to complete the questionnaire. These must be very easy to understand, so use short sentences and basic vocabulary. Be sure to print the return address on the questionnaire itself (since questionnaires often get separated from the reply envelopes).

Begin with a few non-threatening and interesting items. If the first items are too threatening or "boring", there is little chance that the person will complete the questionnaire. People generally look at the first few questions before deciding whether or not to complete the questionnaire. Make them want to continue by putting interesting questions first.

Use simple and direct language. The questions must be clearly understood by the respondent. The wording of a question should be simple and to the point. Do not use uncommon words or long sentences. Make items as brief as possible. This will reduce misunderstandings and make the questionnaire

appear easier to complete. One way to eliminate misunderstandings is to emphasize crucial words in each item by using bold, italics or underlining.

Leave adequate space for respondents to make comments. One criticism of questionnaires is their inability to retain the "flavor" of a response. Leaving space for comments will provide valuable information not captured by the response categories. Leaving white space also makes the questionnaire look easier and this increases response.

Place the most important items in the first half of the questionnaire. Respondents often send back partially completed questionnaires. By putting the most important items near the beginning, the partially completed questionnaires will still contain important information.

Hold the respondent's interest. We want the respondent to complete our questionnaire. One way to keep a questionnaire interesting is to provide variety in the type of items used. Varying the questioning format will also prevent respondents from falling into "response sets". At the same time, it is important to group items into coherent categories. All items should flow smoothly from one to the next.

If a questionnaire is more than a few pages and is held together by a staple, include some identifying data on each page (such as a respondent ID number). Pages often accidentally separate.

Provide incentives as a motivation for a properly completed questionnaire. What does the respondent get for completing your questionnaire? Altruism is rarely an effective motivator. Attaching a dollar bill to the questionnaire works well. If the information you are collecting is of interest to the respondent, offering a free summary report is also an excellent motivator. Whatever you choose, it must make the respondent want to complete the questionnaire.

Use professional production methods for the questionnaire--either desktop publishing or typesetting and keylining. Be creative. Try different colored inks and paper. The object is to make your questionnaire stand out from all the others the respondent receives.

Make it convenient. The easier it is for the respondent to complete the questionnaire the better. Always include a self-addressed postage-paid envelope. Envelopes with postage stamps get better response than business reply envelopes (although they are more expensive since you also pay for the non-respondents).

The final test of a questionnaire is to try it on representatives of the target audience. If there are problems with the questionnaire, they almost always

show up here. If possible, be present while a respondent is completing the questionnaire and tell her that it is okay to ask you for clarification of any item. The questions she asks are indicative of problems in the questionnaire (i.e., the questions on the questionnaire must be without any ambiguity because there will be no chance to clarify a question when the survey is mailed).

Qualities of a Good Question

There are good and bad questions. The qualities of a good question are as follows:

1. Evokes the truth. Questions must be non-threatening. When a respondent is concerned about the consequences of answering a question in a particular manner, there is a good possibility that the answer will not be truthful. Anonymous questionnaires that contain no identifying information are more likely to produce honest responses than those identifying the respondent. If your questionnaire does contain sensitive items, be sure to clearly state your policy on confidentiality.
2. Asks for an answer on only one dimension. The purpose of a survey is to find out information. A question that asks for a response on more than one dimension will not provide the information you are seeking. For example, a researcher investigating a new food snack asks "Do you like the texture and flavor of the snack?" If a respondent answers "no", then the researcher will not know if the respondent dislikes the texture or the flavor, or both. Another questionnaire asks, "Were you satisfied with the quality of our food and service?" Again, if the respondent answers "no", there is no way to know whether the quality of the food, service, or both were unsatisfactory. A good question asks for only one "bit" of information.
3. Can accommodate all possible answers. Multiple choice items are the most popular type of survey questions because they are generally the easiest for a respondent to answer and the easiest to analyze. Asking a question that does not accommodate all possible responses can confuse and frustrate the respondent. For example, consider the question:

What brand of computer do you own? ___
A. IBM PC
B. Apple

Clearly, there are many problems with this question. What if the respondent doesn't own a microcomputer? What if he owns a different brand of

computer? What if he owns both an IBM PC and an Apple? There are two ways to correct this kind of problem.

The first way is to make each response a separate dichotomous item on the questionnaire. For example:

Do you own an IBM PC? (circle: Yes or No)

Do you own an Apple computer? (circle: Yes or No)

Another way to correct the problem is to add the necessary response categories and allow multiple responses. This is the preferable method because it provides more information than the previous method.

What brand of computer do you own?

(Check all that apply)

Do not own a computer

IBM PC

Apple

Other

4. Has mutually exclusive options. A good question leaves no ambiguity in the mind of the respondent. There should be only one correct or appropriate choice for the respondent to make. An obvious example is:

Where did you grow up? ___

A. country

B. farm

C. city

A person who grew up on a farm in the country would not know whether to select choice A or B. This question would not provide meaningful information. Worse than that, it could frustrate the respondent and the questionnaire might find its way to the trash.

5. Produces variability of responses. When a question produces no variability in responses, we are left with considerable uncertainty about why we asked the question and what we learned from the information. If a question does not produce variability in responses, it will not be possible to perform any statistical analyses on the item. For example:

What do you think about this report? ___
A. It's the worst report I've read
B. It's somewhere between the worst and best
C. It's the best report I've read

Since almost all responses would be choice B, very little information is learned. Design your questions so they are sensitive to differences between respondents. As another example:

Are you against drug abuse? (circle: Yes or No)

Again, there would be very little variability in responses and we'd be left wondering why we asked the question in the first place.

6. Follows comfortably from the previous question. Writing a questionnaire is similar to writing anything else. Transitions between questions should be smooth. Grouping questions that are similar will make the questionnaire easier to complete, and the respondent will feel more comfortable. Questionnaires that jump from one unrelated topic to another feel disjointed and are not likely to produce high response rates.

7. Does not presuppose a certain state of affairs. Among the most subtle mistakes in questionnaire design are questions that make an unwarranted assumption. An example of this type of mistake is:

Are you satisfied with your current auto insurance? (Yes or No)

This question will present a problem for someone who does not currently have auto insurance. Write your questions so they apply to everyone. This often means simply adding an additional response category.

Are you satisfied with your current auto insurance?
 Yes
 No
 Don't have auto insurance

One of the most common mistaken assumptions is that the respondent knows the correct answer to the question. Industry surveys often contain very specific questions that the respondent may not know the answer to. For example:

What percent of your budget do you spend on direct mail advertising? ____

Very few people would know the answer to this question without looking it up, and very few respondents will take the time and effort to look it up. If you ask a question similar to this, it is important to understand that the responses are rough estimates and there is a strong likelihood of error.

It is important to look at each question and decide if all respondents will be able to answer it. Be careful not to assume anything. For example, the following question assumes the respondent knows what Proposition 13 is about.

Are you in favor of Proposition 13 ?

- Yes*
- No*
- Undecided*

If there is any possibility that the respondent may not know the answer to your question, include a "don't know" response category.

8. Does not imply a desired answer. The wording of a question is extremely important. We are striving for objectivity in our surveys and, therefore, must be careful not to lead the respondent into giving the answer we would like to receive. Leading questions are usually easily spotted because they use negative phraseology. As examples:

Wouldn't you like to receive our free brochure?

Don't you think the Congress is spending too much money?

9. Does not use emotionally loaded or vaguely defined words. This is one of the areas overlooked by both beginners and experienced researchers. Quantifying adjectives (e.g., most, least, majority) are frequently used in questions. It is important to understand that these adjectives mean different things to different people.
10. Does not use unfamiliar words or abbreviations. Remember who your audience is and write your questionnaire for them. Do not use uncommon words or compound sentences. Write short sentences. Abbreviations are okay if you are absolutely certain that every single respondent will understand their meanings. If there is any doubt at all, do not use the abbreviation. The following question might be okay if all the respondents are accountants, but it would not be a good question for the general public.

What was your AGI last year? _____

11. Is not dependent on responses to previous questions. Branching in written questionnaires should be avoided. While branching can be used as an effective probing technique in telephone and face-to-face interviews, it should not be used in written questionnaires because it sometimes confuses respondents. An example of branching is:

1. Do you currently have a life insurance policy ? (Yes or No) If no, go to question 3

2. How much is your annual life insurance premium ? _____

These questions could easily be rewritten as one question that applies to everyone:

1. How much did you spend last year for life insurance ? _____

12. Does not ask the respondent to order or rank a series of more than five items. Questions asking respondents to rank items by importance should be avoided. This becomes increasingly difficult as the number of items increases, and the answers become less reliable. This becomes especially problematic when asking respondents to assign a percentage to a series of items. In order to successfully complete this task, the respondent must mentally continue to re-adjust his answers until they total one hundred percent. Limiting the number of items to five will make it easier for the respondent to answer.

Pre-notification Letters

Many researchers have studied pre-notification letters to determine if they increase response rate. A meta-analysis of these studies revealed an aggregate increase in response rate of 7.7 percent. Pre-notification letters might help to establish the legitimacy of a survey, thereby contributing to a respondent's trust. Another possibility is that a pre-notification letter builds expectation and reduces the possibility that a potential respondent might disregard the survey when it arrives.

Pre-letters are seldom used in marketing research surveys. They are an excellent (but expensive) way to increase response. The researcher needs to weigh the additional cost of sending out a pre-letter against the probability of a lower response rate. When sample sizes are small, every response really counts and a pre-letter is highly recommended.

1. Briefly describe why the study is being done and identify the sponsors. This is impressive and lends credibility to the study.

2. Explain why the person receiving the pre-letter was chosen to receive the questionnaire.
3. Justify why the respondent should complete the questionnaire. The justification must be something that will benefit the respondent. For most people, altruism is not sufficient justification. If an incentive will be included with the questionnaire, mention the inclusion of a free gift without specifically telling what it will be.
4. Explain how the results will be used.

Cover Letters

The cover letter is an essential part of the survey. To a large degree, the cover letter will affect whether or not the respondent completes the questionnaire. It is important to maintain a friendly tone and keep it as short as possible. The importance of the cover letter should not be underestimated. It provides an opportunity to persuade the respondent to complete the survey. If the questionnaire can be completed in less than five minutes, the response rate can be increased by mentioning this in the cover letter.

Flattering the respondent in the cover letter does not seem to affect response. Altruism or an appeal to the social utility of a study has occasionally been found to increase response, but more often, it is not an effective motivator.

There are no definitive answers whether or not to personalize cover letters (i.e., the respondents name appears on the cover letter). Some researchers have found that personalized cover letters can be detrimental to response when anonymity or confidentiality are important to the respondent.

The literature regarding personalization are mixed. Some researchers have found that personalized cover letters with hand-written signatures helped response rates. Other investigators, however, have reported that personalization has no effect on response.

The signature of the person signing the cover letter has been investigated by several researchers. Ethnic sounding names and the status of the researcher (professor or graduate student) do not affect response. One investigator found that a cover letter signed by the owner of a marina produced better response than one signed by the sales manager. The literature is mixed regarding whether a hand-written signature works better than one that is mimeographed. Two researchers reported that mimeographed signatures worked as well as a hand-written one, while another reported that hand-written signatures produced better response.

Another investigator found that cover letters signed with green ink increased response by over 10 percent.

It is commonly believed that a handwritten postscript (P.S.) in the cover letter might increase response. One older study did find an increase in response, however, more recent studies found no significant difference.

1. Describe why the study is being done (briefly) and identify the sponsors.
2. Mention the incentive. (A good incentive is a copy of the results).
3. Mention inclusion of a stamped, self-addressed return envelope.
4. Encourage prompt response without using deadlines.
5. Describe your "confidentiality/anonymity" policy.
6. Give the name and phone number of someone they can call with questions.

Response Rate and Following up on Nonrespondents

Response rate is the single most important indicator of how much confidence can be placed in the results of a survey. A low response rate can be devastating to the reliability of a study.

One of the most powerful tool for increasing response is to use follow-ups or reminders. Traditionally, between 10 and 60 percent of those sent questionnaires respond without follow-up reminders. These rates are too low to yield confident results, so the need to follow up on nonrespondents is clear.

Researchers can increase the response from follow-up attempts by including another copy of the questionnaire. When designing the follow-up procedure, it is important for the researcher to keep in mind the unique characteristics of the people in the sample. The most successful follow-ups have been achieved by phone calls.

Many researchers have examined whether postcard follow-ups are effective in increasing response. The vast majority of these studies show that a follow-up postcard slightly increases response rate, and a meta-analysis revealed an aggregate gain of 3.5 percent. The postcard serves as a reminder for subjects who have forgotten to complete the survey.

Nonresponse Bias

Many studies have attempted to determine if there is a difference between respondents and nonrespondents. Some researchers have reported that people who respond to surveys answer questions differently than those who do not. Others have found that late responders answer differently than early responders, and that the differences may be due to the different levels of interest in the subject matter. One researcher, who examined a volunteer organization, reported that those more actively involved in the organization were more likely to respond.

Demographic characteristics of nonrespondents have been investigated by many researchers. Most studies have found that nonresponse is associated with low education. However, one researcher reported that demographic characteristics such as age, education, and employment status were the same for respondents and nonrespondents. Another study found that nonrespondents were more often single males.

Most researchers view nonresponse bias as a continuum, ranging from fast responders to slow responders (with nonresponders defining the end of the continuum). In fact, one study used extrapolation to estimate the magnitude of bias created by nonresponse. Another group of researchers argue that nonresponse should not be viewed as a continuum, and that late respondents do not provide a suitable basis for estimating the characteristics of nonrespondents.

The Order of the Questions

Items on a questionnaire should be grouped into logically coherent sections. Grouping questions that are similar will make the questionnaire easier to complete, and the respondent will feel more comfortable. Questions that use the same response formats, or those that cover a specific topic, should appear together.

Each question should follow comfortably from the previous question. Writing a questionnaire is similar to writing anything else. Transitions between questions should be smooth. Questionnaires that jump from one unrelated topic to another feel disjointed and are not likely to produce high response rates.

Most investigators have found that the order in which questions are presented can affect the way that people respond. One study reported that questions in the latter half of a questionnaire were more likely to be omitted, and contained fewer extreme responses. Some researchers have suggested that it may be necessary to present general questions before

specific ones in order to avoid response contamination. Other researchers have reported that when specific questions were asked before general questions, respondents tended to exhibit greater interest in the general questions.

It is not clear whether or not question-order affects response. A few researchers have reported that question-order does not effect responses, while others have reported that it does. Generally, it is believed that question-order effects exist in interviews, but not in written surveys.

Anonymity and Confidentiality

An anonymous study is one in which nobody (not even the researcher) can identify who provided data. It is difficult to conduct an anonymous questionnaire through the mail because of the need to follow-up on nonresponders. The only way to do a follow-up is to mail another survey or reminder postcard to the entire sample. However, it is possible to guarantee confidentiality, where those conducting the study promise not to reveal the information to anyone. For the purpose of follow-up, identifying numbers on questionnaires are generally preferred to using respondents' names. It is important, however, to explain why the number is there and what it will be used for.

Some studies have shown that response rate is affected by the anonymity/confidentiality policy of a study. Others have reported that responses became more distorted when subjects felt threatened that their identities would become known. Others have found that anonymity and confidentiality issues do not affect response rates or responses.

The Length of a Questionnaire

As a general rule, long questionnaires get less response than short questionnaires. However, some studies have shown that the length of a questionnaire does not necessarily affect response. More important than length is question content. A subject is more likely to respond if they are involved and interested in the research topic. Questions should be meaningful and interesting to the respondent.

Incentives

Many researchers have examined the effect of providing a variety of nonmonetary incentives to subjects. These include token gifts such as small packages of coffee, ball-point pens, postage stamps, key rings, trading stamps, participation in a raffle or lottery, or a donation to a charity in the respondent's name. Generally (although not consistently), nonmonetary

incentives have resulted in an increased response. A meta-analysis of 38 studies that used some form of an incentive revealed that monetary and nonmonetary incentives were effective only when enclosed with the survey. The promise of an incentive for a returned questionnaire was not effective in increasing response. The average increase in response rate for monetary and nonmonetary incentives was 19.1 percent and 7.9 percent, respectively.

Most researchers have found that higher monetary incentives generally work better than smaller ones. One researcher proposed a diminishing return model, where increasing the amount of the incentive would have a decreasing effect on response rate. A meta-analysis of fifteen studies showed that an incentive of 25¢ increased the response rate by an average of 16 percent, and \$1 increased the response by 31 percent.

Notification of a Cutoff Date

Several researchers have examined the effect of giving subjects a deadline for responding. While a deadline will usually reduce the time from the mailing until the returns begin arriving, it appears that it does not increase response, and may even reduce the response. One possible explanation is that a cutoff date might dissuade procrastinators from completing the questionnaire after the deadline has past.

Reply Envelopes and Postage

A good questionnaire makes it convenient for the respondent to reply. Mail surveys that include a self-addressed stamped reply envelope get better response than business reply envelopes. Some investigators have suggested that people might feel obligated to complete the questionnaire because of the guilt associated with throwing away money--that is, the postage stamp. Others have pointed out that using a business reply permit might suggest advertising to some people. Another possibility is that a business reply envelope might be perceived as less personal.

A meta-analysis on 34 studies comparing stamped versus business reply postage showed that stamped reply envelopes had a 9 percent greater aggregate effect than business reply envelopes. In another meta-analysis on nine studies, an aggregate effect of 6.2 percent was found.

The Outgoing Envelope and Postage

There have been several researchers that examined whether there is a difference in response between first class postage versus bulk rate. A meta-analysis of these studies revealed a small, but significant, aggregate difference of 1.8 percent. Envelopes with bulk mail permits might be

perceived as "junk mail", unimportant, or less personal, and thus will be reflected in a lower response rates.

A few researchers have also examined whether metered mail or stamps work better on the outgoing envelope. The results of these studies suggest a small increase in response favoring a stamped envelope. A meta-analysis of these studies revealed that the aggregate difference was slightly less than one percent.

Many researchers have reported increased response rates by using registered, certified, or special delivery mail to send the questionnaire. The wisdom of using these techniques must be weighed against the consequences of angering respondents that make a special trip to the post office, only to find a questionnaire.

It is not clear whether a typed or hand-addressed envelope affects response. One study, conducted at the University of Minnesota, reported that students responded better to hand-addressed postcards, while professors responded better to typed addresses.

This writer could find no studies that examined whether gummed labels would have a deleterious effect on response rate, although we might predict that response rate would be less for gummed labels because they have the appearance of less personalization.

This writer could also find no studies that examined whether the color of the envelope affects response rate. First impressions are important, and the respondent's first impression of the study usually comes from the envelope containing the survey. Therefore, we might predict that color would have a positive impact on response because of its uniqueness.

The "Don't Know", "Undecided", and "Neutral" Response Options

Response categories are developed for questions in order to facilitate the process of coding and analysis. Many studies have looked at the effects of presenting a "don't know" option in attitudinal questions. The "don't know" option allows respondents to state that they have no opinion or have not thought about a particular issue.

The physical placement of the "undecided" category (at the midpoint of the scale, or separated from the scale) can change response patterns. Respondents are more likely to choose the "undecided" category when it was off to the side of the scale. There are also different response patterns depending on whether the midpoint is labeled "undecided" or "neutral".

Several researchers have found that the physical location of the middle alternative can make a difference in responses, and that placing the middle option at the last position in the question increases the percentage of respondents who select it by over 9 percent. Frequently, offering respondents a middle alternative in a survey question will make a difference in the conclusions that would be drawn from the data. The middle option of an attitudinal scale attracts a substantial number of respondents who might be unsure of their opinion.

Researchers have also studied the "don't know" option for factual questions. Unlike attitude questions, respondents might legitimately not know the answer to a factual question. Surprisingly, the research suggests that the "don't know" option should not be included in factual questions. Questions that exclude the "don't know" option produce a greater volume of accurate data. Furthermore, there is generally no difference in response rate depending on the inclusion or exclusion of the "don't know" option. There is still a controversy surrounding the "don't know" response category. Many researchers advocate including a "don't know" response category when there is any possibility that the respondent may not know the answer to a question. The best advice is probably to use a "don't know" option for factual questions, but not for attitude questions.

Question Wording

The wording of a question is extremely important. Researchers strive for objectivity in surveys and, therefore, must be careful not to lead the respondent into giving a desired answer. Unfortunately, the effects of question wording are one of the least understood areas of questionnaire research.

Many investigators have confirmed that slight changes in the way questions are worded can have a significant impact on how people respond. Several authors have reported that minor changes in question wording can produce more than a 25 percent difference in people's opinions.

Several investigators have looked at the effects of modifying adjectives and adverbs. Words like *usually*, *often*, *sometimes*, *occasionally*, *seldom*, and *rarely* are "commonly" used in questionnaires, although it is clear that they do not mean the same thing to all people. Some adjectives have high variability and others have low variability. The following adjectives have highly variable meanings and should be avoided in surveys: *a clear mandate*, *most*, *numerous*, *a substantial majority*, *a minority of*, *a large proportion of*, *a significant number of*, *many*, *a considerable number of*, and *several*. Other adjectives produce less variability and generally have more shared meaning. These are: *lots*, *almost all*, *virtually all*, *nearly all*,

a majority of, a consensus of, a small number of, not very many of, almost none, hardly any, a couple, and a few.

Sponsorship

There have been several studies to determine if the sponsor of a survey might affect response rate. The overwhelming majority of these studies have clearly demonstrated that university sponsorship is the most effective. A meta-analysis of these studies revealed an aggregate increase in response rate of 8.9 percent. This may be due to the past benefits that the respondent has received from the university. Another possibility is that a business sponsor implies advertising or sales to potential respondents.

Sampling

It is incumbent on the researcher to clearly define the target population. There are no strict rules to follow, and the researcher must rely on logic and judgment. The population is defined in keeping with the objectives of the study.

Sometimes, the entire population will be sufficiently small, and the researcher can include the entire population in the study. This type of research is called a *census* study because data is gathered on every member of the population.

Usually, the population is too large for the researcher to attempt to survey all of its members. A small, but carefully chosen *sample* can be used to represent the population. The sample reflects the characteristics of the population from which it is drawn.

Sampling methods are classified as either *probability* or *nonprobability*. In probability samples, each member of the population has a *known non-zero* probability of being selected. Probability methods include random sampling, systematic sampling, and stratified sampling. In nonprobability sampling, members are selected from the population in some nonrandom manner. These include convenience sampling, judgment sampling, quota sampling, and snowball sampling. The advantage of probability sampling is that *sampling error* can be calculated. Sampling error is the degree to which a sample might differ from the population. When inferring to the population, results are reported plus or minus the sampling error. In nonprobability sampling, the degree to which the sample differs from the population remains unknown.

Random sampling is the purest form of probability sampling. Each member of the population has an equal and known chance of being selected. When there are very large populations, it is often difficult or impossible to identify every member of the population, so the pool of available subjects becomes biased.

Systematic sampling is often used instead of random sampling. It is also called an *Nth name selection* technique. After the required sample size has been calculated, every Nth record is selected from a list of population members. As long as the list does not contain any hidden order, this sampling method is as good as the random sampling method. Its only advantage over the random sampling technique is simplicity. Systematic sampling is frequently used to select a specified number of records from a computer file.

Stratified sampling is commonly used probability method that is superior to random sampling because it reduces sampling error. A *stratum* is a subset of the population that share at least one common characteristic. The researcher first identifies the relevant strata and their actual representation in the population. Random sampling is then used to select subjects from each stratum until the number of subjects in that stratum is proportional to its frequency in the population. Stratified sampling is often used when one or more of the strata in the population have a low incidence relative to the other strata.

Convenience sampling is used in exploratory research where the researcher is interested in getting an inexpensive approximation of the truth. As the name implies, the sample is selected because they are convenient. This nonprobability method is often used during preliminary research efforts to get a gross estimate of the results, without incurring the cost or time required to select a random sample.

Judgment sampling is a common nonprobability method. The researcher selects the sample based on judgment. This is usually an extension of convenience sampling. For example, a researcher may decide to draw the entire sample from one "representative" city, even though the population includes all cities. When using this method, the researcher must be confident that the chosen sample is truly representative of the entire population.

Quota sampling is the nonprobability equivalent of stratified sampling. Like stratified sampling, the researcher first identifies the strata and their proportions as they are represented in the population. Then convenience or judgment sampling is used to select the required number of subjects from each stratum. This differs from stratified sampling, where the strata are filled by random sampling.

Snowball sampling is a special nonprobability method used when the desired sample characteristic is rare. It may be extremely difficult or cost prohibitive to locate respondents in these situations. Snowball sampling relies on referrals from initial subjects to generate additional subjects. While this technique can dramatically lower search costs, it comes at the expense of introducing bias because the technique itself reduces the likelihood that the sample will represent a good cross section from the population.

Significance

What does significance really mean?

Many researchers get very excited when they have discovered a "significant" finding, without really understanding what it means. When a statistic is significant, it simply means that you are very sure that the statistic is reliable. It doesn't mean the finding is important.

For example, suppose we give 1,000 people an IQ test, and we ask if there is a significant difference between male and female scores. The mean score for males is 98 and the mean score for females is 100. We use an independent groups t-test and find that the difference is significant at the .001 level. The big question is, "So what?". The difference between 98 and 100 on an IQ test is a very small difference...so small, in fact, that its not even important.

Then why did the t-statistic come out significant? Because there was a large sample size. When you have a large sample size, very small differences will be detected as significant. This means that you are very sure that the difference is real (i.e., it didn't happen by fluke). It doesn't mean that the difference is large or important. If we had only given the IQ test to 25 people instead of 1,000, the two-point difference between males and females would not have been significant.

Significance is a statistical term that tells how sure you are that a difference or relationship exists. To say that a significant difference or relationship exists only tells half the story. We might be very sure that a relationship exists, but is it a strong, moderate, or weak relationship? After finding a significant relationship, it is important to evaluate its strength. Significant relationships can be strong or weak. Significant differences can be large or small. It just depends on your sample size.

One-Tailed and Two-Tailed Significance Tests

One important concept in significance testing is whether you use a one-tailed or two-tailed test of significance. The answer is that it depends on your hypothesis. When your research hypothesis states the direction of the difference or relationship, then you use a one-tailed probability. For example, a one-tailed test would be used to test these null hypotheses: Females will not score significantly higher than males on an IQ test. Blue collar workers are will not buy significantly more product than white collar workers. Superman is not significantly stronger than the average person. In each case, the null hypothesis (indirectly) predicts the direction of the difference. A two-tailed test would be used to test these null hypotheses:

There will be no significant difference in IQ scores between males and females. There will be no significant difference in the amount of product purchased between blue collar and white collar workers. There is no significant difference in strength between Superman and the average person. The one-tailed probability is exactly half the value of the two-tailed probability.

There is a raging controversy (for about the last hundred years) on whether or not it is ever appropriate to use a one-tailed test. The rationale is that if you already know the direction of the difference, why bother doing any statistical tests. While it is generally safest to use a two-tailed tests, there are situations where a one-tailed test seems more appropriate. The bottom line is that it is the choice of the researcher whether to use one-tailed or two-tailed research questions.

Procedure Used to Test for Significance

Whenever we perform a significance test, it involves comparing a test value that we have calculated to some critical value for the statistic. It doesn't matter what type of statistic we are calculating (e.g., a t-statistic, a chi-square statistic, an F-statistic, etc.), the procedure to test for significance is the same.

1. Decide on the *critical alpha level* you will use (i.e., the error rate you are willing to accept).
2. Conduct the research.
3. Calculate the statistic.
4. Compare the statistic to a *critical value* obtained from a table.

If your statistic is higher than the *critical value* from the table:

Your finding is significant.

You reject the null hypothesis.

The probability is small that the difference or relationship happened by chance, and p is less than the critical alpha level ($p < \alpha$).

If your statistic is lower than the *critical value* from the table:

Your finding is not significant.

You fail to reject the null hypothesis.

The probability is high that the difference or relationship happened by chance, and p is greater than the critical alpha level ($p > \alpha$).

Modern computer software can calculate exact probabilities for most test statistics. If you have an exact probability from computer software, simply compare it to your critical alpha level. If the exact probability is less than

the critical alpha level, your finding is significant, and if the exact probability is greater than your critical alpha level, your finding is not significant. Using a table is not necessary when you have the exact probability for a statistic.

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