

Chapter 1

What Is a Survey¹

It has been said the United States is no longer an “industrial society” but an “information society.” That is, our major problems and tasks no longer mainly center on the production of the goods and services necessary for survival and comfort.

Our “society,” thus, requires a prompt and accurate flow of information on preferences, needs, and behavior. It is in response to this critical need for information on the part of the government, business, and social institutions that so much reliance is placed on surveys.

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Then, What Is a Survey

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¹ The chapter originally was published by the American Statistical Association (ASA) as the first of ten pamphlets. The material included in this Chapter has been updated by Fritz Scheuren from the original 1980 *What Is a Survey* publication prepared for the ASA, by Robert Ferber, Paul Sheatsley, Anthony Turner, and Joseph Waksberg. As with the other material in this booklet, the contents have been subjected to a professional peer-review process and examined for accuracy and readability by members of the survey community.

This “sample” is usually just a fraction of the population being studied.

For example, a sample of voters is questioned in advance of an election to determine how the public perceives the candidates and the issues ... a manufacturer does a survey of the potential market before introducing a new product ... a government entity commissions a survey to gather the factual information it needs to evaluate existing legislation or to draft proposed new legislation.

Not only do surveys have a wide variety of purposes, they also can be conducted in many ways—including over the telephone, by mail, or in person. Nonetheless, all surveys do have certain characteristics in common.

Unlike a census, where all members of the population are studied, surveys gather information from only a portion of a population of interest—the size of the sample depending on the purpose of the study.

In a bona fide survey, the sample is not selected haphazardly or only from persons who volunteer to participate. It is scientifically chosen so that each person in the population will have a measurable chance of selection. This way, the results can be reliably projected from the sample to the larger population.

Information is collected by means of standardized procedures so that every individual is asked the same questions in more or less the same way. The survey’s intent is not to describe the

particular individuals who, by chance, are part of the sample but to obtain a composite profile of the population.

The industry standard for all reputable survey organizations is that individual respondents should never be identified in reporting survey findings. All of the survey's results should be presented in completely anonymous summaries, such as statistical tables and charts.

How Large Must The Sample Size Be

The sample size required for a survey partly depends on the statistical quality needed for survey findings; this, in turn, relates to how the results will be used.

Even so, there is no simple rule for sample size that can be used for all surveys. Much depends on the professional and financial resources available. Analysts, though, often find that a moderate sample size is sufficient statistically and operationally. For example, the well-known national polls frequently use samples of about 1,000 persons to get reasonable information about national attitudes and opinions.

When it is realized that a properly selected sample of only 1,000 individuals can reflect various characteristics of the total population, it is easy to appreciate the value of using surveys to make informed decisions in a complex society such as ours. Surveys provide a speedy and economical means of determining facts about our economy and about people's knowledge, attitudes, beliefs, expectations, and behaviors.

Who Conducts Surveys

We all know about the public opinion surveys or "polls" that are reported by the press and broadcast media. For example, the Gallup Poll and the Harris Survey issue reports periodically describing national public opinion on a wide range of current issues. State polls and metropolitan area polls, often supported by a local newspaper or TV station, are reported regularly in many localities. The major broadcasting networks and national news magazines also conduct polls and report their findings.

The great majority of surveys, though, are not public opinion polls. Most are directed to a specific administrative, commercial, or scientific purpose. The wide variety of issues with which surveys deal is illustrated by the following listing of actual uses

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- Major TV networks rely on surveys to tell them how many and what types of people are watching their programs
- Statistics Canada conducts continuing panel surveys of children (and their families) to study educational and other needs
- Auto manufacturers use surveys to find out how satisfied people are with their cars
- The U.S. Bureau of the Census conducts a survey each month to obtain information on employment and unemployment in the nation
- The U.S. Agency for Health Care Policy and Research sponsors a periodic survey to

- determine how much money people are spending for different types of medical care
- Local transportation authorities conduct surveys to acquire information on commuting and travel habits
- Magazine and trade journals use surveys to find out what their subscribers are reading
- Surveys are conducted to ascertain who uses our national parks and other recreation facilities.

Surveys provide an important source of basic scientific knowledge. Economists, psychologists, health professionals, political scientists, and sociologists conduct surveys to study such matters as income and expenditure patterns among households, the roots of ethnic or racial prejudice, the implications of health problems on people's lives, comparative voting behavior, and the effects on family life of women working outside the home.

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What Are Some Common Survey Methods

Surveys can be classified in many ways. One dimension is by size and type of sample. Surveys also can be used to study either human or non-human populations (e.g., animate or inanimate objects -- animals, soils, housing, etc.). While many of the principles are the same for all surveys, the focus here will be on methods for surveying individuals.

Many surveys study all persons living in a defined area, but others might focus on special population groups—children, physicians, community leaders, the unemployed, or users of a

particular product or service. Surveys may also be conducted with national, state, or local samples.



Surveys can be classified by their method of data collection. Mail, telephone interview, and in-person interview surveys are the most common. Extracting data from samples of medical and other records is also frequently done. In newer methods of data collection, information is entered directly into computers either by a trained interviewer or, increasingly, by the respondent. One well-known example is the measurement of TV audiences carried out by devices attached to a sample of TV sets that automatically record the channels being watched.

Mail surveys can be relatively low in cost. As with any other survey, problems exist in their use when insufficient attention is given to getting high levels of cooperation. Mail surveys can be most effective when directed at particular groups, such as subscribers to a specialized magazine or members of a professional association.

- Telephone interviews are an efficient method of collecting some types of data and are being increasingly used. They lend themselves particularly well to situations where timeliness is a factor and the length of the survey is limited.
- In-person interviews in a respondent's home or office are much more expensive than mail or telephone surveys. They may be necessary, however, especially when complex information is to be collected.

- Some surveys combine various methods. For instance, a survey worker may use the telephone to “screen” or locate eligible respondents (e.g., to locate older individuals eligible for Medicare) and then make appointments for an in-person interview.

What Survey Questions Do You Ask

You can further classify surveys by their content. Some surveys focus on opinions and attitudes (such as a pre-election survey of voters), while others are concerned with factual characteristics or behaviors (such as people’s health, housing, consumer spending, or transportation habits).

Many surveys combine questions of both types. Respondents may be asked if they have heard or read about an issue ... what they know about it ... their opinion ... how strongly they feel and why... their interest in the issue ... past experience with it ... and certain factual information that will help the survey analyst classify their responses (such as age, gender, marital status, occupation, and place of residence).

Questions may be open-ended (“Why do you feel that way?”) or closed (“Do you approve or disapprove?”). Survey takers may ask respondents to rate a political candidate or a product on some type of scale, or they may ask for a ranking of various alternatives.

The manner in which a question is asked can greatly affect the results of a survey. For example, a recent NBC/Wall Street Journal poll asked two very similar questions with very

different results: (1) Do you favor cutting programs such as social security, Medicare, Medicaid, and farm subsidies to reduce the budget deficit? The results: 23% favor; 66% oppose; 11% no opinion. (2) Do you favor cutting government entitlements to reduce the budget deficit? The results: 61% favor; 25% oppose; 14% no opinion.

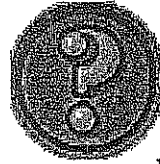
The questionnaire may be very brief -- a few questions, taking five minutes or less -- or it can be quite long -- requiring an hour or more of the respondent’s time. Since it is inefficient to identify and approach a large national sample for only a few items of information, there are “omnibus” surveys that combine the interests of several clients into a single interview. In these surveys, respondents will be asked a dozen questions on one subject, a half dozen more on another subject, and so on.

Because changes in attitudes or behavior cannot be reliably ascertained from a single interview, some surveys employ a “panel design,” in which the same respondents are interviewed on two or more occasions. Such surveys are often used during an election campaign or to chart a family’s health or purchasing pattern over a period of time.

Who Works on Surveys

The survey worker best known to the public is the interviewer who calls on the telephone, appears at the door, or stops people at a shopping mall.

The manner in which a question is asked can greatly affect the results of a survey.



Traditionally, survey interviewing, although occasionally requiring long days in the field, was mainly part-time work and, thus, well suited for individuals not wanting full-time employment or just wishing to supplement their regular income.

Changes in the labor market and in the level of survey automation have begun to alter this pattern—with more and more survey takers seeking to work full time. Experience is not usually required for an interviewing job, although basic computer skills have become increasingly important for applicants.

Most research organizations provide their own training for the interview task. The main requirements for interviewing are an ability to approach strangers (in person or on the phone), to persuade them to participate in the survey, and to collect the data needed in exact accordance with instructions.

Less visible, but equally important are the in-house research staffs, who among other things—plan the survey, choose the sample, develop the questionnaire, supervise the interviews, process the data collected, analyze the data, and report the survey's findings.

In most survey research organizations, the senior staff will have taken courses in survey methods at the graduate level and will hold advanced degrees in sociology, statistics, marketing, or psychology, or they will have the equivalent in experience.



Middle-level supervisors and research associates frequently have similar academic backgrounds to the senior staff or they have advanced out of the ranks of clerks, interviewers, or coders on the basis of their competence and experience.

What About Confidentiality and Integrity

The confidentiality of the data supplied by respondents is of prime concern to all reputable survey organizations. At the

U.S. Bureau of the Census, for example, the data collected are protected by law (Title 13 of the U.S. Code). In Canada, the Statistics Act guarantees the confidentiality of data collected by Statistics Canada, and other countries have similar safeguards.

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Several professional organizations dealing with survey methods have codes of ethics (including the American Statistical Association) that prescribe rules for keeping survey responses confidential. The recommended policy for survey organizations to safeguard such confidentiality includes

- Using only number codes to link the respondent to a questionnaire and storing the name-to-code linkage information separately from the questionnaires
- Refusing to give the names and addresses of survey respondents to anyone outside the survey organization, including clients
- Destroying questionnaires and identifying information about respondents after the responses have been entered into the computer

- Omitting the names and addresses of survey respondents from computer files used for analysis
- Presenting statistical tabulations by broad enough categories so that individual respondents cannot be singled out.

What Are Other Potential Concerns

The quality of a survey is largely determined by its purpose and the way it is conducted.

Most call-in TV inquiries (e.g., 900 “polls”) or magazine write-in “polls,” for example, are highly suspect. These and other “self-selected opinion polls (SLOPS)” may be misleading since participants have not been scientifically selected. Typically, in SLOPS, persons with strong opinions (often negative) are more likely to respond.

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Surveys should be carried out solely to develop statistical information about a subject. They should not be designed to

produce predetermined results or as a ruse for marketing and similar activities. Anyone asked to respond to a public opinion poll or concerned about the results should first decide whether the questions are fair.

Another important violation of integrity occurs when what appears to be a survey is actually a vehicle for stimulating donations to a cause or for creating a mailing list to do direct marketing.

Where Can I Get More Information

In the preface to this booklet provided many general suggestions are made that might be pursued for more information. There seems to be no need to repeat these here. One point of information that might be of interest is that the clever acronym, SLOPS was coined by Norman Bradburn who used to head up NORC.

Chapter 2

How to Plan a Survey²

A survey usually originates when an individual or institution is confronted with an information need and the existing data are insufficient.

At this point, it is important to consider if the required information can even be collected by a survey. Maybe it cannot? Is an experiment needed instead? Perhaps only an indirect way of measuring is possible.

The first step in planning is to lay out the objectives of the investigation.

If a survey is decided upon, the first step is to lay out the objectives of the investigation. This is generally the function of the sponsor of the inquiry.

A sponsor may be...a government agency trying to assess the impact on the primary recipients and their families of a social welfare program...a university researcher examining the

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relationship between actual voting behavior and expressed political beliefs...a computer maker gauging the level of customer satisfaction among existing and potential purchasers.

The objectives of a survey should be as specific, clear-cut, and unambiguous as possible. Trade-offs typically exist and sometimes this only becomes apparent as the planning process proceeds. Therefore, it is important to make the sponsor a full participant in every planning step.

How to Plan a Survey Questionnaire

First, the mode of data collection must be decided upon (*e.g., mail, telephone, or in person*). Once this has been determined a questionnaire can then be developed and pretested.

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Planning the questionnaire is one of the most *critical stages* in the survey development process. Social and behavioral scientists have given a great deal of thought to the design issues involved.

Questionnaire construction has elements that often appear to be just plain commonsense, but, when they are implemented, may involve some subtlety. It is common sense to require that the concepts be clearly defined and questions unambiguously phrased; otherwise, the resulting data are apt to be seriously misleading.

Consider how we might apply this strategy in a survey to estimate the incidence of robbery victimization. One might start out by simply asking, "Were you robbed during the last

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six months?" Although apparently straightforward and clear-cut, the question does present an ambiguous stimulus. Many respondents are unaware of the legal distinction between *robbery* (involving personal confrontation of the victim by the offender) and *burglary* (involving breaking and entering but no confrontation).

Therefore, in the National Crime Survey conducted by the U.S. Bureau of the Census, the questions on robbery victimization do not mention "robbery." Instead, there are several questions used; when taken together, they seek to capture the desired responses by using more universally understood phrases.

See the following example from the National Crime Victim Survey Questionnaire.

I'm going to read some examples that will give you an idea of the kinds of crimes this study covers.

As I go through them, tell me if any of these happened to you in the last 6 months, that is since _____, 200__.

Was something belonging to YOU stolen, such as—

- a) Things that you carry, like luggage, a wallet, purse, briefcase, book—
- b) Clothing, jewelry, or calculator—
- c) Bicycle or sports equipment—
- d) Things in your home—like a TV, stereo, or tools—
- e) Things from a vehicle, such as a package, groceries, camera, cassette tapes—

OR

- f) Did anyone ATTEMPT to steal anything belonging to you?

Briefly describe incident(s)

Designing a suitable questionnaire entails more than well-defined concepts and distinct phraseology. Attention must also be given to its length. Long questionnaires are apt to induce respondent fatigue and errors arising from inattention, refusals, and incomplete answers. They may also contribute to higher non-response rates in subsequent surveys involving the same respondents.

There are other factors to take into account when planning a questionnaire. These include such diverse considerations

as...the order in which the questions are asked...their appearance... even such things as the questionnaire's physical size and format.

How to Get Good Coverage

A critical element in any survey is to *locate* (or "cover") all the members of the population being studied so that they have a chance to be sampled. To achieve this, a list—termed a "*sampling frame*"—is usually constructed.

In a *mail survey*, a frame could be all of the postal addresses in Tampa, Florida....for an *in-person business survey*, a frame might be the names and addresses of all the retail establishments licensed in Westchester County, New York...in a *telephone survey* at The George Washington University in Washington, DC, the frame might simply be a list of student names and telephone numbers.

A sampling frame can also consist of geographic areas with well-defined natural or artificial boundaries, when no suitable population list exists (as might be true in some parts of rural America). In this instance, a sample of geographic areas (referred to as "*area segments*") is selected and interviewers canvass the sample area segments and list the appropriate units—households, retail stores or whatever—so that these units have a chance of being included in the final sample.

The quality of the sampling frame is probably the dominant feature for ensuring adequate coverage of the desired population to be surveyed.

The quality of the sampling frame—whether it is up-to-date and complete—is probably the dominant feature for ensuring adequate coverage of the desired population to be surveyed.

Selecting a sample of households for a telephone interview is easier than that for an in-person interview. The telephone survey is generally less expensive and simpler to carry out. Its one main drawback is that only about 95 percent of all households have telephones. Therefore, some people will be missed. Persons without telephones generally have much lower incomes than those in households with telephones—so telephone surveys do not adequately represent the low-income population. Sampling from a frame of all possible telephone numbers, including unlisted ones, is called *random digit dialing (RDD)*. This may seem relatively easy today but "weeding out" non-residential telephone numbers can be difficult. Nonetheless, several ingenious methods have been developed to enable RDD samples to be picked in an efficient way.



How to Choose a Random Sample

Virtually all surveys taken seriously by social scientists and policymakers use some form of random sampling.

Even the U.S. Decennial Census employs sampling techniques for gathering the bulk of the data items. Complete (100 percent) enumeration is used for just the basic population counts—only a subset receives the so-called "*long form.*"

Methods of random sampling are well grounded in statistical theory and in the theory of probability. Reliable and efficient estimates of needed statistics can be made by surveying a

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carefully constructed sample of a population. This is provided, of course, that a large proportion of the sample members give the requested information.

The particular type of sample used depends upon the objectives and scope of the survey. Factors include the nature of potentially available frames, the overall survey budget, the method of data collection, the subject matter, and the kind of respondent needed.

Some types of samples are straightforward, requiring little in the way of experience or training; others are highly complex and may require many stages of selection. Consider the range of difficulty between a sample of sixth graders in a particular school on the one hand and a sample of the homeless in the same city on the other.

Whether simple or complex, the goal of a properly designed sample is that all of the units in the population have a known, positive chance of being selected. The sample plan also must be described in sufficient detail to allow a reasonably accurate calculation of sampling errors. These two features make it scientifically valid to draw inferences from the sample results about the entire population that the sample represents.

Ideally, the sample size chosen for a survey should be based on how precise the final estimates must be. In practice, usually a trade-off is made between the ideal sample and the expected cost of the survey.

How to "Plan In" Quality

An integral part of a well-designed survey is to "plan in" quality all along the way. One must devise ways to keep respondent mistakes and biases to a minimum. For example, memory is important when the respondent is expected to report on past events, such as in a consumer expenditure survey. In these "retrospective" surveys it is essential that the respondent not be forced to report events that may have happened too long ago to be remembered accurately.

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Other elements to pretest during the planning phase include...whether any of the questions are too sensitive...whether they unduly invade the respondent's privacy...or whether they are too difficult even for a willing respondent to answer. Each of these concerns has an important bearing on the overall statistical validity of the survey results.

Deciding on the right respondent in a household sample is a key element in "assuring" quality. For surveys where the inquiry is basically factual in nature, any knowledgeable person may be asked to supply the needed information. This procedure is used in the *Current Population Survey (CPS)*, where any responsible adult in a household is expected to be

able to provide accurate answers to employment or unemployment questions.

In other surveys, a so-called “household” respondent may produce erroneous or even invalid information—for example, when the information is known only by a specific individual and no one else.

A different, but related, issue arises in “attitude” surveys. It is generally accepted that a randomly chosen respondent produces a more valid cross-section of opinion than does a nonrandomly selected household respondent. This is because a nonrandomly selected individual, acting as a household respondent, is more likely to be someone who is at home, so the working public and their attitudes would be underrepresented.

One final point: for a quality product, checks must be made at every step to ensure that the sample is selected according to specifications; that the interviewers do their work properly; that the information from the questionnaires is coded accurately; that computer data entry is done correctly; and that the computer programs used for data analysis work properly.

Perhaps the most common planning error is to underestimate the time needed...

telephone from a list already available. More commonly, a survey of 1,000 individuals or more could take anywhere from a few months to one year—from initial planning to having results ready for analysis.

The steps in a survey are not necessarily sequential; many of them can be overlapped. Some, such as listing and sampling housing units in the areas to be covered, can be carried out while a questionnaire is being put into final form. Although they are not additive, all of these steps are time consuming. Perhaps the most common planning error is to underestimate the time needed by making a *global* estimate, without considering these individual stages.

How to Budget

A *checklist of budget factors*, such as this partial one, may be useful in estimating total survey costs (whether in time or money). A “traditional” (paper and pencil) in-person interview survey will be used to illustrate the budget steps. Many of these are general; however, increasing use of survey automation is altering costs—reducing some and adding others.

- Staff time for planning the study and steering it through the various stages, including time spent with the sponsor in refining data needs
- Sample selection costs, including central office staff labor and computing costs
- For “area segments” samples, substantial field staff (interviewer) labor costs and travel expenses for listing sample units within the segments

How to Schedule

How much time should be allotted for a survey? This varies with the type of survey and the particular situation. Sometimes a survey can be done in two or three weeks—if it involves a brief questionnaire and if the data are to be collected by



- Labor and material costs for pretesting the questionnaire and field procedures; the pretesting step may need to be done more than once and money and time should be set aside for this (especially when studying something new)
- Supervisory costs for interviewer hiring, training, and monitoring
- Interviewer labor costs and travel expenses (including meals and lodging, if out of town)
- Labor and expense costs of redoing a certain percentage of the interviews (as a quality assurance step) and for follow-up on non-respondents
- Labor and material costs for getting the information from the questionnaire onto a computer file
- Cost of spot-checking the quality of the process of computerizing the paper questionnaires
- Cost of “cleaning” the final data—that is, checking the computer files for inconsistent or impossible answers; this may also include the costs of “filling in” or imputing any missing information
- Analyst costs for preparing tabulations and special analyses of the data; computer time for the various tabulations and analyses
- Labor time and material costs for substantive analyses of the data and report preparation
- Potentially important are incidental telephone charges, postage, reproduction and printing costs for all stages of

the survey—from planning activities to the distribution of results

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As a rule, surveys made by an in-person interviewer are more expensive than those made by mail or by telephone. Costs will increase with the complexity of the questionnaire and the amount of data analysis to be carried out.

Surveys that involve a large number of interviews tend to be cheaper on a per-interview basis than surveys with fewer interviews. This is particularly so when the sample size is less than 1,000 respondents, because “tooling up” is involved for just about any survey—except one that is to be repeated on the same group.

Where Can I Get More Information

The quality of survey efforts can suffer because there is too little time set aside to do planning. Two important general sources to examine on planning in quality are Juran (1989) *Quality Planning* and Deming (1986) *Out of the Crisis*. The publications of the American Society for Quality are also worth looking for and can be searched for on the Internet. Software tools like MS Project are also useful in making planning more systematic and in increasing the efficiency of lessons learned, as Juran calls them from one survey to the next.

Chapter 3

How to Collect Survey Data³

Survey data can be collected, as we have seen, in several modes: In person, by mail, telephone or through the Internet. Currently, mail surveys are the most common example of self reported data collection. One reason is that

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these surveys can be relatively low in cost. This does not mean, however, they are necessarily easy to carry out. Planning the questionnaires for mail surveys is often more difficult than for surveys that use interviewers. *For example*, care is needed to anticipate issues that respondents may have and to deal with them ahead of time.

Using the mail can be particularly effective in business surveys—such as those conducted by the U.S. Bureau of the Census or the U.S. Bureau of Labor Statistics. Mail surveys

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also work well when they are directed toward specific groups— such as, subscribers to a specialized magazine or members of a professional organization.

The manner in which self-reported data are obtained has begun to move away from the traditional *mail-out/mail-back* approach. The use of fax machines—and now the Internet—is on the rise. Fax numbers and Internet addresses are being added to specialized membership and other lists. As a by-product, they can be used, along with more conventional items like names and mailing addresses, in building potential sampling frames.



There are still other methods of obtaining self-reported data. *For example*, the U. S. Bureau of Labor Statistics has a panel of business establishments, in which the respondents supply monthly data via touch-tone telephone entries that are directly connected to the agency's computers.

The use of fax machines—and now the Internet—is on the rise.

For the immediate future, this type of automation will probably be restricted largely to business or institutional surveys in which the same information is collected at periodic intervals— monthly, quarterly, etc.

As computers and telecommunications become more widespread, touch-tone applications or those involving respondents' computers "*talking*" directly to the survey organizations' computers will increase significantly. This

increase is already well underway in health surveys, where samples of patient records are often supplied electronically.

How to Conduct a Survey Interview

Interview surveys—whether face-to-face or by telephone—offer distinct advantages over self-reported data collection. The “presence” of an interviewer can increase cooperation rates and make it possible for respondents to get immediate clarifications.

The main requirement for good interviewers is an ability to approach strangers in person or on the telephone and persuade them to participate in the survey. Once a respondent’s cooperation is acquired, the interviewers must maintain it, while collecting the needed data— data that must be obtained in exact accordance with instructions.

Interview surveys offer distinct advantages over self-reported data collection.

For high-quality data to be collected, interviewers must be carefully trained through classroom instruction, self-study, or both. Good interviewer techniques are stressed, such as...how to make initial contacts... how to conduct interviews in a professional manner...and how to avoid influencing or biasing responses. Training generally involves practice interviews to familiarize the interviewers with the variety of situations they are likely to encounter.



Time must be spent going over survey concepts, definitions, and procedures. A question-by-question approach is needed

to be sure the interviewers can deal with any misunderstandings that may arise.

In most reputable survey organizations, the interviewers are also required to take a strict *oath of confidentiality* before beginning work.

Survey materials must be prepared and issued to the interviewers. For traditional paper-and-pencil, in-person interviews, ample copies of the questionnaire, plus a reference manual, information about the identification and location of the households, and any cards or pictures to be shown to the respondents must be given to the interviewers.

Before conducting in-person interviews, survey organizations frequently send an advance letter to the sample respondents, explaining the purpose of the survey and that an interviewer will be calling soon.

In many surveys, especially those sponsored by the federal government, information must be given to the respondents regarding the voluntary or mandatory nature of the survey and how the answers are to be used.

Visits to sample units are scheduled with attention to such considerations as the best time of day to call or visit, and allowance is made for repeated attempts (*i.e., callbacks*) in not-at-home situations.

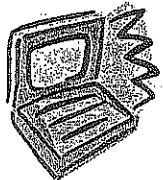
What Is CATI

The use of computers in survey interviewing is becoming quite common. In the United States, most of the large-scale telephone surveys are now conducted via *CATI* (*Computer-Assisted Telephone Interviews*). With CATI, the interviewers use a computer terminal. The questions to be asked appear on the computer screen, and the interviewers use the keyboard to directly enter the respondents' replies as they are given.

The use of computers in survey interviewing is becoming quite common.

CATI's important advantages are in *quality and speed*, not in cost savings. CATI can cost more for small, non-repeated surveys, due to programming the questionnaire. CATI's cost per interview decreases as sample size increases—so in large and/or repeated surveys, it is cost competitive with conventional telephone methods.

The CATI interviewer's screen is programmed to show questions in a planned order, so that interviewers cannot inadvertently omit questions or ask them out of sequence. *For example*, the answers to some questions require "branching" (*i.e.*, answers to prior questions determine which other questions are asked). CATI can be programmed to do the correct branching automatically. In non-computer-assisted telephone interviewing, incorrect branching has sometimes been an important source of errors, *especially omissions*.



In the CATI setting, the computer can be programmed to edit replies. The computer can check whether the reply to a

particular question is consistent with other information reported. If the editing indicates that a problem may exist, the respondents are asked to confirm or correct earlier answers.

CATI can produce statistical results quicker than traditional methods of data collection. *For example*, it eliminates the need for a separate computer data-entry step. Furthermore, with CATI, some organizations are able to provide summaries of results as each questionnaire is completed or at the end of each day.

What About CAPI

In recent years, there has been a trend toward the use of portable laptop computers for in-person interview surveys.

Portable computers can be taken into the field, and either the interviewer or the respondent can directly enter data in response to questions. Data collection carried out in this way is referred to as *CAPI* (*Computer-Assisted Personal Interviews*).

The CAPI laptops are not directly connected with a centralized computer. Nonetheless, most CATI quality and speed advantages also occur with CAPI.

there has been a trend toward the use of portable laptop computers for in-person interview surveys.

Although only a few organizations currently employ CAPI methods, their use is expected to expand in the next few years. *For example*, the very large monthly Current Population

Survey, which measures unemployment, has recently been converted from conventional in-person and telephone interviews to a combination of CAPI and CATI.

Clearly, as electronic technology becomes more widely used traditional paper and pencil methods may eventually disappear— at least in surveys conducted by the federal government.

No matter what type of data collection is used, there are a number of "back-end" processing steps.

What Is Done After Data Collection

No matter what type of data collection is used, there are a number of "back-end" processes that may be needed to get the data in a form so that aggregated totals, averages, or other statistics can be computed.

For mail surveys and conventional paper and pencil interviews, this may involve coding after the questionnaires have been completed. Coded paper questionnaires are entered into a computer (*e.g., being keyed onto a disk*) so that a computer file can be created. At this point, most of the remaining back-end steps are common to all surveys, whether or not a computer was used initially for data collection.

Once a computer file has been generated, additional computer editing, separate from clerical editing, can be accomplished to alter inconsistent or impossible entries.

Decisions are usually needed on how to handle missing items— cases in which the respondent did not know the answer... refused to provide one...or in which the question was

simply not asked. Preferred practice for missing items is to provide special codes indicating why the data are not included.

When resources are available, the "filling in" or imputation of these missing data items should be undertaken to reduce any biases arising from their absence.

When there is a "clean" file the survey data are ready for analysts to begin summarizing what has been learned. It is a good idea to use commercially available software packages to carry out this step rather than using your own specially written computer programs.

Often the best way to start the analysis is with simple counts and related percentages for each question. Next, it is common to produce tables of growing complexity. Eventually, there may be a need for even more sophisticated forms of data presentation to address the concerns outlined when the survey was initially conceived.

The results of surveys are usually printed in publications and presented at staff briefings or in more formal settings. Additional analyses can also be done by making unidentifiable computer data files available to other researchers at a nominal cost.

Shortcuts to Avoid

Conducting a credible survey entails scores of activities, each of which must be carefully planned and controlled. Taking shortcuts can invalidate the results and badly mislead the

sponsor and other users. Here are three shortcuts to avoid, that crop up often:

- Not pretesting field procedures
- Not sufficiently following up on non-respondents
- Sloppy fieldwork and inadequate quality controls.

A pretest of the questionnaire and field procedures is the only way of finding out if everything "works."

A pretest of the questionnaire and field procedures is the only way of finding out if everything "works"—especially if a survey employs new techniques or a new set of questions. Because it is rarely possible to foresee all the potential misunderstandings

or biasing effects of different questions and procedures, it is vital for a well-designed survey operation to include provision for a pretest. There should usually be a series of small-scale pilot studies to test the feasibility of the individual techniques (if new) or to perfect the questionnaire concepts and wording.

This should be followed by a full-scale "dress rehearsal" to find out if everything connects together as intended.

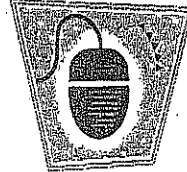
Failure to follow up non-respondents can ruin an otherwise well-designed survey. It is not uncommon for the initial response rate in many surveys to be under 50 percent.

To deal with this possibility, survey plans should include returning to sample households where no one was home (*perhaps at a different time or on a weekend*), attempting to persuade persons who are inclined to refuse, and so on. In the case of mail surveys, it is usually necessary to conduct several

follow-up mailings—spaced, possibly, about three weeks apart. There is some evidence that responses to subsequent mailings may differ from responses to the first mailing. Thus, biases can result without the extra effort of follow-ups. Depending on the circumstances, it may even be necessary to contact a subsample of the remaining non-respondents by telephone or personal visit.

A low response rate does more damage in rendering a survey's results questionable than a small sample, because there may be no valid way of scientifically inferring the characteristics of the population represented by the non-respondents.

Sloppy execution of a survey in the field can seriously damage results.



Controlling the quality of the fieldwork is done in several ways, most often through observation or redoing a small sample of interviews by supervisory or senior personnel. There should be at least some questionnaire-by-questionnaire checking, while the survey is being carried out; this is essential if omissions or other obvious mistakes in the data are to be uncovered before it is too late to fix them.

In other words, to assure that the proper execution of a survey corresponds to its design, every facet of a survey must be looked at during implementation. *For example...* re-examining the sample selection ... re-doing some of the interviews... assessing the editing and coding of the responses.

Failure to follow up non-respondents can ruin an otherwise well-designed survey.

*Murphy's Law:
"If anything can
go wrong it
will." The
corollary is
even more
important: "If
you didn't check
on it, it did."*

Without proper checking, errors may go undetected. With good procedures, on the other hand, they might even have been prevented. Insisting on high standards in recruiting and training of interviewers is crucial to conducting a quality survey.

Just looking at each step by itself is still not enough. As W. Edwards Deming recommends, a complete systems approach should be developed to be sure each step fits

into the previous and subsequent steps. Murphy's Law applies here, as elsewhere in life. The corollary to keep in mind is that not only is it true that "If anything can go wrong it will... but, "If you didn't check on it, it did."

Where Can I Get More Information

The specific data collection steps taken, naturally, depend heavily on the survey mode in use. Some modes, like telephone and Internet, are imbedded in fast changing technologies and there is a compelling need to keep up with the industry. Other modes, like mail surveys require active contact with improving Postal Service Operations . Face-to-face surveys continue to be encountering steep cost increases and a search for best practices, especially cost containment efforts are going to be needed. Membership in the American Association for Public Opinion Polling and the Section on Survey Research Methods of the American Statistical Association are ways to address the need to keep up here.

Chapter 6

Designing a Questionnaire⁶

In survey taking it is clear that special training and expertise are required to draw the sample, or to create any necessary computer programs. But what about writing the questions for the survey questionnaire? We've all been asking questions and obtaining answers from those around us throughout our lives. Aren't we already "question-asking experts"? Maybe. Maybe not!

Where to Start

The place to start in designing a questionnaire is with your data collection goals—What information do you need and from whom?

The place to start in designing a questionnaire is with your data collection goals.

Once these objectives have been clearly identified, the next step is to decide what pieces of specific information are needed to satisfy these objectives.

Many experienced questionnaire designers actually draft an outline of the final report,

⁶ The chapter originally was published by the American Statistical Association (ASA) as the ninth of ten pamphlets. It was drafted by Linda Stinson. The material included in this Chapter is part of the updating done by Fritz Scheuren of the original 1980 *What Is a Survey* publication prepared for the ASA, by Robert Ferber, Paul Sheatsley, Anthony Turner, and Joseph Waksberg. As with the other material in this booklet, the contents have been subjected to a professional peer-review process and examined for accuracy and readability by members of the survey community.

detailing how they will answer their fundamental data analysis concerns. This pinpoints exactly which pieces of information will be required and leads to the construction of a "data analysis plan"—which connects every data collection objective to each of the specific questions and how they should be asked. *For example*, consider answering an inquiry, such as How do people differ in their eating habits?

The data analysis plan may be quite informal.

Visualize a questionnaire that captures:

- attitudes about food preferences and likely food choices in different circumstances
- self-reports of quantities, frequencies, and type of food intake
- age, income, and gender information to distinguish different groups

It may also be good to have a question in which people use their own words to describe their eating habits. Sometimes this approach can reveal whether the other questions were really understood.

The data analysis plan may be quite informal—a table or flowchart linking everything together at a high level. Whatever the formality, each broad goal should be clearly set and linked to each of the specific questions on the questionnaire as they are constructed.

The use of an analysis plan at this early stage may seem extravagant; however, it is one of the easiest ways, if kept

updated, to ensure that the questionnaire contains everything that is needed and nothing extraneous.

The larger and more complex the inquiry, the more emphasis should be placed on an analysis plan. Otherwise, it becomes virtually impossible to keep all of the details in mind through the constant revisions a questionnaire undergoes. No one wants to come to the end of a \$50,000 (or \$500,000) survey project and discover that a critical variable was missing or was collected in the wrong way.

How to deliver the questionnaire—by mail or email, by fax, by telephone, or in person must be decided early on in the design process

Question Context

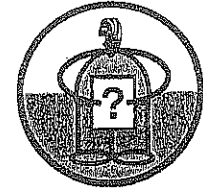
As the survey team approaches the point of constructing specific questions, they must decide whether the questionnaire will be self-administered or interviewer-administered. The team also must decide how to deliver the questionnaire—by mail or email, by fax, by telephone, or in person. Because the mode of data collection determines how questions and response options are constructed, this decision must be made early in the design process.

In many cases decisions about the collection mode will be driven by financial constraints or other resource limitations. Still, considerations such as overall questionnaire length, question complexity, and question sensitivity must be weighed in determining the mode of collection. *For example, long questionnaires may not work well on the telephone,*

The essential task is to convey the same information to all respondents about what is wanted.

complex questions may require an interviewer to be sure that they are understood, and sensitive questions may be best done in a self-administered format.

After the mode of collection is determined—but before the designer can draft the first question—the data collection team has to “operationalize” all the variables. *For example, continuing our earlier illustration, we must define what we mean by an “eating habit” and which behaviors will identify it.*



We might choose to define an eating habit as any of the following:

- food and drink actually consumed within the past 24 hours, whether typical or not
- most frequently consumed food items during a certain time period, such as last month
- food and beverages preferred when one is given a choice
- typical patterns of consumption, even if these patterns may not currently be in place.

We also have to decide whether the information is to reflect the patterns of food and beverage consumption for the individual respondent or whether we want the respondent to report for the entire household. These decisions should take into consideration what needs to be included in the final report. The essential task is to convey the same information to all respondents about what is wanted. Questions can be formatted for open-ended or close-ended responses.

For example:

| | | | | | | | | | |
|--|---|---|---|---|---|---|---------|--|--|
| "How many cups of coffee did you drink yesterday?" | | | | | | | | | |
| Open-ended Response (<i>specify number</i>) | | | | | | | | | |
| _____ (<i>enter answer</i>) | | | | | | | | | |
| Close-ended Response (<i>circle one</i>) | | | | | | | | | |
| None | 1 | 2 | 3 | 4 | 5 | 6 | or more | | |

Close-ended response choices must exhaust the entire range of answers. These choices must be mutually exclusive so that a single answer cannot fall into more than one category. The differences between the response choices should also be clear, so that respondents find it easy to select the response that best represents their answer.

In summary, questions and response choices need to be constructed so that respondents can be successful in giving answers that meet the analytic needs of the inquiry.

Good Question Structure

To design a good question, it is crucial that all the concepts be clear and simply expressed. The designer must think about how the answer to the question will be processed and prepared for analysis.

It is crucial that all the concepts be clear and simply expressed.

If there are terms with precise or technical meanings that everyone should use, these definitions must be included in the questionnaire and respondents should be instructed in them. It is essential to provide respondents with the tools necessary to translate their varied experiences accurately into a common, relevant set of response options.

One of the first points to think about (and one that will emerge quickly if an analysis plan is used) is whether a particular question is included primarily to make comparisons over time or comparisons across groups. Question consistency becomes paramount, *for example*, if the new data are to be compared with previous versions of the same questionnaire or with previous studies that collected some of the same information.

It is often easier to ensure consistency by repeating word for word the earlier question. A dilemma may arise if it appears that the previous question is flawed (*when retested, as it should be in the new context*). Social changes since the previous survey also may have altered the meaning of terms or the frequency of behaviors. Consider the question:

"About how many times did you speak with someone on the telephone today?"

How would the range of response options have to change if the goal is to compare an office worker's answer in the 1920s to what an office worker might say now? In the 1920s, the response options might have been:

None 1 2 3 4 5+

These options seem unreasonable in the current business world. Today, we might have:

None 1-5 6-10 11-15 16-20 21+

For a comparison over time, it would be better if the response options were:

None 1-4 5-8 9-12 13-16 17-20 21+

This way, with an extra category, there would be a better contrast between today's office world and that of the 1920s. Another factor to consider is that the range of response categories affects how people think about a question. Pretesting should be conducted to tell if this is occurring. (See the How to Conduct Pretesting Chapter in this booklet for more information.)

Avoid questions that tax the respondent's memory.

Conveying Required Precision

When a question is being created—particularly one requesting information about the frequency of a behavior—it is important for researchers to agree in advance on the level of precision being asked from the respondent.

If respondents are asked to estimate the frequency of their behavior, the questions may be prefaced by such phrases as “roughly how often?” or “about how many?”

It may be necessary to ask the respondents to count the exact frequency of events within a set period of time or to otherwise request that they be as precise as possible. You may ask them to consult records (*assuming these are handy and do not overly delay the data collection or raise the chance of the interview breaking off before completion*).

The choice of closed-response options can affect how people think about and respond to a question.

If precision needs are not conveyed clearly to all respondents, one person may choose to estimate within very broad ranges and another may make an effort to closely count the episodes or behaviors. The result would be that these various respondents would be answering different questions and their data would not be comparable. Remember, respondents are not mind readers; they cannot be expected to guess what is desired by the researcher or questionnaire designer.

Many concepts we ask people to report on in surveys do not have universally agreed-upon definitions. Surprisingly, there is little social consensus about the definitions of some commonplace everyday terms. Straightforward words, such as job, work, or income, can have many nuances and different meanings for different people.

There are many things that may make a question difficult to answer and should be avoided. For instance,

- questions that tax the respondent's memory,
- questions that ask for details that may never have been committed to memory.

For sensitive information, questionnaires may need to be self-administered

Pretesting such questions will quickly reveal the problem. Likewise, questions that ask for sensitive or self-incriminating information (e.g., on illegal drug use or cheating on taxes) are ones respondents may not want to answer. For the most sensitive types of information, questionnaires may need to be self-administered with an unbreakable guarantee of respondent anonymity.

Use extra caution when developing new questions—a great deal of preliminary effort is needed. Questionnaire designers budget a good deal of time for this.

The Questionnaire as a Whole

Respondents are more likely to cooperate if the questions are simple, clear, easy to answer, and personally relevant to them. It is recommended that questionnaires be written at the 5th-grade reading level.

When you think you've finished the individual questions, step back and look at the questionnaire as a whole. Remember, the questionnaire is a total package and needs to be considered as such.

- It needs a strong introduction conveying to the respondent what the survey is about.
- It should indicate why the questions are being asked.
- It needs interesting and readily answerable questions at the beginning to gain respondent attention and build rapport.



- The conclusion should be gentle and friendly, expressing gratitude for the respondent's time and effort.

The questions need to flow well from one to the next, and designers should be aware that earlier questions provide information and context to the respondents that they may use in later answers. Often the answer to one question may influence the answer to a later question. *For instance*, suppose respondents are asked first How do you feel about your job? and later on How do you feel about life in general?

Answers to the second question may be tempered by the first question. Because respondents have already reported their feelings about their job, including those feelings in the second answer may be redundant. On the other hand, if their job is very important to them (or salient for some other reason), then the answer to the first question may be used when constructing the second answer. These so-called "order effects" are difficult to predict and often become apparent only through field tests of the questionnaire, in which different orderings of the questions are compared.

KISS Principle— Keep It Simple, Statistician

The three most important things for any questionnaire designer to remember are simplicity, simplicity, and simplicity. Ideas need to be conveyed clearly and questions should be easy to comprehend. There must be no guesswork for the respondent when it comes to understanding exactly what information is being requested.

*KISS Principle—
Keep It Simple,
Statistician*

It has been recommended that survey questions be written at the 5th grade reading level.

Most questionnaires are not about trivial matters. It is the questionnaire designer's greatest challenge to take important topics and translate them into simple concepts, simple behaviors, and simple words. The style of the questionnaire must not get in the way of respondents'

providing their information; otherwise the result could be incomplete or misleading data, item refusals, respondent fatigue effects—even the respondent's refusal to complete the questionnaire.

It is a good idea to try out the questions on many different people—even as the questions are evolving. At different stages of development, the entire questionnaire should be tested to identify weaknesses and potential difficulties.

Think about which respondents might have the most problems answering the questions, and deliberately seek out those respondents for pretests. Another good method for identifying

Questionnaire designers must understand the need to pretest, pretest, and then pretest some more.

difficulties is for the questionnaire designers to actually serve as respondents and answer the questions themselves. It is amazing what insight may be gained by turning the tables in this way. The questionnaire designer must understand the need to pretest, pretest, and then pretest some more.

Where Can I Get More Information

Cognitive psychology is making major inroads into survey practice, not only in questionnaire design but also improving methods for eliciting informed consent on questions of privacy and the effective use of incentives. For more information on these changes as they affect questionnaire design, see *Cognition and Survey Research*, Sirken, et al (1999), Wiley.