



Screening Questions

How screening questions can cause self-selection bias

By Nanci A. Glassman and Myron Glassman

To minimize fieldwork costs, screening questions are frequently asked first and are rather "to the point." This can cause self-selection bias when the wording of the screener suggests who the interviewer wants to survey and the participant gives an incorrect answer as a polite way of saying "No" to the interviewer. Five studies where this was a problem are described. Incidence rates were less than half of what was expected.

Marketing researchers use survey screening questions to find people with certain behavioral, attitudinal, or demographic characteristics. Screeners save time and money by immediately telling the interviewer whether the respondent qualifies for the survey or if he or she should end the interview. Marketing research texts address the issue and typically suggest screening questions be placed at the beginning of the survey instrument.

Based on the recommended methods for screening, a researcher who has the unfortunate task of conducting a phone survey of bus commuters who earn over \$50,000 a year and live in ZIP Code 23456, might start the survey by asking if the person on the phone earns over \$50,000 a year, lives in ZIP Code 23456, and has commuted to work by bus in the past week. Such a method might be used despite the fact that researchers usually ask about income at the end of the survey, after some rapport has been established.

While having to screen for three characteristics

may be an extreme example for a phone survey, needing to screen for multiple characteristics is very common when recruiting for focus groups. In fact, a review of 68 recent focus group screeners used by clients of Continental Research found an income screener on the first page of over 70% of them.

Sometimes, researchers can reduce the number of screening questions or eliminate them altogether by narrowing the initial sample frame. In the above example, the need to ask ZIP Code could be eliminated by using a sampling frame that contains only households in the desired ZIP Code. Similarly, if the researcher purchased a list of people living in that ZIP Code who earned over \$50,000 a year, then two of the "screeners" could be asked at the end of the survey as confirmation questions (anticipating a very high incidence). While only one screening question, bus ridership, would be necessary, one does have to weigh any possible biases caused by the list source.

Although researchers are sometimes able to purchase a sample frame that will minimize the need for screening, there are still many instances when

screening questions are essential. While placing screeners at the beginning of the survey, as is often recommended, may seem to enhance a study's cost-effectiveness, this can compromise the validity of the responses. Direct and "to-the-point" screening questions cause two very significant problems.

One problem arises when a researcher must screen for certain income groups. Asking income as an initial screener goes against common sense because researchers know that asking sensitive questions before the interviewer has established rapport often leads to lower participation rates. If people won't answer the question, more contacts will be necessary to achieve the desired quota.

Another problem arises when the screener gives the respondent clues about who the interviewer wants to speak with. This gives the potential respondent an easy way to avoid participating. Rather than saying, "I'm too busy," some people may say, "No, I drive to work in my car. Sorry, I can't help you." Although the survey was officially terminated by the interviewer, the potential respondent achieved his goal. If the people who use screening questions to politely "refuse" are different from those who don't, the survey is no longer random or representative because of self-selection.

The bias problem is more damaging when researchers are doing a market feasibility study and need to project the results back to the community as a whole. For example, if a client wanted to open a health club in a small suburb that doesn't have one, he may commission a survey to determine how many town residents already have a membership in the health club in an adjacent community. If enough people already belong to one, the client believes that his facility will succeed because it would be more convenient.

To identify the proportion of the adults already belong to a health club, the survey opens by saying, "Good evening, this is Barbara from Acme Research. I'm taking a brief survey. I assure you that I'm not selling anything. Do you currently belong to a health club?"

Despite the interviewer identifying herself as being from a local research firm and assuring the person that she is not selling anything, people may still think that if they say "No" a sales pitch will ensue. Essentially, a respondent may fib because the interviewer hasn't had enough time to establish any rapport.

Researchers have long been concerned about some unscrupulous telemarketers who use the pretense of a survey to mask their identity and locate sales leads; commonly referred to as "sugging" (selling under the guise of research).

In the above example, if many town residents who don't belong to a health club say, "Yes, I already do," an inappropriate conclusion may be

reached. Based on such inaccurate results, a client may open a new club and be out of business within a year.

The recent flurry of sugging has left many respondents immune to interviewers' assurances. And, as telemarketing becomes common for more products and services, research problems associated with using direct screening questions will likely increase.

SURVEYS AND SCREENING QUESTIONS

Participants giving false answers to questions as a way of ending the survey can cause serious problems with survey results. The following are five examples where screening questions have caused a problem.

The Funeral Home Survey

A funeral home in a large metropolitan area needed potential use (absorption) rates to obtain the financing needed to physically expand and offer a new service. Industry sources indicated that the primary target for the new service was people over age 80 who had not already pre-planned their funeral and burial. Based on U.S. Census data, approximately 2.5% of the adult population in that geographic area was age 80 or older.

The client wanted to screen many households quickly and at a minimal cost, so the telephone survey began with:

Good evening. I'm _ with Acme Research and we're doing a very brief opinion survey.

- 1) Is there anyone in your home who is age 80 or older?
YES -(Ask for the person and re-read introduction)
NO -(Thank & Terminate)

After 200 calls, interviewers had not found a single person over age 79, so the project was canceled. We suspect that the five or six households where someone was indeed over age 79 may have said "No" as a polite way of declining to participate. While this subject matter is challenging to address in a survey, the problem is compounded by the difficulty of screening the population.

Had we found someone over age 79, he or she would have been asked a second question:

- 2) Some people make their funeral and burial arrangements ahead of time to make life easier for family and friends. Have you already made your final arrangements?
YES -(Thank & Terminate)

NO -(Continue)

3) We'd like to get your opinion tonight on...

In retrospect, the second screener sounds all too much like a sales pitch. We believe that most people would have said "Yes" regardless of their actual pre-need plans.

The Career Choice Survey

The purpose of this telephone survey was to learn more about how women between ages 20 and 29 made certain career decisions. To minimize costs, the questionnaire started with:

Hello, I'm with Acme Research in (city). We're doing a survey this evening with women in their twenties.

IF MALE SAY: Does anyone in your home fit this description? (Get female, repeat introduction)

IF FEMALE SAY: May I ask your age?

At the close of the first evening of interviewing, we found a female in the age group in only 23 (12.8%) of 180 households contacted. Researchers began to suspect that some people were using the screening criteria to politely end the interview. The survey was revised by placing three opinion questions after a brief introduction. The newly revised survey read:

Hello, I'm with Acme Research in (city). We're doing a brief opinion survey this evening.

IF MALE SAY: We alternate who we ask for in our surveys, may I speak with an adult female?

IF FEMALE SAY: Do you think that employees should be allowed to smoke in ALL workplaces, SOME, or in NO workplaces?

(THEN, TWO OTHER OPINION ITEMS WERE ASKED BEFORE THE AGE QUESTION.)

Using this survey format, the improved incidence rate was 26.6%. The difference was found to be statistically significant.

Pet Product Survey

A client who was considering creating an informational for a pet product had identified his target market as dog and/or cat owners who held a major credit card. He wanted these prospects to evaluate various features of his new product. To

minimize cost, the questionnaire started with:

- 1) Hello, I'm with (company). We're doing a survey this evening with pet owners, do you have a dog or cat?
- 2) And, do you have a major credit card such as a MasterCard or VISA?

Based on other research done previously, the client said that we should expect an incidence rate of between 30% and 40%. Unfortunately, the incidence rate we found when using this survey format was only 8.9%.

To help account for the lower-than-expected incidence rate, we split the sample frame and reworded some surveys as follows:

- 1) Hello, I'm with (company). We're doing a brief lifestyle survey tonight and we'd like to know how many refrigerators and televisions you have in your home?
- 2) Do you have a VCR?
- 3) Do you have a dog or cat?
- 4) Do you have more than one car?
- 5) Do you have a major credit card?

By the end of the project, the incidence rate was 11.4% using the first, more direct questioning method and 31.8% using the second, more indirect technique. The difference between these two percentages was found to be statistically significant.

Night Club Study

Two partners who owned a nightclub commissioned a telephone survey of non-patrons to learn if their club's theme was outdated and perhaps contributing to a drop in patronage. To be sure that only active nightclub-goers were interviewed, the questioning began by asking:

"Have you gone to a night-spot for food or drinks in the past two months?"

Using this direct method, the incidence rate was barely 7%. This was far below the 20% to 25% that the client said was typical, based on his industry information. To address this problem, the screener was re-worded. Now, respondents were asked:

Which of the following things have you done in the past two months: **(Read each and pause for a response.)**

Played tennis? Gone to a movie? Gone out for dinner? Gone to a nightspot for food or drinks? Gone to the beach?

Exhibit 1

Problem: a gap between plan & actual

Summary of findings

	Direct wording incidence rate	Indirect wording incidence rate	Known value incidence rate
Funeral study	0%	Question not asked	2.4%
Career study	12.8%	26.6%	Not ascertained
Pet study	11.4%	31.8%	30% - 40%
Night club study	7%	22%	20% - 25%
Radio study 1 General Pop.	29%	Question not asked	60%
Radio study 2 Known Age	76%	Question not asked	100%

The less direct method produced a more realistic 22% incidence rate and the resultant survey was a success.

Radio Study

The purpose of this study was to learn about the radio listening habits of people between the ages of 22 and 44. According to U.S. Census data, approximately 60% of the households in the area included at least one person in this age group. To save time and money, the client wrote the following screening question:

I'm doing a survey of people between the ages of 20 and 44. Is there anyone in your household in that age group?



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Only 29% said, "Yes." This is slightly less than half of the known percentage in the area's population.

Later, we used, the same screening question with households that were known to have someone in this age group. In that case, 24% of those contacted said that there was no one between age 20 and 44 living in the household. Despite the fact that someone in the household had recently said they were in that age group, nearly one-quarter of those contacted denied having someone in the home between those ages.

SUMMARY AND CONCLUSION

Even though it is common practice to start a survey with direct screening questions to minimize costs, the practice can invalidate a survey's results. "To the point" screening questions can offer a signal as to who qualifies for the survey and who doesn't. Potential respondents probably use this information to politely refuse to participate.

We believe that Exhibit 1, which summarizes the five studies, supports the following conclusions:

- 1) "To the point" screening questions caused self-selection bias in a number of different topic areas.
- 2) Potential respondents were able to self-select based on direct screening questions about age (funeral home, career, and radio study), gender (career study), and lifestyle (pet and night club study).
- 3) Self-selection bias resulted in a discrepancy in incidence rates of between 31.9% for night club study's (7% direct wording vs. 22% indi-

ADDITIONAL READING

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- Waters, Kevin M. (1991), "Designing screening questions to minimize dishonest answers." *Quirk's Marketing Research Review*, Vol. 5, No. 5. (May).
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rect wording) and 48.3% for the radio study (29% direct wording vs. 60% known population value).

- 4) Indirect screeners generally produced incidence rates that were comparable to known values, e.g., the pet study and nightclub study.

In summary, it may be wise to begin by working

with a sample frame that will minimize the number of screening questions needed. When that is not practical, researchers should use more buffer questions and write less obviously worded screeners to minimize self-selection bias. Although this technique may increase a project's cost, the findings will be more accurate and the research more valuable. If we ignore the problem, survey validity will drop along with confidence in our work. ■

LOGISTIC

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benefits of using logistic regression as an alternative to linear discriminant analysis for the two-group classification problem. We began by outlining the two approaches and then discussed their relative strengths and weaknesses. We concluded that it would be sensible to at least consider the viability of logistic regression as it seems to be more robust than linear discriminant analysis for many types of data set encountered in practice, although not infrequently the magnitude of these differences in forecasting ability have been found to be relatively slight.

To illustrate the use and interpretation of the logistic regression approach, we have presented a topical example involving the reclamation of potentially environmentally damaged residential property in Kenai, Alaska. This study would seem to indicate that, other things being equal, the odds of an individual being potentially interested in or at least not being totally averse to purchasing a residential property in a recently reclaimed potentially environmentally damaged area would increase as income level increases and decrease as age, the level of perceived risk, and the level of environmental concern increases. The odds are also higher for males than for females. These results, of course, are only suggestive. For a more definitive conclusion, a more extensive study would be required.

Finally, we should just note that there are

also a number of other approaches to the classification problem that could be considered. These include a variety of mathematical programming techniques, nonparametric methods, and artificial neural network models. For an introduction to this literature, two recent papers may be recommended, the survey paper by Duarte Silva and

Sometimes a researcher is more interested in the predicted probability or the predicted odds for an individual with a specific array of characteristics.

Stam in *American Statistician* mentioned earlier and a paper by Edward Altman, Giancarlo Marco, and Franco Varetto in the May 1994 issue of the *Journal of Banking and Finance*. Many of these methods show considerable promise, but large training samples are often required for them to be effective. ■

CYBER

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and not just the easy-to-get ones regularly enclose incentives to boost response rates. Certainly such incentives might have significantly boosted the mail response in our survey from the small 5% to 10% difference that favored mail. Of course, e-mail and Web form surveys can include incentives as well. Marketers increasingly include "electronic coupons" on their Web form sites, while others provide discounts on products and services or contests and giveaways.

Finally, to what extent can the results from a

survey of a technologically sophisticated population be generalized to problems of reaching other populations such as homemakers, food service workers or sports fishermen? While this may still be a significant limitation, it seems to be fast disappearing, at least in North America where e-mail is becoming the "killer application" of the Internet with an estimated 70 million people in the United States being connected and an annual growth rate projected to be between 30% to 50%. New methods have a bright future and with continued research we can begin to better understand how to use the new data collection methods. ■