

## Types of Survey Questions and Data Analysis

There are several types of questions to choose from when you design a survey. The broadest distinction that we make is between **close-ended** and **open-ended** questions. Closed-ended questions provide participants with pre-established response options or answers. This is why some people refer to these questions as “fixed choice.” Open-ended questions allow respondents to write anything they want in the space you provide.

Each type of question has strengths and weaknesses. Closed-ended questions generally take respondents much less time, because they just check a box or circle their answer from the list provided. Data entry, analysis, and presentation of the findings are all a lot easier with closed-ended questions. The down side of this approach is that the survey designer has to pre-specify all of the answer choices. If you are talking about something like a person’s current age, this is usually straightforward (e.g., 18 to 24, 25 to 34, 35 to 44, etc.). If you are asking for someone’s preferred strategy for preventing crime, it may be harder.

Researchers have found that the way you group response options in closed-ended questions assessing frequency or quantity, can also influence how people respond. Take for example the following question with two alternate response options:

- *“How many times in the past month did you see someone driving 10+ miles an hour above the speed limit in your neighborhood?”*
- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 0 times    | <input type="checkbox"/> 0 times    |
| <input type="checkbox"/> 1 to 4     | <input type="checkbox"/> 1 to 9     |
| <input type="checkbox"/> 5 to 9     | <input type="checkbox"/> 10 to 19   |
| <input type="checkbox"/> 10 to 14   | <input type="checkbox"/> 20 to 29   |
| <input type="checkbox"/> 15 or more | <input type="checkbox"/> 30 or more |

Let us assume someone’s real answer is 21 but they are not 100% sure. Giving them the answer choices on the left suggests that 21 might be somewhat high – it is after all, the last box in the list provided. This could lead them to change their answer and check a different box. The same number, 21, does not seem quite as deviant when you look at the second set of responses.

The main benefit of open-ended questions is that they can provide a wealth of information. For example, you are likely to get a wide variety of responses if you ask people for suggestions about reducing crime in their neighborhood. The responses would likely include things that you never thought of before and would not have added as discrete choices in a closed-ended version of the same question. As for drawbacks, adding too many open-ended questions can overwhelm or fatigue your potential respondents, possibly resulting in fewer people completing

the survey. Moreover, the large quantity of text produced from open-ended responses can burden the people who do the data entry and analysis.

In the end, the choices you make regarding the use of these two types of questions will depend on the nature of the project, the level of commitment you can expect from your respondents, and your capacity to manage the resulting data. Provided below are detailed examples of the six most common closed-ended questions and one example of an open-ended item.

1. Dichotomous (close-ended)

The simplest form of a closed-ended question is a dichotomous item, where you give the respondent just two options for answering. Coding the answers with 0 (no) and 1 (yes) allows you to determine the frequency of the “yes” answers by taking the average of the scores. Adding codes like this to printed surveys greatly expedites the data entry process and numbers are more efficient to store in computers than text. When it comes to analyzing dichotomous variables and presenting the results, simple pie charts or text statements work best (e.g., *“88% of the respondents drove a motor vehicle in the city at least once per month over the last 12 months.”*).

## Question

1. Have you driven a MOTOR VEHICLE at least once per month over the last 12 months?

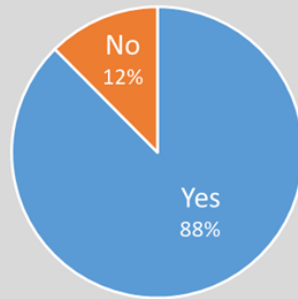
- ☐ 0 No  
☐ 1 Yes

## Data

	A	B	C	D	E	F
1	ResponseID	Drove 12M	Drive Safety	Drive Unsafe Text	Driving Map 1	Driving Map 2
2	38	1	10		0	0
3	41	1	7	There are not always good signs. Some of the s	0	0
4	158	1	4	The roads around here aren't always the best, t	0	0
5	103	1	5	There are too many people that sleep at the wi	0	0
6	26	0	9	The main thing that makes driving in my comm	0	0
7	189	0	5	I live in a city so people are always in a rush in c	0	0
8	140	1	6	The presence of aggressive drivers, jaywalkers,	0	0
9	93	1	10		0	0
10	48	1	9	I live in a relatively small town and do not enco	0	0
11	111	1	5	The main thing that makes driving less than saf	0	0
12	66	1	8	I feel a lot of the drivers in town aren't very go	0	0
13	123	1	9	We have a lot of drivers that run red lights on r	0	0
14	191	1	9	There are many people that do not check their	0	0

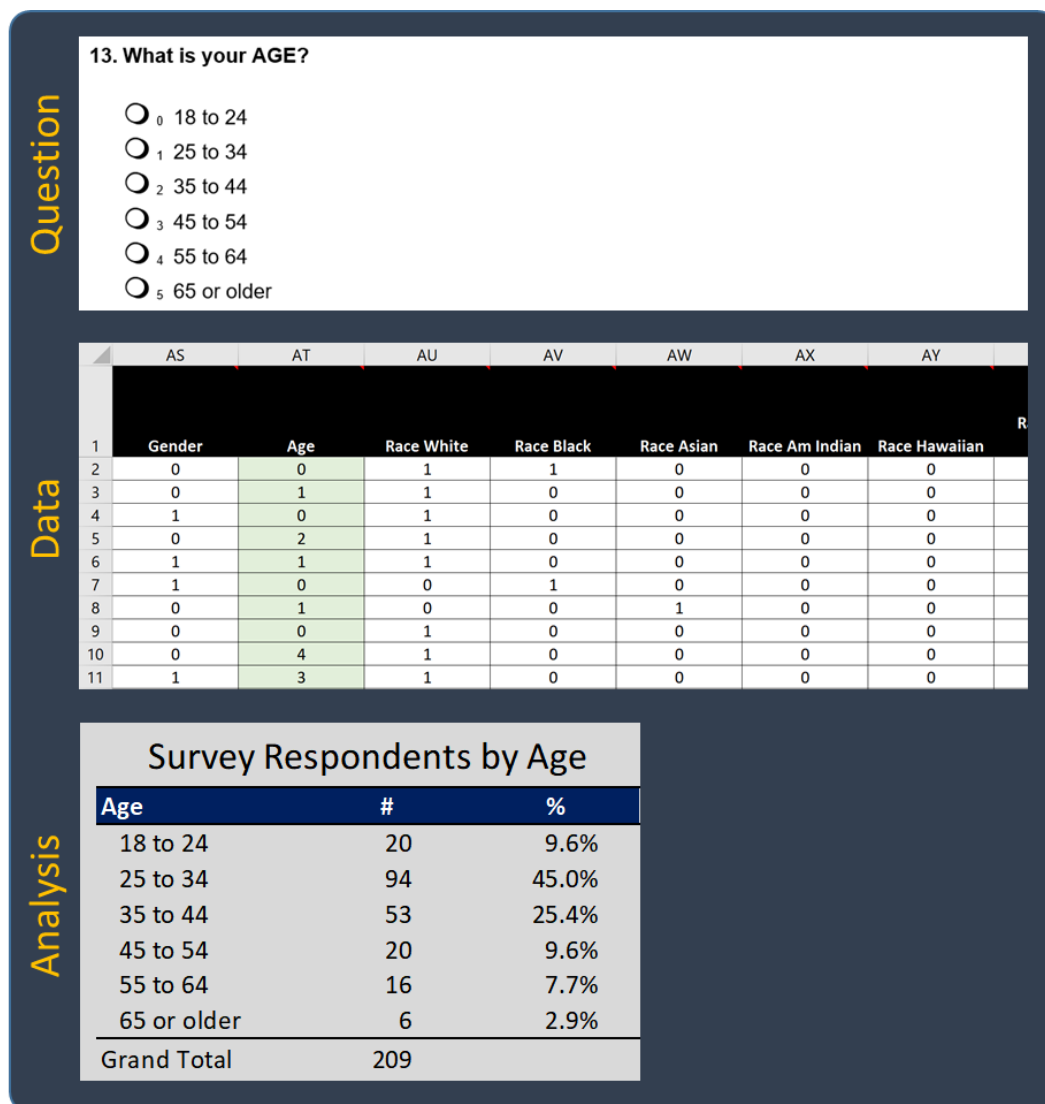
## Analysis

Drove a Motor Vehicle  
(past 12 months)



## 2. Multiple Choice - Single Answer (close-ended)

Most people are familiar with multiple-choice questions from school. They are used with equal frequency in community surveys. The most common version of a multiple-choice survey question involves forcing the respondent to choose just one answer from the list provided. The answer choices should not overlap (i.e., be mutually exclusive) and everyone should be able to find an answer that works, even if that requires adding “Other” as an option (i.e., exhaustive).<sup>1</sup> Frequency tables like the one shown below and bar/column charts are a good way to analyze and present the findings from this type of question.



<sup>1</sup> See our *Tips for Writing Survey Questions* for more details about the concepts mutually exclusive and exhaustive.

### 3. Multiple Choice - Check all that Apply (close-ended)

The second version of a multiple-choice question is a bit more complicated. There are times when you want/need to give people the option of selecting one or more answers. Race is a good example: the U.S. Census Bureau allows people to select more than one race using the options shown below. While this looks like a standard multiple-choice question on paper, in a data spreadsheet you actually have a separate column or field for each of the options presented. Each race becomes a dichotomous question or variable. If a person checks the boxes for White and Black/African-American, as seen in the fourth row of data, you would enter a "1" or "yes" into each cell. The analysis of these data can be simple or a bit more complicated. The easy version is to analyze and report the findings each racial group separately: 75% of the people were White, 12% were Black, etc. The problem with this is that your percentages will probably add to more than 100%. You are also not taking into consideration the fact that some people self-identify as bi or multi-racial. The more complicated approach is to look across all of the individual categories to identify the people checking more than one box. We have demonstrated this in the data sample below. As for presenting the results, bar/column charts and frequency tables work well for this type of closed-ended question.

Question

14. What is your RACE? ☒ one or more boxes

- ☐ White
- ☐ Black or African-American
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Some Other Race

Data

	A	B	C	D	E	F	G	H
1	Race White	Race Black	Race Asian	Race Am Indian	Race Hawaiian	Race Some Other	Race Count	Race Final
2	1	0	0	0	0	0	1	White
3	0	1	0	0	0	0	1	Black/African-American
4	0	0	0	0	0	1	1	Some Other Race
5	1	0	1	0	0	0	2	Two or More Races
6	0	0	1	0	0	0	1	Asian
7	1	0	0	0	0	0	1	White
8	0	1	0	0	0	0	1	Black/African-American
9	0	0	1	0	0	0	1	Asian
10	1	0	0	0	0	0	1	White
11	0	0	1	0	0	0	1	Asian
12	0	0	0	0	0	1	1	Some Other Race

Analysis

Survey Respondents by Race

Race	#	%
White	166	79.4%
Non-White	43	20.6%
Am. Indian or Alaska Native	2	1.0%
Asian	12	5.7%
Black/African-American	13	6.2%
Some Other Race	7	3.3%
Two or More Races	9	4.3%
Grand Total	209	

#### 4. Likert Rating Scale (close-ended)

Rating scales differ from multiple-choice items in that the latter usually ask a respondent to pick a discrete option from a list of arbitrarily ordered categories. In other words, the options provided may not have an inherent quantitative value that allows you to order them meaningfully from low to high. Rating scales assess where someone falls along a single continuum. One of the most popular versions of a rating scale is the Likert scale. With a Likert item, you provide the respondent with a positively or negatively worded statement and ask them to indicate their level of agreement on a symmetrical scale (e.g., “strongly agree” to “strongly disagree”). The response scales are usually set up to have either five or seven options with a neutral choice in the middle. We provide three examples of Likert items and the resulting data in the image below. When it comes to analyzing Likert scale questions, you have several choices. In the first sample chart we “collapsed” (i.e., combined) “agree” and “strongly agree” into one category and calculated the percentage of people in this category for each item. With the second chart we plotted the average score for each item using the original scaling from 0 “strongly disagree” to 4 “strongly agree”. A third option with Likert scale variables assessing a similar construct (i.e., impact of how people drive) is to combine the items into a single global score.

## Question

7. Rate your level of agreement with the following statements:

The way people drive here makes me worry about my own safety.

- ☐ 0 Strongly Disagree  
☐ 1 Disagree  
☐ 2 Neither Agree /Disagree  
☐ 3 Agree  
☐ 4 Strongly Agree

The way people drive here makes me worry about the safety of my family.

- ☐ 0 Strongly Disagree  
☐ 1 Disagree  
☐ 2 Neither Agree/Disagree  
☐ 3 Agree  
☐ 4 Strongly Agree

The way people drive here makes me think about moving away from the city.

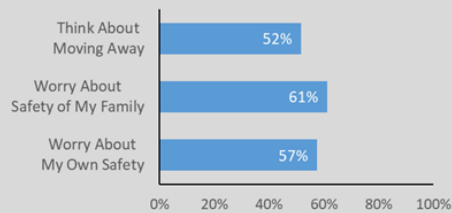
- ☐ 0 Strongly Disagree  
☐ 1 Disagree  
☐ 2 Neither Agree/Disagree  
☐ 3 Agree  
☐ 4 Strongly Agree

## Data

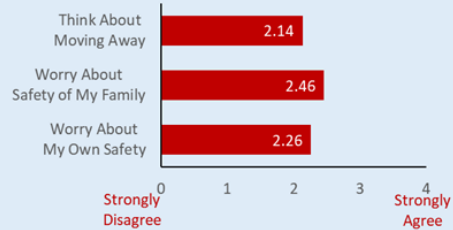
	AC	AD	AE	AF	AG
	Worry Own				
	Biggest Threat	Safety	Worry Family	Leave City	Police Do
1					
2	6	2	3	3	I think they are doing a good job in all honesty. It is
3	1	2	1	1	They could repair the roads. I think that having saf
4	7	3	3	3	They took basic road safety classes out of schools &
5	4	3	1	3	There are already many police cars around, the pr
6	1	3	3	2	Actually enforcing the laws that are already in plac
7	4	3	3	3	The increased use of public transportation and ride
8	4	1	2	0	They could start handing out more fines and possib
9	6	1	4	3	I guess just be more alert for distracted drivers. I'n
10	7	3	4	4	Enforce the law more stringently; I live on a corner

## Analysis

The Way People Drive Makes Me...  
(% answering "agree" or "strongly agree")



The Way People Drive Makes Me...  
(average score on 0 to 4 point scale)





## 5. Semantic Differential Rating Scale (close-ended)

A second type of rating scale, the Semantic Differential scale, is used to assess a person's attitudes or feelings towards a given object, event, or construct. The primary feature distinguishing this item from Likert scales is that the latter forces the surveyor to make a clear statement in one direction or the other then people respond to it. The following examples illustrate the difference:

- Likert

Do you agree or disagree with the following statement: **The police are doing a good job controlling crime in the city.**

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Semantic Differential

**How are the police doing at controlling crime in the city?**

Very Poor Job				Very Good Job
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Analyzing the data from questions using a semantic differential scale is similar to the approach used with Likert items. You can collapse responses at one end of the spectrum or calculate the average score (see demonstration below).

## Question

## 2. How safe is it to DRIVE on public streets in Sara City?

[Circle a number on the scale below from 0 'very unsafe' to 10 'very safe']

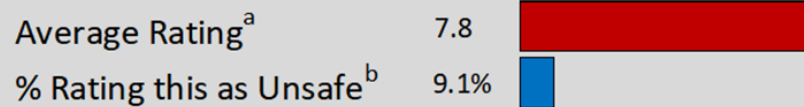


## Data

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4	158	1	4	The roads around here aren't always the best,	0	0
5	103	1	5	There are too many people that sleep at the w	0	0
6	26	0	9	The main thing that makes driving in my comm	0	0
7	189	0	5	I live in a city so people are always in a rush in	0	0
8	140	1	6	The presence of aggressive drivers, jaywalkers,	0	0
9	93	1	10		0	0
10	48	1	9	I live in a relatively small town and do not enco	0	0
11	111	1	5	The main thing that makes driving less than saf	0	0
12	66	1	8	I feel a lot of the drivers in town aren't very go	0	0

## Analysis

## How Safe Is It to Drive on Public Streets?

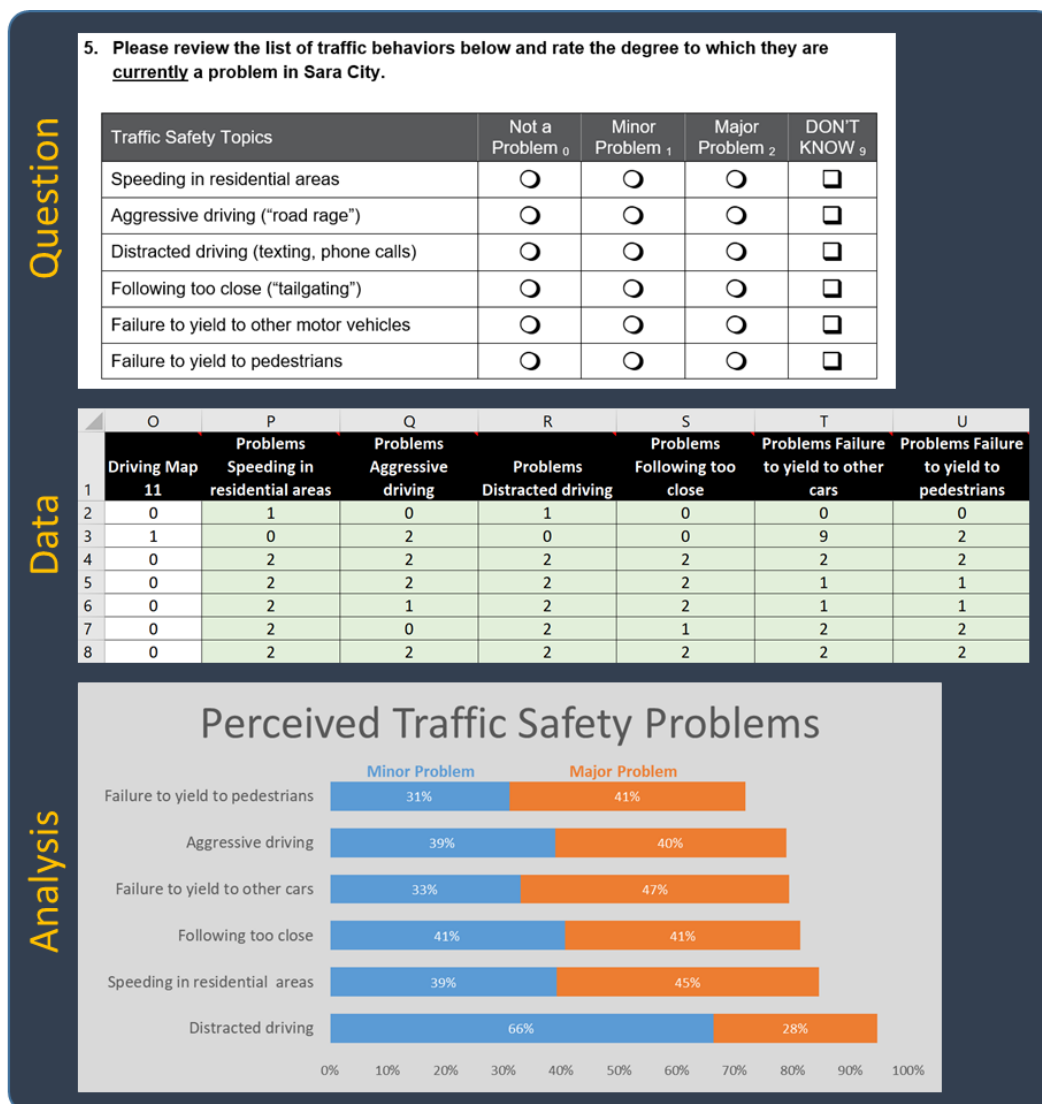


<sup>a</sup>Rated from (0) "Very Unsafe" to (10) "Very Safe".

<sup>b</sup>Percent answering 4 or less.

## 6. Matrix Rating Scale (close-ended)

An efficient way to incorporate ratings scales in a survey, including Likert and Semantic Differentials, is to present them in a matrix rather than have individual questions. A matrix saves space and facilitates a quicker response by listing the response anchors just one time. The data produced by a matrix also allows for nice comparisons across different items. The one caveat to matrices is that their width can be a problem in online surveys, especially if people try to complete the survey on a mobile device.



## 7. Open-ended questions

Open-ended questions can vary in length from asking for a single number (e.g., “How old are you? \_\_”), a brief response (e.g., “What type of crime worries you the most?”), to an unlimited text field (e.g., “What could the police department do to improve safety in your neighborhood?”). What distinguishes these questions from the closed-ended items above is that you, as the survey designer, do not predetermine the answer choices presented to the respondents. Instead, you provide space for the person to respond. This does not mean you have no control over the answers. On a paper form, you can manipulate the size of the lines you give and the height of the boxes you provide to guide the respondents on how much text to provide. Even more control is possible in online surveys: you can specify the type of data that a field will accept (e.g., date, number, text) as well as the minimum and maximum number of text characters required. Still, you have less control than you do with a closed-ended question. People can write or type whatever they want, including on occasion things that have nothing whatsoever to do with the question you asked.

Probably the biggest challenges with open-ended data is the analysis process. For the sample below, we asked 209 people the following question: *“What could the Police Department do to improve traffic safety in our community?”* Nineteen people skipped the question rather than type a response into the box provided. The responses for the remaining 190 participants ranged from 101 characters to 1,016, with a combined total of 47,863 characters. This is a lot of text and there is no easy way to automate the analysis process beyond doing something like a word cloud (see below):



The analysis of open-ended questions generating whole sentences and paragraphs usually involves several steps. First, you read many if not all of the responses to identify 6 to 10 common themes. You should clearly articulate each theme to differentiate it as much as possible from the others. You would then read the first response and “check off” all of the themes that apply. You repeat this until you have coded all of the responses. At this point, you can calculate a frequency for each theme and extract sample responses to share with others. A further improvement to this process involves a second coder that uses your thematic system to independently code a random sample or all of the responses. Ideally, the second rater will “check” the same boxes you did, or at least most of them. If not, then your approach to defining the themes may need revision. Provided below is an illustration of this process.

# Question

8. What could the Police Department do to improve traffic safety in our community?

[Type a brief response in the box below]

# Data

	A	B	C	D	E	F	G	H
	What could the Police Department Do to Improve Traffic Safety	LEN	Enforce Traffic Laws, Crackdown, Give Citations	Increase Officers Patrolling Streets	Provide Information to Public, PSAs, Driver Training	Improve/Do Maintenance on Roads, Bike Lanes, Sidewalks	Reduce Speed Limits	Speed Cameras, Red Light Cameras
1	About the only thing the police department or sheriff's office can do to improve traffic safety is to have more officers on traffic duty and aggressively enforce the laws.	173	1	1				
2	They need to educate people about laws. Some people may have come from other countries and are able to drive with their drivers licenses in the states. So they never took classes on how to drive in the US.	206			1			
3	Ticket more people for following too closely. I have yet to see a person get a ticket for following too closely, UNLESS they are in a traffic accident.	151	1					
4	They should clean up the streets and make sure there are more potholes. They should also make sure the lines are clear and easy to see as well as lots of visible speed limit and traffic signs.	192				1		
5	Signage could be improved. Pedestrian education programs could be instituted. Bike education programs could be instituted for drivers and riders. Improvement and creation of bike paths.	190				1		
6								

# Analysis

#2 - Aggressively enforce traffic laws, issue more citations, crackdown on violators.

- *“They could have more police officers on the road ready to aggressively ticket drivers who think they do not have to follow certain laws because they think the minor laws are not a big deal.”*
- *“I think that they can crack down on distracted driving by hiding on a major street and while checking for speeders also look for people who may be texting and driving or doing any other distracting activity.”*

## 8. Additional Resources

- Bruce, C. W., & Stallo, M. A. (2009). [\*Better policing with Microsoft Office 2007\*](#). BookSurge Publishing, USA.
- Clarke, R. V., & Eck, J. E. (2005). [\*Crime analysis for problem solvers in 60 steps\*](#). Community Oriented Policing Services. U.S. Dept. of Justice.