
14. Survey Construction and Formatting

The step of gathering your data involves interacting with subjects. This section discusses **surveys** as a data-gathering technique, but many of the same observations apply other techniques. For example, if you **directly observe** the behavior of subjects instead of questioning them, you would create an **observational checklist** using similar principles.

The first step is to write down your basic research question. For example, your basic question might be

What influences viewer satisfaction with downloaded movies?

In this case, **viewer satisfaction** is the **dependent variable** and the **influences** are the **independent variables**. At a minimum, you need a question on your survey that **measures** satisfaction. One possibility might

be:

Which of the following best describes your most recent experience watching a downloaded movie? Check one box only.	
<input type="checkbox"/>	Extremely Satisfied
<input type="checkbox"/>	Satisfied
<input type="checkbox"/>	Neither satisfied nor dissatisfied
<input type="checkbox"/>	Dissatisfied
<input type="checkbox"/>	Extremely dissatisfied

There are some things to observe about this question. First, because the choices are listed vertically it's **clear which box to check**. Listing them in a row can be confusing.

Second, this list of answers **permits a neutral response**. If we used an **even number of responses** we would **force respondents to choose** between being satisfied and dissatisfied.

Since the basic question deals with possible influences on viewer satisfaction, we'll need to construct a list of what these might be. Examples include things like:

- respondent age;

- respondent educational level;
- expense;
- convenience;
- video/audio quality.

Each **influence** corresponds to a **independent variable**. For each independent variable, we need a question on the survey what will **measure it**. For example, for age we might ask

Which of the following best describes your age?	
<input type="checkbox"/>	At least 18 but younger than 28
<input type="checkbox"/>	At least 28 but younger thn 38
<input type="checkbox"/>	At least 38 but younger than 48
<input type="checkbox"/>	At least 49 but younger than 58
<input type="checkbox"/>	58 or older

Continuing in this way constructs your survey.

Generally speaking, every question on the survey corresponds to a variable, and every variable corresponds to a question. The questions **measure** the variable.

One exception to the above is a **filter question**. In order to be satisfied or dissatisfied with downloaded movies, the subjects must have **downloaded a movie**, i.e., our population consists of

The population in this example consists of people who have downloaded and watched a movie, for example in the last three months.

Finally, when we ask our questions, we won't ask the respondents to **summarize their behavior**. Instead, we will ask them about **the last time they downloaded a movie**.

Part of good survey design includes how researchers will interact with their subjects before and after administering the survey. Typically, the researcher will want to

- identify themselves to the subject;
- inform the subject why the researcher is doing the survey;
- inform the subject what the survey is about;
- inform the subject of how long the survey will take;
- inform the subject of safeguards regarding their confidentiality;
- ask them to participate.

After administering the survey, a thank you is always appropriate. Sometimes researchers will also include a token of appreciation. For example, families participating in Nielson surveys receive a token payment of \$15 per month.

The way that you interact with your subjects is your **protocol**.

14.1. Example.


A recent (2015) *poll* showed that 45% of Americans believe that aliens/extraterrestrials have visited the Earth. Suppose you are interested in studying what influences people to have this belief. For example, the poll showed that women are more likely than men to disbelieve in alien visitations. To study these influences, you would need to

- Define your *population*;
- define *dependent* a variable regarding belief in alien visits; and
- create a list of factors or *independent* variables that influence this belief.


Group Assignment. Identify four possible independent variables besides gender that might influence belief in alien visitations. Design a questionnaire that measures the dependent and independent variables. Include your *protocol*. Also be sure to identify the *population* you intend to study and a filter question if required.

Sometimes your research objectives will involve questions that are **too complex** for a self-administered survey. Sometimes the objectives will require **interactive questions** which necessitate the intervention of a trained interviewer. Sometimes the questions may be **personal in character**. Some personal questions are better administered in a personal interview in which the respondent and the researcher have an opportunity to develop a trusting relationship; in other cases the anonymity of a self-administered survey may elicit more reliable responses.

Your **budget** includes not only **financial** resources but also the **availability of trained interviewers** and the **available time** frame for responses. **Self administered questionnaires** require mailing lists, printing and postage costs. In addition you must wait for your respondents to return the forms and may incur the expense of follow-up mailings. **Telephone surveys** can have a quicker turn around but add the expense of trained interviewers and (except for local surveys) long distance tolls. **Personal interviews** are the most expensive in terms of all resources – financial, personnel and time.



Another issue is **sample design**. Self administered surveys generally require mailing lists. Telephone surveys require phone directories. Personal interviews will require either addresses or phone numbers or both to establish the interview appointment. In each case the sample must be selected from the available list and can only be as reliable as the original list.



Each of the survey methods provide potential sources of **bias**. A self administered questionnaire may be **misinterpreted** or may elicit **biased responses due to question wording or order**. Since your only contact with your respondents is the survey instrument, you may never discover these problems. Similar problems can arise with telephone and personal interviews, but because the interviewer can interact with the respondent the researcher has an opportunity to discover errors or sources of bias in the survey instrument. Of course, because the interviewer is interacting with the respondent there is potential that this interaction will bias the results; special care must be taken that the interviewer maintain a completely neutral demeanor and tone. Another problem with self administered and telephone surveys is that the respondent may not be the person you selected for your sample.

Finally the researcher needs to choose a method which has a reasonable response rate. In general you should strive for an 80% response rate to your survey. *A survey with a response rate of less than 50% is not valid for statistical inference* unless there is strong evidence that the non-respondents are similar to the respondents in all essential features. Since the self administered questionnaire can be filled out according to the respondent's schedule this will enhance the chance of reply (and of a thoughtful and accurate reply); of course, it also enhances the chance that the survey will be discarded or lost. Telephone surveys rely on being able to contact the respondent; this is exacerbated by the increasing use of answering machines and other call-screening devices. Personal interviews tend to have the highest response rate.

Response rates can be enhanced by contacting the respondent with a post card or letter to advise respondents that they have been selected for a survey, inform them of the purpose of the survey and let them know when the survey instrument (survey, phone call, interviewer) will arrive. Each question on your survey should be **purposeful** – do not ask question just because you think it might be interesting. In a survey on a presidential election, don't ask what kind of car the respondent drives. Unnecessary questions waste your time and are inconsiderate of the respondent – and probably will depress the response rate. A question does not have to address a research objective to be purposeful: you might ask a question whose only purpose is to motivate response. (“Do you think that the national news represents your interests?”)

Often surveys will gather demographic information (gender, ethnicity, age, marital status, occupation) on the first page of the survey. For this reason these are sometimes called *face sheet* questions. Such demographic information is often gathered just to validate the sample; often the researchers will also check the response variables against these

controls to ascertain if there is a difference in common demographic groups.

Your questions can assume several formats: short answer, open-ended, check lists, yes/no, Likert scales or some other form. Short answer and open-ended questions have the advantages of not suggesting responses (and hence less bias) however they also tend to be much more difficult to tabulate.

Be careful with your checklists: what is wrong with the following questions (taken from student surveys)?

What is your age?

0-25 25-35 35-45 45-55 55+

Of course, the choices are not mutually exclusive, so, for example, a respondent who is 35 years old could give either of two answers.

What is your age?

0-24 25-34 35-44 45-54 55+

This one has been fixed so that the responses are mutually exclusive, but it is difficult to read. It would be better if a list were used:

What is your age?

- 0-24
- 25-34
- 35-44
- 45-54
- 55+

Beware of unwarranted assumptions! What's wrong with the following?

Which of the following best describes your experience with the Armed Forces?

- On Active Duty
- Retired
- Husband on Active Duty
- None

Checklists need to be mutually exclusive and collectively exhaustive. Be sure to include an “other” response with room for the respondent to fill in their own answer on any checklist. When you construct your checklist, you are making a list of what you *think* are all possible answers. You can be undone if what you think you know is wrong.


Likert scales can either provide for a continuous response

Strongly Agree

Strongly Disagree

or for graduated response:

- (a) Strongly Agree
- (b) Agree
- (c) Neutral
- (d) Disagree
- (e) Strongly Disagree



The above graduated scale permits a neutral response; an even number of choices forces a choice:

- (a) Strongly Agree
- (b) Agree
- (c) Disagree
- (e) Strongly Disagree

Notice that the graduated Likert responses will be easier to tabulate than continuous Likert scales.

You should endeavor to save your respondents unnecessary reading. One way to do this is with *filter questions*. If your survey deals with CD purchases (for example) your first question might be:

Do you own a CD player? Yes No.
If your answer is “yes” please continue. If your answer is “no” please be sure to check the “no” circle and return the questionnaire. Your answer is very important to the accuracy of our research. Thank you very much for your assistance.

Internal Consistency. Surveys will often contain the same question worded in several different ways and placed in different positions in the questionnaire. This is done to check for consistency in responses (as well as to check for bias in the questions themselves). If you do this, there are statistical tests (such as Cronbach's alpha) to help you decide if the responses to a set of questions are consistent. Because this adds to the expense and length of the survey, many surveys omit such consistency checks in the final version of the survey instrument.

The formatting of the questionnaire – especially for self administered surveys – can be very important. A survey needs to both *appear* to be simple and short to fill out as well as actually *be* simple and short. Long and complex surveys will have poorer response rates; in addition, the accuracy of the response will degrade toward the end of the survey due to fatigue on the part of the respondents.

Your cover letter, survey title and instructions not only convey information about the survey but can serve to motivate the respondent to answer your questions. Part of your goal is to persuade your respondent to assume some ownership in your research project, investing time and consideration in the responses. While such motivational efforts are important, care should be taken to avoid biasing the responses: a cover letter from the National Committee of a political party would almost certainly bias the responses regardless of political persuasion.


In addition to question formatting, the paper size can influence the response rate, with Monarch size (7×10 inch) obtaining more responses than letterhead size ($8 \frac{1}{2} \times 11$ inches), which in turn does better than legal size ($8 \frac{1}{2} \times 14$ inches).

As a general rule, the fewer pages the higher your return will be. Of course, there will be a tradeoff between paper size and number of pages, but often a Monarch sized four page survey will draw as well as a two page survey printed on letterhead stock.

If you print your survey on colored stock it may be confused with an advertisement, depressing the response rate. If you need to use colored stock (for example, to help code different sample groups), use light colors. The paper weight should be sufficiently heavy to accept printing on both sides without showing through; avoid too heavy a stock since this will increase mailing costs.

You should select a consistent and legible typeface. *You should avoid fancy or peculiar typefaces since they are difficult to read. Even italics should be avoided – people are generally able to read italic type at only about 60% of the rate for non-italic type.*


The most legible typefaces tend to be sans serif (like your lecture notes) as opposed to fonts like the traditional Times Roman used in newspapers. Typefaces should be at least ten point size (twelve pitch on a typewriter) but twelve point (ten pitch on a typewriter) is generally



more legible. A line length of five inches is generally best to avoid eye strain and fatigue.


Your survey should not look cramped or cluttered. Liberal use of white space and vertical – as opposed to horizontal – lists can make your survey more attractive as well as clearer. The survey should look professional (but not too slick: you don't want to be confused with an advertisement, nor do you want to alienate the respondents by appearing too affluent). It should always be clear where to respond (and whether the response is a check box or written). In the case of written responses, the amount of room you leave will suggest the length of response which you desire.

The questions on the survey should be neutrally worded. Care should be taken not to suggest answers, either in the format, wording or positioning of the question. Surveys can be biased in subtle ways.



For example, if you are asking a question about education and expect that all of your respondents will have at least a high school education, include a choice “grammar school only” so that respondents will not feel they are falling in the lowest category.


Some questions may embarrass the respondent. Questions about sexual activity or preference are notorious for unreliable responses. Even if the respondent is certain that the answers will be confidential, untrue or missing responses are inevitable for sensitive questions unless the respondents are able to both establish a trusting relationship with the researcher (for example through personal interviews) and are convinced as to the importance of the project. The Kinsey studies, for example, were preceded by involving community leaders (religious leaders, newspapers, etc.) in giving public expressions of support for the project. Then the subjects were interviewed several times to assist in developing a trusting relationship with the researcher.



The order of questions can influence results by placing the respondent in particular frame of mind. The question “Do you support the use of public funds to pay for abortions” is, itself, phrased in a neutral fashion. However, if you precede this question with a sequence of questions about the respondent’s own children or about child care you will get one set of answers. Preceding the question with a sequence of questions about women’s rights and freedom of choice will produce a different set of responses.

The phrasing and structure of the questions, and the layout and character of the responses should be designed with problems of tabulating in mind.

As you construct your questions, keep in mind that you will eventually need to tabulate and summarize the results of your survey. You will also probably want to be able to statistically analyze the results in some manner. The final steps in your survey, the analysis and interpretation of results, can be a nightmare unless you have planned ahead.



Before you administer your survey, it's a good idea to make some trial graphs, tables and charts to describe how you will summarize your data. Also think about the numerical summaries and cross-tabulations which you will want to make (how did women answer questions 12-15 differently from men). Finally, think about the statistical tests which you will need to perform in order to realize your research objectives and answer your hypotheses. Make sure that you can readily capture the required data from your questionnaire.

Sometimes you will want to consolidate several questions into a single group in order to get an overall response. For example, if you are interested in attitudes about women in combat, you may have a set of questions dealing with women serving in various specific roles (fighter pilot, air evac pilot, tank commander, CIC officer, etc.) which can be consolidated in a single scaled response. If you do this, make sure that the scales from question to question are consistent!

Finally, you will need to pay attention to how the responses are *coded*. Using a computer will facilitate doing summaries, but computers only understand numbers, not “attribute” responses. Thus when measuring “gender” for example, you might want to code one gender as “0” and one gender as “1”:

- “males” = 0; and
- “females” = 1.

On the other hand, if your response includes more than two categories, you should regard *each category* as a separate “yes/no” responses. For example, if your survey has two questions:

1. What is your gender? ○ male ○ female
2. Which best describes your highest educational level?
 - (a) do not have a high school diploma
 - (b) high school diploma or GED
 - (c) two years of college or less
 - (d) four years of college or less
 - (e) more than four years of college

In this case you might have the following five respondents:

#	Gender	Education
1	Female	(b)
1	Male	(a)
1	Female	(e)
1	Female	(c)
1	Male	(d)

In this case you could code “gender” with a single column of “0’s” and “1’s.” But “education” becomes *five* columns, with each of the choices coded “0” for “no” and “1” for “yes.” Any particular respondent will have exactly one “1” response for the education choices.

respondent #	Gender	5Education				
		(a)	(b)	(c)	(d)	(e)
1	1	0	1	0	0	0
2	0	1	0	0	0	0
3	1	0	0	0	0	1
4	1	0	0	1	0	0
5	0	0	0	0	1	0

Questions. Why is only one column, not two, needed for “gender?” Do you really need to use five columns for Education?

Later lectures will deal with the **reliability** and **validity** of surveys, including **inter-rater reliability** and the **internal consistency** of survey items.